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THE TYPOLOGIES OF LEARNING CONTENT AS A SUBSIDY TO THE TEACHING OF BIOCLIMATISM IN THE UNDERGRADUATE COURSE IN ARCHITECTURE AND URBANISM

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ABSTRACT

This article addresses the impact of the typologies of learning content proposed by Zabala (2007) on teaching planning. The study aims to analyze the impact of this theory on the learning of students in the second semester of the Architecture and Urbanism course at the University of Brasilia. The theoretical foundation is based on the didactic-pedagogical principles of education, especially teaching in Zabala (2007), Dantas (2007), Libâneo (2017), Pimenta, Anastasiou and Cavallet (2002), Masetto (2012) and, in learning, in Pozo (2009), among others. The methodology is qualitative, characterized as a case study. The experiment took place during the course of the course of the discipline "Environmental Studies: Bioclimatism", organized considering the contents of a conceptual, procedural and attitudinal nature in the proposition of objectives, in the systematization of activities and in the evaluation of students. The research instrument consisted of documentary analysis (Discipline Plans and Pedagogical Project of the Course) and a questionnaire applied to the students. In the final stage of the course, the students answered the questionnaire, in order to evaluate the perception of the adequacy of each activity in function of the intended objective. The results and conclusions pointed out that the activities were evaluated as "very effective" or "effective" indicating that the teaching planning based on the typologies of learning content had a positive impact on the teaching-learning process, and this planning approach can be used, without prejudice, in other disciplines in the context of Architecture and Urbanism, considering that every teacher must know and appropriate the didactic-pedagogical foundations to develop the teaching work successfully.

Keywords: Typologies of learning content, Teaching planning, Teaching-learning evaluation.

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INTRODUCTION

According to several education scholars - among them Gil (2017), Masetto (2012), Dantas (2007), Zabalza (2004) and Pimenta *et al.* (2002), it is not enough to have a restricted knowledge in a scientific area to face the challenges of university teaching, it is also necessary to develop pedagogical knowledge for the understanding of the contents by students. In this set of knowledge, planning stands out as the didactic-pedagogical component that guides teaching practice and facilitates the realization of activities aimed at meaningful learning (LIMA; SILVA, 2019).

In teaching Architecture and Urbanism, planning plays a crucial role due to the need to promote in students the ability to synthesize between the various contents, aiming at the use of knowledge in their design practice (SOUSA, 2023).

This article aims to analyze the impact of the typology of learning content (ZABALA, 2007) on the learning of students of the 2nd semester of the Architecture and Urbanism course at the University of Brasilia, in the discipline called "Environmental Studies: Bioclimatism". It is intended, in this way, to support a teaching practice anchored in didactic-pedagogical knowledge that helps its development in a reflective way.

THE TYPOLOGIES OF LEARNING CONTENT AS SUPPORT FOR THE PLANNING OF THE TEACHING OF ARCHITECTURE AND URBANISM

In view of the challenge that teacher planning represents, the proposal for the organization of typologies of learning content[3] (ZABALA, 2007) presents itself as a possibility to assist in the systematization of the various themes to be dealt with in the context of specific disciplines, aligned with a certain objective, resulting in sequenced activities that favor the use of knowledge by the student.

Zabala (2007) proposes an organization of teacher planning that seeks the intentional and articulated integration between theoretical concepts (conceptual contents), the development of practical skills (procedural contents) and critical and reflective attitudes in relation to knowledge and reality (attitudinal contents). According to the author, this perspective helps educators to plan and select the most appropriate content and activities to achieve educational objectives. Therefore, this logic encompasses the entire teaching process, from the definition of objectives to the implementation of classroom activities.

3 Zabala (2007) proposes to understand the term "content" as "everything that one has to learn to achieve certain objectives that not only encompass cognitive capacities, but also include other capacities".

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Conceptual content is understood as the knowledge of facts, concepts and principles. Zabala (2007) states that this type of content becomes part of the student's knowledge when he is able not only to repeat its definition, but to use them in an interpretative way, being able to situate facts or concrete situations, always considering the possibility of expanding the knowledge related to it.

For Zabala (2007), procedural content includes rules, techniques, methods, skills, strategies and procedures, configuring itself as a set of ordered actions directed towards the achievement of an objective. In the teaching of Architecture and Urbanism, specifically, knowledge of the procedural type is very present and fundamental for the achievement of several objectives related to the profession, including the mastery of representation techniques, project analysis, research techniques, etc. (SOUSA, 2023).

