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HIGHER EDUCATION METHODOLOGIES AND INTERDISCIPLINARITY: A PUBLIC UNIVERSITY CASE IN BRAZIL

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ABSTRACT

The teaching-learning process and its concepts and practices are in continuous transformation. Innovative practices, as the active methodologies and interdisciplinarity, are challenges for professors, students, and institutions. This study aimed to identify teaching methodologies, techniques, resources and interdisciplinarity adopted by professors in a public higher education institution in Paraná, Brazil. A sample of 231 valid questionnaires was obtained. Data were analyzed using descriptive statistics and comparisons with parametric and non-parametric tests. The results indicate that a large part of the teachers seeks to use active methodologies, but there is some restriction on pedagogical training. Therefore, a high proportion of traditional methods use is observed. Although 62,3% has at least a doctorate degree, these results suggest that pedagogical undertraining leads to a lack of innovation. The most of professors do not adopt interdisciplinary activities; its potential is underestimate; and major complaining barriers for its underuse were low dialogue and stimuli. This study results can contribute with institutions for understanding their own teaching-learning process, for amplifying discussion on innovative practices in higher education, and for helping professors to reflect about their pedagogical practices.

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INTRODUCTION

Higher education in Brazil is ordered to cultural creation, scientific spirit, and reflective thinking (BRASIL, 1996). Professors are compelled to stimulate students to learn and to teach others what they have learned (Rodrigues, Moura, Testa, 2011).Throughout their career, teachers form students and transform themselves (Isaia, Bolzan, 2011). Transformation of traditional education to innovative/active education changes the teacher status from a knowledge owner (banking) into a mediator (tutoring) (Freire, 2003). Altet (2001) indicates active methodologies towards the objective "to make learning". More than transmitting concepts, university teaching-learning process aims to learn to think and learn to learn, aiming autonomy, using pedagogical techniques, which are part, not the whole, of methodology (Libâneo, 2000).Wall, Prado and Carraro (2008) observed that the active methodologies in undergraduate courses face in multiple challenges, from structural (academic and administrative organization of institutions and courses) to pedagogical (beliefs, values, and ways of doing of teachers and students), with professional, political, and social connexons.

Given the importance of innovative practices, a relevant issue is: 'what is the teachers' view?' (Valente, Viana, 2010). This study aims to contribute to this knowledge and helping teachers' reflection and training, the main objective is to identify methodologies, techniques and resources used by professors from different knowledge areas in a public institution of higher education in Paraná, Brazil. Specific objectives were to assess the professional profile and level of satisfaction, to identify the use of teaching methodologies and resources, to assess the adoption of interdisciplinary practices; and to compare profile with methodologies.

MATERIALS AND METHODS

The questionnaire was developed based on literature review, with 3 distinct blocks: professors' profile; satisfaction level; and methods, techniques, and interdisciplinarity. Nominal and ordinal scales for profile variables, Likert scale, maximal punctuation=5, for methodologies and resources, and three descriptive questions were developed for assessment and interdisciplinary practices. It was first applied to 10 teachers from the institution, chosen by convenience,

aiming to eliminate ambivalent questions and improve clarity. Sample target was the total professors' population (841 individuals) from a state public university, in Guarapuava, state of Paraná, Brazil, in 2019. Links to Google Forms were send via institutional mailing to all professors asking for online answering. After a few days of sending, for the cases in which there was no response, the request was reinforced. The obtained sample has 231 valid questionnaires (27.5% of population), with confidence level of 90% and sampling error of 5%, allowing robust statistics. Statistical techniques' choice was based on sample and subgroups size. For comparison two subgroups of methods were considered: traditional methods: expositive nondialogue classes, expositive dialogue classes, guided studies, summaries, and files; and active methods: all the others. Parametric tests, namely One-Way Anova or t Test, were used for subgroups with n>30; and non-parametric, as Kruskall-Wallis or Mann-Whitney U, for subgroups with n<30, using SPSS statistical software, according to guidelines (Hair et al., 2009). For all tests, the null hypothesis (Ho) was that there were no differences between the variables in the different groups, and a significance level of 5% was adopted. The descriptive questions were analyzed by content technique (Bardin, 2011).

