Teaching in transport: The use of active methods in the discipline of urban transport

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ABSTRACT

This research aims to present the pedagogical methodology applied in the discipline of Urban Transport based on the methods of active learning in the teaching of transport of the Faculty of Civil Engineering. The method applies student response mechanisms regarding adherence to the proposed activities and content using team-based and project-based learning, problem-solving, gamification and case study. The results highlight that 60% met the deadline for the delivery of the activities, the students obtained grades close to the maximum limit, whose focus was the relationship with the team, and in the group activities the overall score was higher than the individual one. It is concluded, therefore, that the use of active methodologies in the teaching of transportation in this discipline contributed to an active, participatory, collaborative and interactive pedagogical approach centered on the student, however, the challenge is to stimulate their engagement in group activities, attend to the learning and evaluation processes of the discipline, as well as the student's approval in this curricular component.

Keywords: Active Methodology, Learning Assessment, Higher Education, Urban Transport.

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INTRODUCTION

Continuing education tends to value work by linking knowledge to a given daily reality and to the learning process through educational and integrative actions of an inter- and multi-professional nature (Almeida et al., 2016; Lima et al., 2022). Best practices combine technique or methodology and experience or research, aiming to obtain good results and reliability according to the needs of users (Vendruscolo et al., 2021). Applying best practice requires recognizing and tailoring resources that meet specific situations and contexts.

Continuing Education and Continuing Education are characterized by the continuity of educational actions, develop skills and competencies aiming at professional transformation when worked together, which can strengthen the work process although they present different methodological guidelines (Peixoto et al., 2013; Lima et al., 2022).

The evaluation of teaching is an integral part of the teaching-learning process of the two undergraduate courses and has a formative character and should be conceived as diagnostic, continuous, inclusive and procedural, and prioritizes qualitative and quantitative aspects, considering the verification of competencies, skills and attitudes without losing sight of the labor market in the organic articulation with the trends of the profession in contemporary society. The curricular structure was organized in such a way as to offer learning situations throughout the course that ensure a technical, humanistic and political training of the undergraduate.

Article 70 of the Undergraduate Education Regulation determines that the evaluation of didactic-pedagogical activities must occur at the end of each academic period, and a teaching evaluation questionnaire is made available in the Academic System, which has information and instruments to evaluate the curricular activities and the performance of the professors who taught them, the objectives, the contents, the workload and the material conditions of the pedagogical work. Each professor stipulates his/her evaluation process according to the discipline he/she teaches and can consider continuous evaluations with different strategies in written and oral form, individual and group work, seminars, among others contemplated in the Regulation of Undergraduate Courses at UFPA.

The curricular organization foresees in the Pedagogical Project of the Course (PPC) the articulation of theory with practice, observing the balance between them, allowing, in practice and in the exercise of activities, the learning of the art of learning; seeks an early approach to issues inherent to professional activities in an integrated manner, without losing the knowledge essential to the exercise of the profession; It commits the student to scientific development and the pursuit of technological advancement. In this way, the student gradually acquires knowledge in a greater breadth and depth, with a greater concentration of technical and specific disciplines as the student advances in the course.

This article presents the methodological strategy in undergraduate education at a Federal University, promotes discussions about the results of the application of active methods in the discipline TE08088 Urban Transport offered by the Faculty of Civil Engineering (FEC). The objective is to evaluate the adherence to the proposed activities in relation to the content provided for in the menu. The discipline has a total workload of 60 hours, 45 hours theoretical and 15 hours practical, whose extract is the evening class.

LITERATURE REVIEW

Active learning methodologies stand out as a way of stimulating students' autonomy and independence, modifying the relationship between them and the teacher through instructional techniques and activities of engagement and protagonism of the student in the construction of their own knowledge and professional training. Of the types conceptualized, the following stand out in this study:

a) Team-Based Learning (*TBL*) – brings together a set of sequenced teaching-learning practices that make the student responsible for the acquisition of their own knowledge, leads them to decision-making through collaborative and effective teamwork. The evaluation includes individual and team tests in the exercises of application of concepts and peer evaluation of the contribution of each of the members to the achievement of teamwork (Correa; Silva, 2022);

b) Project-Based Learning (PBL) – is a method of investigation focused on real-world problems, integrates different knowledge, and encourages reasoning through teamwork, protagonism, and critical thinking (Gouvêa; Days; Cabrelli, 2022);

c) Problematization – students perform actions that lead them to cognitive, procedural, and attitudinal learning through reflected and transformative theory and practice. The stages are divided into observation of reality, identification of key points, theorization in research sources, hypotheses of solution and application to reality (Rigonato; Cruz, 2022);

d) Gamification – a technique that brings together strategies, dynamics and game tools in a new non-game context to motivate learning and stimulate problem solving by dividing tasks into phases where the student must complete a challenge to move on to the next;

e) Case studies – uses real experiences of investigating a phenomenon in its real context, data collection, detailed analysis and discussion of solutions.