Attitudinal contents, on the other hand, encompass those that can be grouped into values, attitudes and norms. Zabala (2007) refers to "values" as the ethical principles or ideas that allow people to make a judgment about their behaviors, such as solidarity, respect for others, responsibility, freedom, etc. In the teaching of Architecture and Urbanism, attitudinal content includes a series of elements necessary for good professional and citizen practice, such as the development of awareness of the social and environmental impacts of architecture, understanding of the ethical issues involved in the project, and commitment to sustainability (SOUSA, 2023).

It is also in the realm of attitudes that the student's capacity for "synthesis" is found, understood as the action of uniting knowledge of all kinds for a new application. The practice of architectural design carried out with new elements that form this transformed knowledge necessarily involves the work of attitudinal content (SOUSA, 2023).

Zabala (2007) argues that didactic sequences should privilege activities that can cover conceptual, procedural and attitudinal contents, as this would imply a more active participation of students. This can be promoted, for example, using techniques such as dialogue, debate, group work, bibliographic research, fieldwork, etc. At the same time, students may be called upon to personal and social challenges that need to be addressed, requiring them to learn, for example, by being tolerant, cooperative, respectful, and rigorous.

Although many of these techniques are used daily in the classrooms of Architecture and Urbanism courses, Zabala (2007) alerts us to the need for the teacher's intentionality in the development of activities that consider the articulation between the three types of learning,

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as well as the need to evaluate them in the student's path, so that they can be considered as such, in fact, as explicit learning contents.

THE DISCIPLINE OF "ENVIRONMENTAL STUDIES: BIOCLIMATISM" IN THE ARCHITECTURE AND URBANISM COURSE OF THE UNIVERSITY OF BRASÍLIA (UNB)

The discipline "Environmental Studies: Bioclimatism" is part of the mandatory curriculum of the Architecture and Urbanism course at UnB, and currently has the following syllabus: "Human bioclimatology and environmental perception of the hygrothermic, luminous, sound and air quality environment, methods and techniques for collecting and processing climate data for the project" (UnB, 2005).

This course includes the principles of design that consider the adequacy to the climate and culture of the place as a parameter for the architectural and urban design, demonstrating that the result of the application of these principles must contemplate historical, cultural, environmental and technological knowledge.

METHODOLOGY

The research, of a qualitative nature, has in its methodology a Case Study of the aforementioned discipline, whose teacher responsible for teaching it is one of the authors of this article. A Case Study is considered a scientific research strategy that analyzes a given phenomenon in its real context and the variables that influence it. It is an intensive and systematic study of an institution, community or individual that allows the examination of complex phenomena (Yin, 2010).

Based on the course syllabus, the Pedagogical Project of the Course and the Discipline Plans developed over time by different professors, a new Course Plan was prepared - for the summer semester of the year 2023 - whose general objective was to understand the built and environmental environment, favoring the development of bioclimatic design techniques in architecture and urbanism. In defining the specific objectives, the teacher intended to balance the different typologies of learning content, as presented in the Frame 1.

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Frame 1: List of the typologies of learning content present in the definition of the objectives of the course

Specific Objectives		Objective Learning Content Typology
1	To know the principles, strategies and dynamics of sustainability, sustainable development and the specificities of the urban.	Conceptual
2	Know general characteristics of the climate and its relations with the relief and vegetation of the site.	Conceptual
3	To know the bioclimatic principles, reflecting on their scope and scope and identifying the environmental conditions, positive and negative, conducive to the human activities of a space.	Conceptual and Attitudinal
4	Diagnose the suitability of the building to the place where it is inserted.	Procedural and Attitudinal
5	Recognize the place and its respective climate as conditioning elements of the urban and architectural project.	Attitudinal

Source: prepared by the authors.

Once the objectives were defined, the didactic sequences that met them were organized, considering the three units that make up the discipline as well as the typologies of learning content in each of them.

In the first unit of the course, dedicated to sustainability, lectures were held dealing with the main concepts, legal frameworks (regulatory frameworks and documents from Eco92 to COP26) and notions of sustainability in urbanism. Parallel to the lectures, the students read two texts: the chapter "Ecology and Urbanization: a new vision of technologies", from the book "Sustainability in small urbanizations", authored by Mascaró (2010) and the article "For a Brazilian Bioclimatic Architecture", authored by Ferreira (2015). The two texts were debated in the classroom – in the conversation circle format – and the students were encouraged to relate the issues raised to the local reality of the Federal District. The students also watched two videos in the classroom, one related to sustainability and the other related to the quality of public spaces. At the end of the unit, they produced a synthesis text of the knowledge learned so far.