RESULTS

The average of professors' age is 42.2 years, with a range of 25-66 years; the average of time dedicated to teaching is 12.9 years, with a range of 1-38 years. Respondents with PhD are 144 (62.3%).

Table 1. Professors' satisfaction levels

Satisfaction	Likert scale points mean (SD)	Class of satisfaction
With the institution	3.91 (1.11)	Indifferent
With the students	3.91 (1.00)	Indifferent
With the didactic resources	3.37 (1.17)	Indifferent
With the structure (classrooms, labs)	2.77 (1.22)	Not satisfied
With your professional performance	4.05 (0.74)	Satisfied

Source: Authors, 2022

Table 2. Teaching methodologies

Method	Likert scale points mean	SD	Application class
Nondialogue lecture	2.04	0.98	Few times
Dialogue lecture	3.66	0.55	Sometimes
Directed study	2.77	0.79	Few times
Group work	3.10	0.71	Sometimes
Small group discussion	2.92	0.87	Few times
Symposia	1.85	0.89	Never
Panels	1.58	0.75	Never
Seminars	2.75	0.85	Few times
Brainstorming	2.19	1.03	Few times
Case studies	2.81	0.87	Few times
Study of the environment / Fieldwork	2.33	0.95	Few times
Practical classes	3.21	0.87	Sometimes
Discovery method	1.94	0.93	Never
Troubleshooting method	2.55	0.99	Few times
Project method	2.17	0.99	Few times
Questions and answers	2.62	0.98	Few times
Abstracts and records	2.16	1.01	Few times
Games	1.90	0.96	Never

Source: Authors, 2022. SD= standard deviation.

There is the following area distribution of professors: 41 (17.7%) from agricultural and environmental sciences; 25 (10.8%) from exacts and technology; 49 (21.2%) from humanities, letters, and arts; 55 (22.8%) from heath sciences; and 61 (26.4%) from applied social sciences. About professors graduation, 68% have technic courses, 28.5% have teaching license courses, and 3,5% have other kind of graduation. When asked about pedagogical training, 136 (58.9%) have reported any kind of training, and 90 (41.1%) said they never had a didactical training. The most reported types of training are short courses or lectures (23.8%), subjects in graduation or postgraduation (22.5%), pedagogical specialization (12.6%). Tables 1 to 4 have data about the professors' satisfaction levels, teaching methods, resources applied, and assessment types. Interdisciplinarity practices are used on regular basis by 84 (36.4%); 147 (63.6%) answered that these practices are applied never (9.1%), rarely (11.3%) or sometimes (42.9%). Most of those who use interdisciplinarity regularly apply common contents with other disciplines. The main arguments for non-use are lack of dialogue, lack of stimuli, excess of subject content, and lack of students' interest. Tables 5 and 6 have group comparisons data. Compared Pairwise method, humanities, literature and arts professors have greater use of traditional methods than exacts and technology (p=0.027), agricultural and environmental (p=0.017) and health sciences (p=0.011) ones; active methodologies are more used bylicensed professors (p=0.07).

Table 3. Resources applied

Resource	Likert scale points mean	SD	Application class
Portfolio	1.29	0.66	Never
Slide show	3.48	0.67	Sometimes
Posters	1.59	0.78	Never
Computer	3.26	0.80	Sometimes
Designs	2.15	1.02	Few times
Films	2.47	0.88	Few times
Flannelgraphs	1.13	0.42	Never
Folders	1.55	0.80	Never
Graphics	2.63	1.00	Few times
Newspapers	2.35	0.91	Few times
Signs	1.26	0.60	Never
Books	3.45	0.81	Sometimes
Maps	1.80	1.03	Never
Architectonic Models	1.28	0.60	Never
Models and simulators	1.98	1.04	Never
Multimedia (data show)	3.63	0.57	Sometimes
Wall	1.46	0.76	Never
Museum	1.31	0.59	Never
Magnetic Board	1.17	0.51	Never
Blackboard	3.43	0.77	Sometimes
Overhead projector	1.50	0.98	Never
Magazines	2.18	1.01	Few times
Television	1.52	0.77	Never
Texts	3.28	0.83	Sometimes
Transparencies	1.21	0.62	Never
Others	1.38	0.83	Never
Moodle/ other distance learning platform	2.30	1.08	Few times

Source: Authors, 2022. SD: standard deviation.