The use of active methods establishes a process of continuing education centered on the student. Thus, there is a distinction between Continuing Education and Continuing Education in terms of methodological principles and, similarity, in educational processes characterized by the

continuity of actions that, when combined, allow the transformation of the individual as a professional, of his skills and competencies (Lima et al., 2022). The authors highlight other characteristics of continuing education, such as: the individual seeks knowledge according to his or her personal needs; define your area of knowledge; searches for solutions to a particular problem; individualization of learning, among others. In continuing education, knowledge and learning are directed to the practical needs of an organization, training is continuous, institutionalized and linked to the good practices developed by the institution.

Barbosa et al. (2021) highlight that in this process it is important to distinguish what is known by the individual and the knowledge acquired as a group that works together. In this case, knowledge management is supported by *i)* people, their skills and competencies and *ii)* processes that involve research and investment. In addition to the active methods, there are actions aimed at socialization and group work, motivated and committed teams, validating successful experiences and learning in adverse situations, stimulating the behavioral side, corroborating with the notes of the cited literature and the foreseen in the Pedagogical Project of the Courses in question.

In force, Law No. 8,655 of July 30, 2008 establishes the Master Plan of the municipality of Belém containing guidelines for the transport system aimed at collective public modes of passengers, provides for broad and democratic access through the planning and management of the Urban Mobility System in its section II, art.41 to art.49. The city has an urban public transport system by bus, the *Bus Rapid Transit* (BRT) divided into two stages: BRT Belém (completed) and BRT Metropolitano (under construction). All themes are present in the syllabus of the disciplines and it was up to the groups to choose according to their research interest. The association of active methodologies with teaching in transportation is supported by the legal determinations provided for in the PPC of Engineering and has the possibility of corroborating with the development of studies and research applied and feasible to the reality of the city of Belém.

METHODS AND APPLICATION

The applied method brings together evaluative actions between the proposed activities and the content taught, aiming to obtain results that can direct behavioral changes in the student through empirical and practical provocations. The sample study corresponds to the evaluation process of students regularly enrolled in the discipline TE08088 Urban Transport (night shift) of the Faculty of Civil Engineering.

The teaching strategy brought together lectures, meetings in groups and with each of them, presentation of videos, discussions and consultations with the materials available in SIGAA and in scientific platforms. It was up to the groups to define a topic of interest between Collective Transport (planning and operation, BRT system and buses), infrastructure for urban transport (bus stops and

BRS), bicycles, vehicle rotation, urban tolls, urban cargo transport and logistics. The class schedule was established at:

- TE08088 Urban Transport – 17 face-to-face meetings divided into: eight lectures under the responsibility of the teacher; three face-to-face orientation meetings for the 10 groups; two partial deliverables segmented into delivery 1 (introduction, problem, justification and objectives) and delivery 2 (literature review and methodology); two days of seminar with an average presentation time of 25 minutes; and, two days for delivery of grades and review of concepts.

The evaluation process established the development of a research applied to a given problem chosen by the group/pair to be carried out throughout the course, consisting of *i)* written work delivered in two parts (Deliveries 1 and 2) at the beginning of each month (April and May/2023) via institutional virtual platform (SIGAA) and *ii)* Final seminar with the delivery of the complete written work containing the results and discussions. The strategy for the formation of the groups was random and random using the existing tool in SIGAA, aiming to minimize the formation of groups by affinities.

As for the evaluation criteria defined in the lesson plan: compliance with the deadlines for partial deliveries and the final one in an editable file via the institutional platform (written work); seminar; the monitoring of the practical activities in the supervised form and the determination of the grades (0 to 2.5 points) according to the four criteria thus defined as problematic of a real situation in the metropolitan region of Belém, written work, seminar and compliance with deadlines. This was the way to establish the final grade and concept in the subjects.

The feedback and verification of learning took place in the individual and group assessments, as described below. The method of data collection and analysis followed the planned planning for the teaching and learning process, applying the following types of active methodologies, namely:

a) TBL, Problematization and Case Studies were applied from the first day of class, following the stages of previous preparation of the student, making materials available on the SIGAA platform for consultation and construction of the conceptual framework of the written work and, application of the concepts, where the team performed several tasks arranged in the forms of deliverables (E1 and E2) ending with the seminar (S) and the final writing (EF). The metric to assess adherence to the stages and engagement considered the completion of Table 1 on a scale of 0 to 2 points per attribute, as well as Table 2, where each group evaluated the others according to the presentations. At the end of each presentation, the other groups should ask a question about what was explained in the seminar and any member could answer. The objective of this evaluation was to capture the different perceptions of the skills required in the proposed activities, as well

as the criticality regarding the content and strategies used by each of them;

Table 1: Evaluation of the individual student in the group.