The second unit of the course addressed the climatic factors that affect the planet and regions. This action gave students the opportunity to delve into the elements of climate such as temperature, humidity, precipitation and air movement. Urban Climatology was explored, including the control of the urban microclimate and heat island formation. Also, according to ABNT NBR 15.220-3 (BRAZILIAN ASSOCIATION OF TECHNICAL STANDARDS, 2005), the Bioclimatic Zoning[4] of Brazil was presented. In addition to the lectures, this unit included as

[4] The division of the Brazilian territory into eight zones was the result of the analysis of climatic data collected between 1931 and 1990. The zoning was established in NBR 15.220 - Part 3, which presents cities whose climates were classified according to parameters and comfort conditions related to the size and protection of openings (such as windows), external seals (walls and roofs) and passive thermal conditioning strategies (MME, 2024).

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didactic activities the reading of chapters of the book "Bioclimatic Principles for Urban Design" (ROMERO, 2013) and the research of reference projects in the content climate adequacy for the development of a case study, in which students were challenged to carry out, in a group, a critical analysis of the solutions used in comparison to the indications present in NBR 15.220-3.

The third unit dealt with bioclimatic architecture itself, in which examples of vernacular and contemporary projects were explored, and students were able to delve into the bioclimatic zoning of Brazil and the use of the Bioclimatic Charter[5] as a guiding tool for the project. In this unit, the main activity was the development of an architectural project, in a group, focusing on the climatic adequacy of architecture and urban implantation, for cities located in different Bioclimatic Zones and different landscapes. In addition, the students were taken to two on-site visits: the Darcy Ribeiro Memorial, a project by the architect João Filgueiras Lima, located on the campus of the University of Brasilia, and the Nursery of the Federal Senate.

Or Frame 2 relates the activities scheduled during the course of the course with their respective typologies of learning content and their specific objectives. It is possible to see that each of the specific objectives is achieved through different types of activities, which, in turn, can contribute to more than one specific objective.

Frame 2: Relationship of the programmed activities with the typologies of learning content

Scheduled Activities	Typology of Learning Content	Specific Objectives					
		1	2	3	4	5	6
Lectures	conceptual	X	X	X	X	X	
Reading texts	conceptual	X	X	X	X	X	
Debate of texts	attitudinal	X					X
Video playback	conceptual	X					
Text production	procedural/attitudinal	X					X
Case Study Research	(procedural)		X	X	X	X	
Visit to the site	conceptual/procedural			X	X	X	
Development of the Final Project	conceptual / procedural / attitudinal		X	X	X	X	X

Source: prepared by the authors.

It is observed that, with the exception of the activities related to "debate of texts", "reproduction of videos" and "production of texts", the other activities include almost all types of learning content, which values and intensifies the teaching and learning process, providing

[5] A tool used in architecture and urbanism that relates the climatic characteristics of a region with environmental comfort strategies.

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significant learning opportunities for students, as highlighted by David Auzubel (Moreira, 2017) and Yves Chevallard (2005) in relation to the didactic transposition of knowledge.

For Ausubel, according to Moreira (2017), meaningful learning occurs when new information is integrated in a substantive and relevant way to the individual's previous knowledge. This means that the new content is related in a coherent way with what the student already knows, making learning deeper and more lasting what is possible in the way the teacher plans the development of the discipline.

With regard to didactic transposition, this is also possible because it is a process in which scientific knowledge is adapted and transformed to become able to be taught. It is, therefore, the passage from scientific knowledge to school/academic knowledge. This theory addresses how the original scientific models are transposed to didactic models, considering how the knowledge produced in academic spheres is modified, simplified and consolidated to be taught. This movement occurs, including in the academic sphere, as we can see in tables 1 and 2.

The discipline was taught between January 8 and February 8, 2024, in two weekly meetings, totaling 30 class hours. On the last day of class, students received the link to answer the online form for the evaluation of the course, anonymous, in order to verify whether the planning proposed for the course was effective for the apprehension of the content taught. The questions that were included in the form, already with the students' answers, are presented in the following item.

RESULTS AND DISCUSSIONS

Out of a total of 20 students enrolled in the course, 17 answered the questionnaire applied at the end of the course, which corresponded to 85% of the class.