Group 1	Responsibility and commitment	Relationship with the team	Preparation of the written work	Elaboration of the practical work	Presentation
Student 1					
...					
Student 4					

Table 2: Evaluation between groups.

Criteria	Presentation	Relevance of the topic	Domain of work	Practical application	Answers to questions
Group 1					
...					
Group 10					

b) In the second application of the TBL, the students answered a questionnaire individually and then in groups. The questionnaire had nine questions about the contents seen in the classroom where, at first, the student answered alone and then in a group they had to agree on an answer to open an option of the template. This feedback contained individual and group scores, with 5 points being counted for individual correct answers and, from 5 on a descending scale for each group error;

Table 3: Evaluation of the student's performance in relation to the content taught

Q1:	The	B	C	D	And
...					
Q9:					
Individual Scoring					
Group Scoring					

c) Gamification was applied only in the discipline TE08088 Urban Transport and occurred in two ways: *i)* participation in a board game that simulated experiences in transport as a way to help the student to actively mobilize with a view to building their own learning; *ii) Quiz* between the groups: each group elaborated five questions on its theme and chose the opponent to answer. In this case, the scoring system per question was defined by the group and in case of error, the chance of answer was passed on to the class at decreasing points.

The results of this process also include project-based learning, as the teacher has established a relationship of guidance and direction, and it is up to the students to search for knowledge and skills to achieve their research objectives. The analyses will be discussed according to the characteristics of the active methodologies applied. It should be noted that the class is mixed, composed of students belonging to the eighth and ninth semester (evening TE08088), whose specificities are students

working in the labor market, as permanent employees in companies or interns, some working in the area of transportation, since the city is undergoing works in this sector.

Table 4: Methodological and evaluative strategy adopted for the course.

Method	Steps	Deliveries	Learning assessment	Evaluation criteria
TBL	* Definition of theme, problem. * Consultation of materials. * Random grouping, no affinities.	E1, E2, EF and S	Individual1 Group2	1Responsibility, relationship, written work, practical application, seminar. [2] Seminar, definition of the theme, mastery of the content, practical application, answer to questions, compliance with deadlines.
	* Grouping by affinity * Answers to a questionnaire about the contents taught	Issues Template	Individual and group scoring system	Individual: 5 points per hit. Group: on a descending scale from 5 per error in each question.
Gamification	Board Game	Participation	Individual behavioral analysis	Lower cost in group, performance indicator spreadsheets
	Quiz	Five questions	Group Scoring	Hit by question per group Descending scale scoring for the class

RESULTS

The methodology used in the disciplines focused on the development of skills and competencies of the student, encouraging him to think about solutions to everyday problems, with the teacher being the facilitator of the process. In the process of knowledge construction, it was up to the students to define the research problem pertinent to the reality of the city, to seek viable solutions in theory and to document the process (written work). At the end of each activity, the student performed an evaluation of their performance and learning. The results of the application of this methodological proposition will be reported and discussed below.

Considering that evaluation is a qualitative treatment based on subjectivity, the results presented correspond to the inferences arising from the student's perception of the evaluation process of the disciplines and their own performance in the individual scope and in group formation, as well as through the adherence and fulfillment of the proposed activities related to the content taught.

TBL, PROBLEMATIZATION AND CASE STUDIES

The applications of the TBL, the problematization and the case study occurred from the first school day with the subdivision of the class into groups of rooms to five randomly chosen components, which needed to define the theme of study and after the internal discussions expressed the theme of interest and the place of research defined as: one group in urban cargo transport, public

transport by bus, urban toll, bicycles, simulation of urban terminal, BRT, BRS, bus stop and, two groups in specific lines of the traditional bus system. In all groups, the experience of the reality of one of the members prevailed in this process, being accepted by the other members and, in general, the leadership of the team was exercised by him.

The problematization method permeated all the propositions foreseen in the classroom and exposed the student to participate in the dynamics. The distribution of the contents in the course schedule interspersed three or four contents followed by a given delivery. Classes started on 03/14/2023, the first delivery was scheduled for 04/04/2023, the second on 05/09/2023 and the seminars on 06/20/2023 and 06/27/2023. The deadline for the final delivery of *the word* and *power point* files was extended to Friday of the current week, according to the order in which they were presented.

As for meeting the deadlines, two groups did not make the first delivery and another with a delay of one day. In the second stage, 60% met the stipulated deadline, two were late and one did not make a partial delivery. The remaining 30% justified the delay, delivered the second part, being aware of the evaluative criterion in this regard. Each file was properly read, corrected and returned to the groups containing *feedback* on the content and they could readjust and complement the written work according to the teacher's observations. In the next delivery, it was observed that the file was already updated and with the new placements required in that delivery. According to informal reports from some students, they were waiting for this feedback and few requested an individualized conversation for further clarification.

Table 4: Compliance with the deadline for partial and final deliveries and seminars

Evaluation Criteria	Groups									
	1	2	3	4	5	6	7	8	9	10
Delivery 1 – 04/04/2023	S	S	S	N	N	S	S	1*	S	S
Delivery 2 – 09/05/2023	S	S	S	S	S	NOT	1*	S	21*	14*
Seminar day 01 – 20/06/2023	S	S	N	S	S	ON	ON	ON	ON	ON
Final delivery (day 01) 23/06/2023	1*	S	S	S	S	ON	ON	ON	ON	ON
Seminar on 02 – 27/06/2023	ON	ON	S	ON	ON	S	S	S	S	S
Final delivery (day 02) 30/06/2023	IN	IN	S	IN	IN	S	S	S	S	S

Legend: S (yes), N (no), *Delay in days, NA (not applicable), NE (did not deliver).

As the date of the seminar approached, on the days of orientation of the groups, it was decided to make the last adjustments of content and presentation of the results, as well as changes of teams. Although the change of members was not foreseen, this action occurred naturally due to self-regulation among them, that is, by giving up the discipline at the beginning of the semester or exclusion from the group for not performing the activities. Two of them requested reallocation based

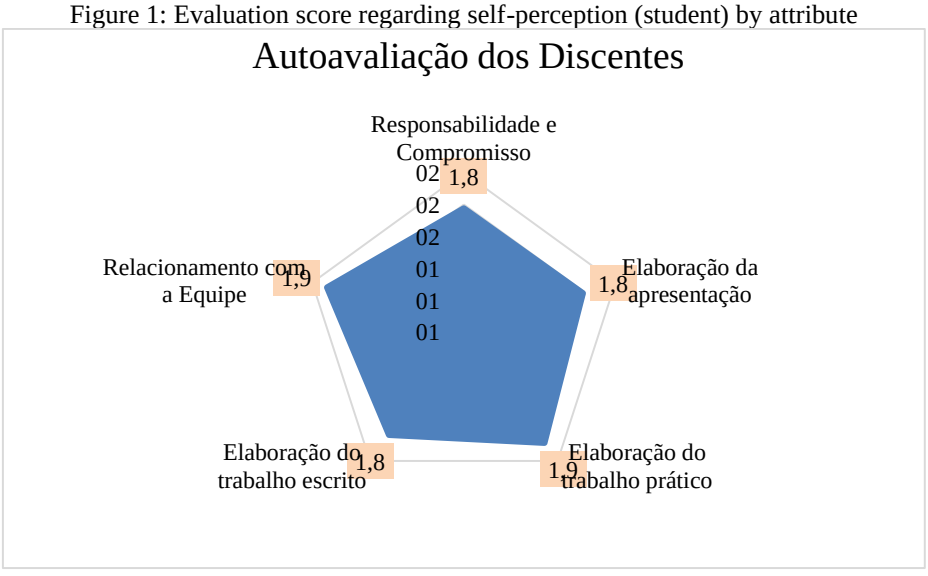
on affinity criteria in order to finish the course in that academic period.

These two students have the highlights: the first student is not a regular in the class, but is enrolled in it, and the other is male belonging to the class. In one of the activities of group 6, the student received the maximum score from her colleagues in three criteria, except for one of them in "preparation of the presentation", contrary to the evaluation of the same, which was given the maximum score in all criteria. The other student belonging to group 7 received the maximum score of three members in all criteria and 1.5 from the other member in "responsibility and commitment, relationship with the team, preparation of written and practical work".

When evaluating the seminar and the posture in the presentation, it was noted a greater engagement of the student to the theme and to the group, a fact that was not observed in the student of group 7, who only presented the conclusion of the work. Another point about this student is the attempt to plead for a formal evaluation via a written test so as not to join another group or perform the evaluation process of the discipline, because the reason for his departure from the original training was the lack of commitment and execution of the work. It was then that he was willing to do a job alone, being accepted by the teacher and then proposed to join another team by affinity to the members, resulting in these scores. It is possible to infer difficulties in assuming responsibility or commitment as a team, although the score indicates different scores given by the new group that welcomed them.

In the results of the evaluation questionnaire, it was found that, on average, the students gave themselves scores close to the maximum limit established of 2.0 points, with emphasis on 1.9 referring to "Relationship with the team" and "Elaboration of practical work" followed by 1.8 in the other criteria (Figure 1).