Considering the specific objective 1 of the discipline "To know the principles, strategies and dynamics of sustainability, sustainable development and the specificities of the urban", it was asked what is the degree of effectiveness of the activities proposed to meet this objective in the students' opinion (0 for not at all effective; 1 for little effective; 2 for effective and 3 for very effective). Graph 1 summarizes the answers collected in this question.

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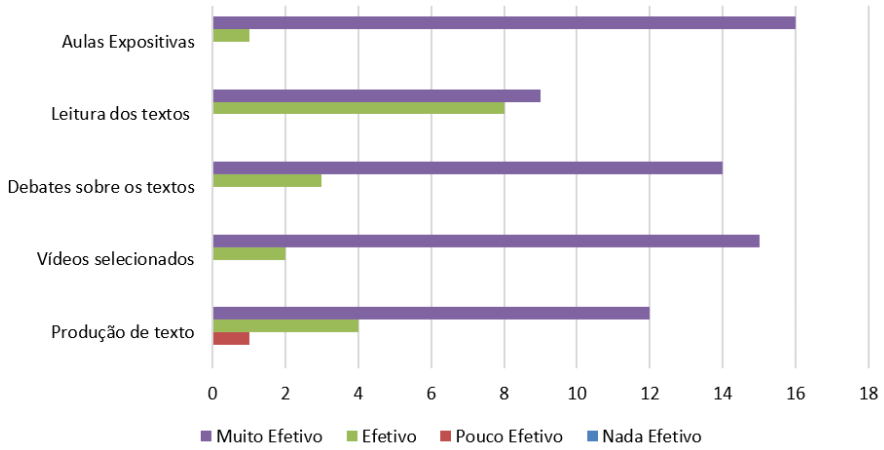
Graph 1: Students' perception of the effectiveness of the activities proposed for specific objective 1



Source: Prepared by the authors.

Of the 17 respondents, 16 opined that the activities proposed to meet this objective were very effective or effective. Only 1 response listed text production as ineffective. It is worth noting that the students' answers are in accordance with the activities proposed by the teacher for objective 1 were: Expository classes, Reading of texts, Debate on texts, Reproduction of videos and Text production. Such activities gave rise to the following typologies of learning contents: conceptual, attitudinal and procedural, which demonstrates a didactic-pedagogical care regarding the teaching and learning processes. It is inferred that the different answer (not very effective) may be due to the student's lack of interest in this didactic activity.

Considering the specific objective 2 of the discipline "Knowing general characteristics of the Climate and its relations with the relief and vegetation of the site", it was asked what is the degree of effectiveness of the activities proposed to meet this objective. According to chart 1, for this purpose, the teacher proposed in her planning to make use of the following activities: lectures, reading of texts, research and case studies and development of the final project. With this, it was expected to contemplate the three types of content: conceptual, procedural and attitudinal, especially in the development activity of the final project. Graph 2 summarizes the answers collected in this question.

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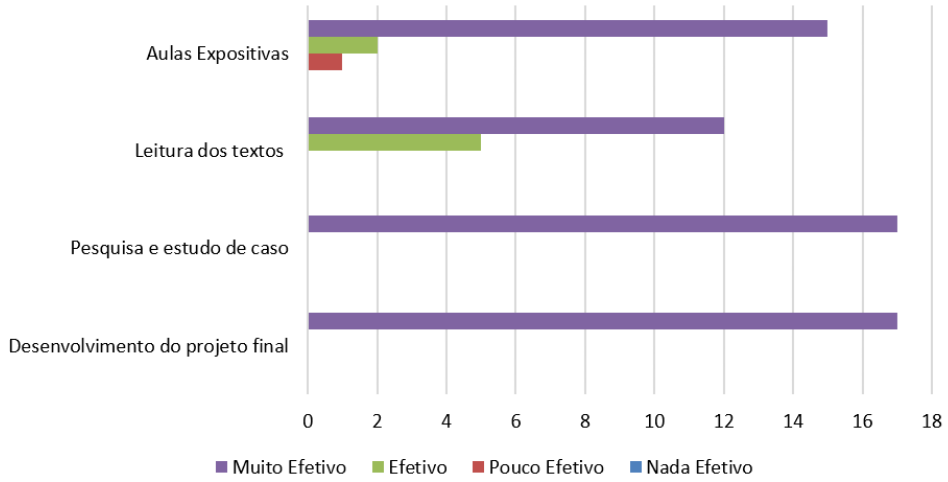
Graph 2: Students' perception of the effectiveness of the activities proposed for specific objective 2



Source: Prepared by the authors.