Figure 1: Evaluation score regarding self-perception (student) by attribute

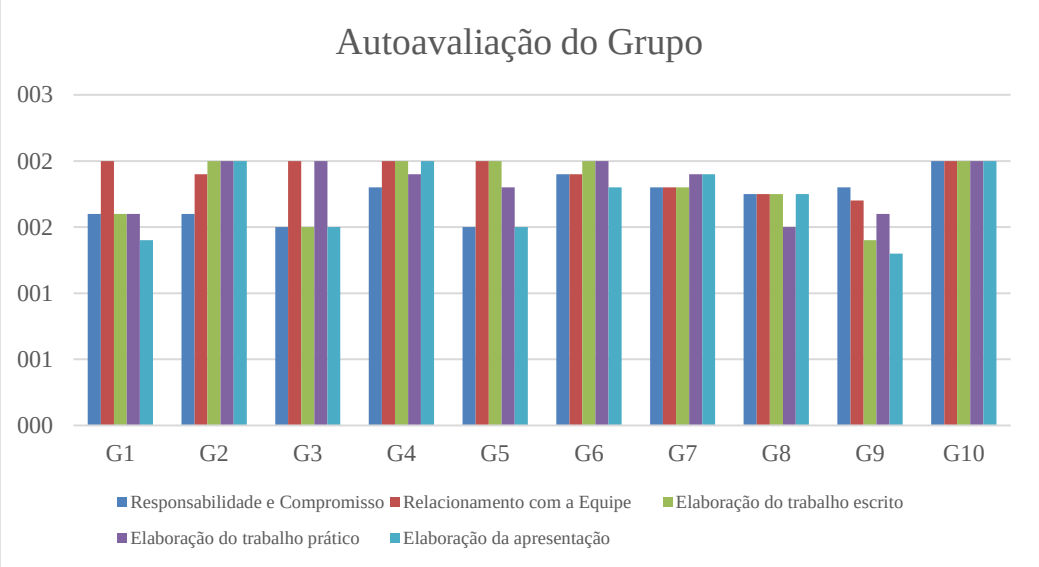


The overall individual evaluation average was 1.8, with the individual score being higher than

the group grade. In the process of assigning grades, the students were aware that it would not imply the definition of the individual concept in the discipline and it was noted that in 66% of the cases the student himself critically self-evaluated, placing his score below that of his colleagues regarding the preparation of the presentation (1.34), the written work (1.43), the practical work (1.61), responsibility and commitment (1.61) and finally, the relationship with the team (1.78).

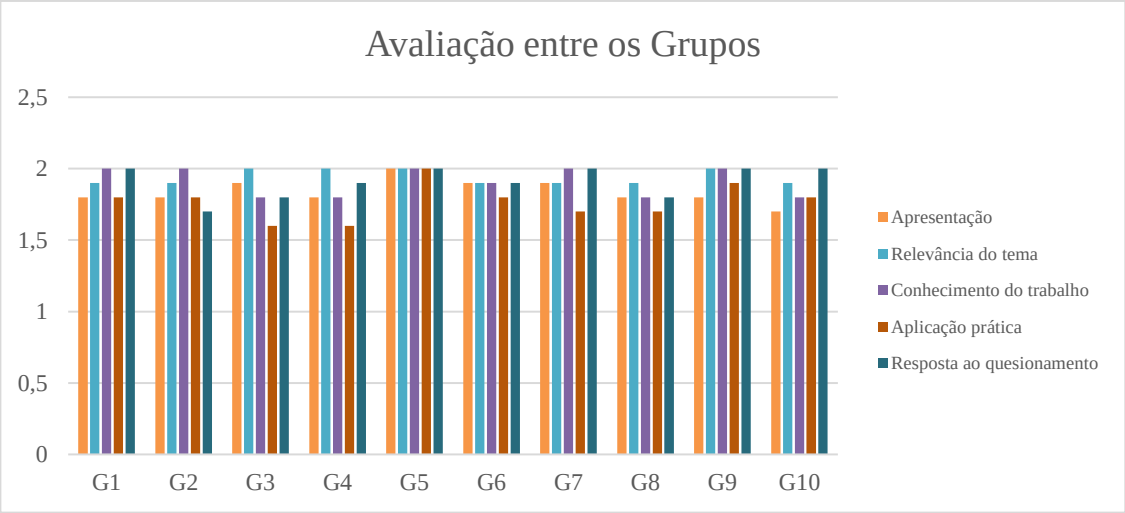
G4 and G9 maintained the original formation, however, the first obtained maximum scores in the individual and group evaluation in three of the items (relationship with the team, preparation of the written work and presentation), unlike the G9, which even with all the members presented variation and scores below the general average. In the others, there was a withdrawal from discipline or a change of group. The curiosity is linked to the G10, which continued to develop the research with 50% of the components, culminating in maximum scores in all analysis attributes (Figure 2).

Figure 2: Group Assessment Score by Attribute



In the next evaluation stage, each team answered a new questionnaire about their perception of the performance of the other groups, following other criteria, on a scale of 0 to 2 points (Figure 3). This score corresponds to the consensus of the group by criterion, with the G5 who obtained the maximum score in everything and this fact reflects the attitude of the members of this team who chose a topic judged as relevant, knew the problem, used theory to find practical solutions and demonstrated such qualities firmly, pleasing the other classmates in the seminar.

Figure 3: Evaluation between groups by attribute



G3, G4 and G9 developed their research on Urban tolls, cycling cities and BRS respectively, topics of interest to the city, proposed viable alternatives and, at the end at the time of the questions (each group answered three questions from the others by lottery) the theme of these teams generated good discussions and controversies in the classroom: the students themselves asked for the floor and used experiences and experiences on that theme to instigate the proposed solutions well as the group without the need for a draw.

When comparing the scores assigned, G3, G4 and G9 obtained the maximum relevance of the theme, however, only the practical solution of G9 was considered to be of greater relevance. This group listed points that imply the effectiveness of the BRS system in the city, not being a practical solution, but a diagnosis, compromising the applicability of the criterion for assigning grades. The solution adopted by G3 regarding the implementation of the urban toll generated questions about the proposition of the tariff to be practiced and whether in fact the benefits to the city and the population would occur and, a curious fact, is that the students applied a questionnaire to the class requesting a position of this feasibility.

The biggest and long-lasting questions occurred in the presentation about G4 bicycles, because in the room were present cyclists, employees of a public agency specific to this approach, as well as other users of this means of transport. In their proposal, the city was zoned in order to study close, central and more populous neighborhoods of the city to create interconnection and new routes using bike lanes and bike lanes since those locations have the medium as an alternative of daily commuting for short distances. However, they obtained a score of 1.6 from the class as an evaluation of the practical application of the solutions.

The second application of the TBL (Figure 4a) verified the content taught in the classroom based on a questionnaire in two phases: individually and in groups. After the end of the dynamics, the highest score was totaled in the group when comparing individually. The criterion of decreasing

the score in the group for each collective error allowed for some addition, which did not occur in the individual, because the correct answer accounted for 5, the error zero. The strategies differed according to their behavior in the execution of the activity: some quickly removed the sticker to find out the correct answer and, in case of an error, stopped for a new consensus since the score had decreased.

In this activity, there are behavioral notes: although the objective of the activity did not include a competition, such action was observed between the groups, because at the end all of them exchanged information about the individual and collective score. As it is a proposal to verify learning, the oral feedback of the students after the completion of the task pointed out the difficulty in reaching a group answer, especially the one who got it right from the beginning (scored 5 in the individual criterion) and did not convince the others, leading them to the wrong alternative and consequent decrease in the group score.

The profile of the class is made up of people who are active in the job market and who study at night, which does not prevent them from maintaining that healthy competition for the best performance when inserted in activities that can generate competition. In a complementary way, the class was active and involved in that activity, they discussed among themselves why it was not a given alternative, questioned the others until they reached consensus and then discovered the correct answer, resulting in *positive feedback*. No one left before the dynamic ended or pressed for frequency.

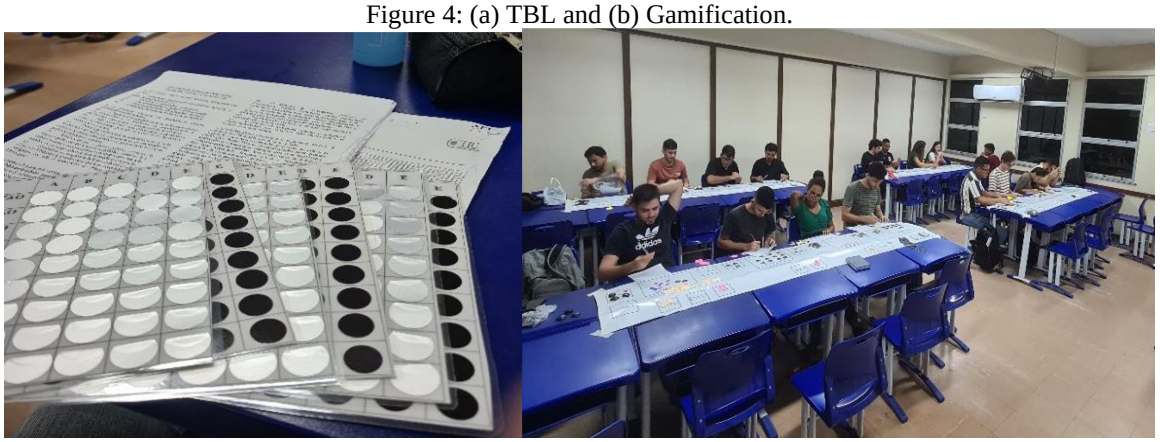
GAMIFICATION

This method was used in an expository class under the teacher's responsibility (Figure 4b) in the form of a board game that simulated experiences in transportation, inventory and supply chain as a way to help the student to actively mobilize with a view to building their own learning. The game is based on obtaining the lowest cost in the chain by performing the *trade off* between the quantity in stock and the demand forecast, the record of the excess and lack of products were quantified and monetized being accumulated over the weeks. The objective of the application of this game was to provide a simulated experience of a reality that involved several concepts that required decision making and, although it did not aim at competition between teams, again it was the behavior observed among the students. At the end of the activity, they waited for the final result ranked from the highest (the learning champions) to the lowest cost.