In this case, all respondents opined that the research and case study activities and the development of the final project were the most effective activities to achieve the objective, and only one respondent believed that the lectures were ineffective. We believe that the low importance given to the expository class activity was due to the proposed objective, since "knowing general characteristics of the climate [...]" can be considered as a practical action that does not require any theoretical knowledge. This hypothesis is strengthened by observing what they answered about the activity "reading texts", reinforcing the little interest in reading, an activity necessary for the execution of an "expository class". There is, therefore, a strangeness regarding the reading of texts.

Considering the specific objective 3 of the discipline of "Knowing the bioclimatic principles, reflecting on their scope and scope and identifying the environmental conditions, positive and negative, conducive to human activities in a space", it was asked what is the degree of effectiveness of the proposed activities to meet this objective. Graph 3 summarizes the answers collected in this question.

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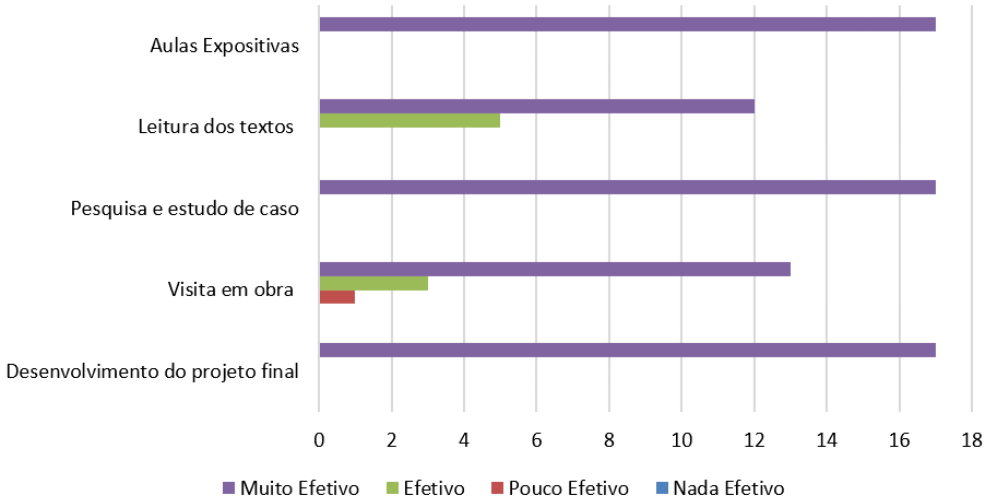
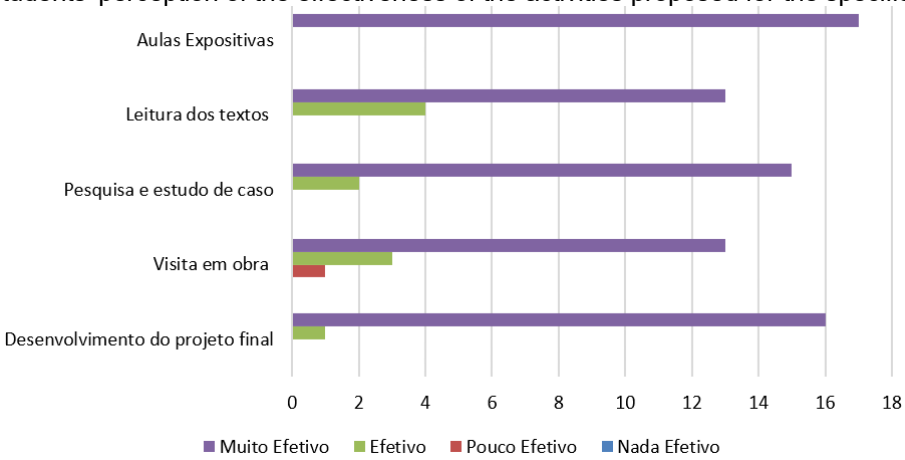
Graph 3: Students' perception of the effectiveness of the activities proposed for specific objective 3



Source: Prepared by the authors.

All respondents pointed out that lectures, research and case study activities and the development of the final project were the most effective activities to achieve the objective, and only one respondent considered that visits to the work were ineffective. We also observed the students' answers about the specific objective 4 of the discipline of "Diagnose the adequacy of the built to the place where it is inserted". What was wanted to know was about the degree of effectiveness of the activities proposed to meet this objective. Graph 4 is similar to Graph 3 above.

Graph 4: Students' perception of the effectiveness of the activities proposed for the specific objective 4



Source: Prepared by the authors.