At the end of the activity, there was *feedback* on perceptions about the game, the probable causes that culminated in those results, individual behavior under pressure, the indication of the "culprits" for their performance, among other notes. As the answers emerged, concepts were introduced to explain the behavior, mental models, attitude, and decision-making required by the

game.

Figure 4: (a) TBL and (b) Gamification.



The fourth and final gamification method applied was the *quiz*. In this study, the groups had one week to elaborate five objective questions about their research topic. In the execution of the activity in the classroom, the groups were guided on the dynamics:

* Assign a score to each of your questions using the criterion from easiest to most difficult on a scale of 1 to 5;
* Challenge a group to answer one of their questions. In case of a wrong answer, the chance would pass to the others at a lower score;
* In case of success, the challenged group chose another, continuing the actions until everyone had participated in the dynamics.

The *quiz* brought together more than 50 questions prepared by the groups referring to the themes defined for the final work, required consultation of various materials made available or not by the teacher, as well as the formulation of right and wrong answers. In this *quiz* there was a reward revealed at the end of the activity, and the winning group was awarded. It should be noted that there was no extra grade assigned to the final concept of the course.

DISCUSSION OF RESULTS

The construction of the five evaluation attributes considered the evaluation points provided for in the teaching plan of the discipline and directed the individual to his/her perception of the others under the same items. By making a parallel to the theory of active methodologies, it was observed that the student was at the center of the learning process, performing research, reflection, decision-making and autonomy from the problematization of reality, correlating theory and practice in the search for solutions applicable to the reality studied. The results can be extrapolated to the critical and constructive attitude about the themes chosen by the groups, as well as the evaluation of themselves and each other, since along the trajectory there were changes in teams and withdrawals

from the discipline.

There are some inferences in the "relationship with the team": the random formation of the groups aimed at not grouping by affinities; most of the students belong to the same class and do not work together, since each one has the declared preference of their peers; Greater responsibility and commitment to the team was foreseen, which did not prevent the differentiation of scores in the group's internal evaluations.

In order to promote the participation and integration of the class and minimize passivity in the seminar routine, the strategy was adopted by drawing groups to ask questions at the end of each presentation. The pertinent themes or needs that were not visible in the city were the ones that generated the most discussions, such as urban tolls and cycling cities. 80% of the groups opted for themes of collective public transport whose focus was the quality perceived by the user, which was verified during the research, a pertinent fact in the city that is expanding this service offer.

The fact found is that all groups opted for the diagnosis of the problem, the starting point was the perception of their daily experience and the solution outlined from a field research and theoretical recommendations applicable to reality. Therefore, it is possible to affirm that by bringing theory closer to practice and the increase of active learning methods, the student tends to develop critical thinking, inserts himself into the problem and projects the appropriate solutions, and it is not possible to apply and quantify the changes in these propositions of improvements due to the non-intervention of action research.

The second application of the TBL corresponded to the questionnaire containing questions about the contents taught in the classroom, whose student participation was analyzed from two perspectives: the first is individual behavior, since the initial challenge was for each one to answer alone by simulating an individual evaluation; The second was the group discussion. When counting the final individual and group score, the students reported that their grade would be below average (stipulated in the Educational Institution), as they would get most of the answers wrong if that activity was an assessment in the traditional models. In the second round, with the opportunity to interact with their colleague, expose their opinions and exchange ideas, they identified errors and other points that could interfere with the correct answer, being beneficial for a higher final score.

Therefore, the higher scores in the group may explain the improvement in the student's responsiveness, perception and apprehension of the content, as well as their behavior when exposed to different learning stimuli. In the case of the latter activity, the students were not communicated in advance, did not consult the materials or even prepare for it. The strategy of the element of surprise on the day of the activity was a differential in the dynamics of the lectures under the command of the teacher, having the acceptance and adhesion of those present.

As for the continuous evaluation process, segmented deliveries was a strategy accepted by the

student, since most groups respected the dates and made adjustments in the following stages. The non-participation or fulfillment of a member's task were the highlights in the group evaluations, however, they were not decisive in the final concept of the discipline, but caused the reorganization of the group or even its dismissal, and these notes corroborate the strategy of promoting skills and attitudes.

At the end of each academic term, the HEI provides AVALIA: teachers and students answer a questionnaire (scale from zero to five) containing the three dimensions *i)* student self-evaluation, *ii)* evaluation of teaching action, *iii)* evaluation of physical facilities. Table 5 shows the mean of the scores of the first two dimensions, whose analysis is the average of the academic period referring to the evaluated specificities highlighted.

The response from AVALIA highlighted that 78.94% of the students stated that they learned the content taught in the course and remained motivated in the development of the proposed activities. Regarding the teaching action, 92.1% evaluated that the teacher stimulated critical thinking and explained the evaluation process in an objective way. The contextualization of the discipline, its contribution to citizenship and professional training and the diversification of assessment instruments obtained the second highest score in the students' view.

The overall average of the period was egalitarian of 3.68 for the student and teacher action, which allows us to infer that there is no differentiation of importance or division of responsibilities, that is, the construction of knowledge was for the student in the same proportion as the orientation of the teacher. The mean of the AVALIA scores has a high standard deviation (mean of 0.72) and high variation, data far from the mean and requires caution in interpretation, generalizations and inferences.

The grade attributed to the learning assessment in terms of the defined criteria (3.73) and the level of depth of the contents worked on (3.70) alert to possibilities for improvement, as the final concept in the discipline depended only on the grade in the group, and was not differentiated by student by effort learned during the deliveries. Less engaged students obtained grades equal to those more participative, which possibly interfered in the attribution of grades at the end of each proposed activity, as well as in AVALIA.

Table 5: Mean AVALIA scores.

Dimension 1: Student Self-Assessment		
1.1.4	I learned the contents taught in the Discipline/Module	3,61
1.1.5	I was motivated throughout the activities proposed in the Course/Module	3,48
1.1.6	I deepened my knowledge, autonomously, with different sources of studies, outside the classroom	3,45
1.1.7	I carried out the activities of the Discipline/Module meeting the deadlines and criteria established	3,48
Dimension 2: Evaluation of teaching action		
2.2.5	The Teacher taught the concepts/contents in a contextualized way	3,76
2.2.6	The Lecturer encouraged me to develop critical thinking	3,85
2.2.8	The Teacher contributed to my citizenship and professional training	3,76
2.3.1	The Lecturer objectively explained the evaluation process of the Discipline/Module	3,85
2.3.2	The Teacher evaluated learning with objectively defined criteria	3,73
2.2.3	The Lecturer evaluated the learning according to the level of depth of the contents worked in the Discipline/Module	3,70
2.3.4	The Teacher used different assessment instruments (tests, seminars, textual production, etc.)	3,76

As for the active methods, the application of TBL produced good results as it enabled the flexibility and differentiation of the evaluation process, as advocated by Machado et al. (2021) and Luckesi (2022). Interaction and cooperation favor learning, dialogue, and the construction of knowledge together, connecting them to the reality of society.

Gamification has transformed the classroom environment in the days of application, the results of which confirmed the benefits of adopting innovative strategies, in interaction and cooperation as positive responses to learning. The stimulus to self-improvement made the student the very agent of change, of the apprehension of the content and in the construction of their knowledge.

FINAL THOUGHTS

In the discipline TE08088 Urban Transport, the theoretical content (45h) predominates over the practical (15h), having to be adjusted to each reality of the class. The profile of the student belonging to the night period of Civil Engineering stimulated the teacher to search for other means, methods and methodologies of teaching-learning, as he is a student who ends his day in a classroom, enters the facilities with different perspectives and dispositions and, sometimes, makes use of this prerogative as a justification for his performance. It is known that adults need a 5 to 10 minute rest every 50 or 60 minutes of activities to maintain focus. In the classroom, dispersion, side conversations, and the use of electronic devices as ways to stay in that environment are notorious, and attention to content is questioned.

Although these difficulties are recurrent in the analyzed public, the adoption of active methods is promising for making teaching more flexible, differentiating the learning and assessment process, as well as helping the development of competencies, skills and attitudes aimed at humanization and motivation.

Therefore, the use of active methodologies in higher education becomes beneficial, somewhat playful and educational when promoted by activities that, in fact, involve and include students, not being a guarantee of the participation of all of them. The strategy of interspersing the theoretical content with partial deliveries was accepted in this and other disciplines belonging to the area of Transportation and, to a certain extent, fulfilled, because the unforeseen events, the changes of dates in the calendar and the dynamics of each academic period generate new adaptations.

The segmentation of the deliveries, the feedback of the teacher with the correction of the work in all stages of delivery, the execution of group and individual activities were valid notes during the course of the course and to the target audience of the night period. The profile of IES students has a declared preference for the traditional and content-based teaching-learning process with individual written assessment, and negatively labels or greater ease the active teaching practices, especially when the flipped classroom occurs. This feedback occurs in internal evaluations when the student assigns grades in the SIGAA system when asked about the teacher and the discipline at the end of each academic period.

In this discipline and course in particular, the challenge is continuous, the initiatives in active learning are the updates and changes perceived by the student. The results appear in orientations of course completion work, students who express interest in continuing the research and submitting them to congresses or journals in the area, involving the professor and stimulating diverse academic experiences.

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