It is noted that the respondents consider, in general, that the activities proposed by the teacher meet objective 4. However, it is observed that one student reported that the visit to construction sites was not relevant to achieve the established objectives. This individual

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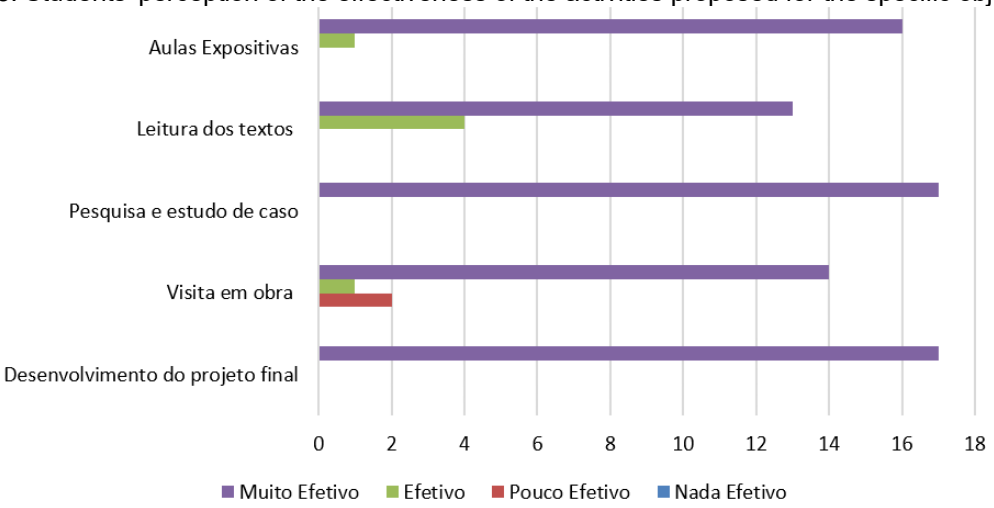
disagreement raises the question: why was this activity not valued by this specific student? This case suggests that while most students enjoy hands-on learning and literacy practice, there may be individual exceptions who do not share the same perspective. This leads to reflection on how it is possible that a student, when attending an academic course, does not see the importance of reading and practical experience, which are often considered essential in the professional context.

Considering the specific objective 5 of the discipline of "Recognizing the place and its respective climate as conditioning elements of the urban and architectural project", it was asked what is the degree of effectiveness of the activities proposed to meet this objective. Graph 5 summarizes the answers collected in this question.

Graph 5: Students' perception of the effectiveness of the activities proposed for the specific objective 5



Source: Prepared by the authors.

All respondents understood that the research and case study activities and the development of the final project were the most effective activities to achieve the objective, and the lectures and reading of texts were also evaluated by all students as very effective or effective activities. Two students judged that, for this purpose, the visits to the site were ineffective.

Finally, the students were asked to indicate the degree of understanding they considered they had acquired at the end of the course in relation to the development of bioclimatic design techniques in architecture and urbanism. Of the total of 17 respondents, 16 declared that they had acquired a lot of understanding and 1 student declared that they had acquired good understanding.

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It is important to consider that the perception of the students' use of the course was validated by the teacher. The students were evaluated through the three typologies of learning content: the mastery of the concepts, the good execution of procedural tasks and how the attitude of each one of them was impacted in this period (both from the point of view of integrating knowledge into their design practice, as well as in changing posture, engagement and contribution to the discipline). It was possible to observe that the students demonstrated remarkable progress in all the items evaluated.

Thus, by intentionally relating the three typologies of learning content proposed by Zabala (2007) in the planning of the course, in its development and in the evaluation of the students, it was possible to perceive that the activities developed were successful in meeting their respective learning objectives.

FINAL CONSIDERATIONS

The systematization of data of this nature together with the survey of the perception of learning with students can provide important information for the constant improvement of the discipline. In this case, special attention should be given to the way visits to construction sites are conducted, so that students have a greater perception of the value of the activity as a means of learning.

In view of the data presented, it is concluded that the organization of the typologies of learning content, proposed by Zabala (2007) can be, in fact, relevant guidelines for the planning, execution of teaching and evaluation of students, in order to contribute to the integral development of students, covering not only theoretical knowledge, but also practical skills and attitudes necessary for their future professional performance in Architecture and Urbanism.

Finally, it is considered that this planning approach can be used, without prejudice, in other disciplines in the context of Architecture and Urbanism.

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