DISCUSSION

Profile and Satisfaction: High instruction level observed reflects the institutional option for staff qualification (UNICENTRO, 2018). A great number of professors (40,2%), however, report to have no pedagogical training. Short courses and lectures (23,8%) are the most reported training types; subjects in graduate school (22.5%) and pedagogical specialization (12.6%) were also cited. The present data suggest the need of more pedagogy trained professors. Pivetta and Isaia (2008) observed that many high courses fail in offer pedagogical training and beginning professors commonly do not note differences between content and its pedagogy. The present research reveal that licensed professionals are minority and feel unprepared to act in graduation; among non-licensed ones, such prepare will be scarcer (Cunha; Isaia, 2006). Pimenta e Anastasiou (2002) affirm that professionals enter higher education to teach without teaching experience. Exposing knowledge of the content is not the only work professors do; there are knowledge activities production, meetings, reunions, articles, peer ideas exchange, and contact with students (Hoffmann et al., 2019). This context reinforces the relevance of permanent and effective training (Aquino; Puentes, 2004). Satisfaction with the institution, students, and didactic resources is considered indifferent. There is some dissatisfaction with the predial structure. Self-performance is considered satisfactory. Pinto (2014) observed that some factors impact satisfaction: working conditions,

training, enjoying teaching activities and social commitment in a Brazilian public higher education institution. The training first step should be the recognition of these factors and next steps should address sensible themes, as lack of training, building self-identity as a teacher, resistance against innovation and lack of commitment (Nascimento, Silva, Nicolli, 2021).

2007). In the present study, there are many resources used by teachers, which suggests that there is a seek to choose the best practice, but the lack of training can lead to some insecurity, thus the most reported practices remain quite traditional. Interdisciplinarity, which is a path to expand students' view, is not practiced in a regular basis.

Table 4. Assessment types

Type	N	Likert scale points mean	SD	Application class
Objective answer questions	231	2.9307	0.99	Few times
Dissertation questions	231	3.4156	0.73	Sometimes
Practical test	230	2.6435	1.07	Few times
Oral test	231	1.5671	0.83	Never
Written work	231	3.1558	0.82	Sometimes
Seminar	231	2.9048	0.91	Few times
Class participation	231	3.1429	0.97	Sometimes
Other type of assessment	212	1.7217	1.11	Never

Source: Authors, 2022. SD: standard deviation.

Table 5. Comparison of traditional methodologies use with knowledge area

Factor	N	Likert scale points mean	SD	Application class	p (K-W)
Knowledge area				Few times	0.028
Agricultural and Environmental	41	2.58	0.51	Few times	
Exact and Technology	25	2.58	0.45	Few times	
Humanities, Letters and Arts	49	2.83	0.48	Few times	
Health Sciences	55	2.59	0.48	Few times	
Applied social	61	2.74	0.47	Few times	

Source: Authors, 2022. SD: standard deviation. K-W= Teste de Kruskal-Wallis.

Table 6. Comparison of active methodologies use with graduation type and training

Factor	N	Likert scale points mean	SD	Application class	p (K-W)
Teacher Graduation					0.025
Professional	157	2.38	0.52	Few times	
Licensed teacher	66	2.56	0.48	Few times	
Other	8	2.37	0.49	Few times	
Pedagogical training					0.030
Any pedagogical training	136	2.59	0.51	Few times	
No pedagogical training	92	2.34	0.52	Few times	

Source: Authors, 2022. SD: standard deviation. K-W= Teste de Kruskal-Wallis.

Methodologies, Resources, Assessment, and Interdisciplinarity: The most reported methods are dialogue lecture, practical classes, and groupwork. Although there is some seek for active methodologies, traditional ways of teaching still prevail. The most used resources are multimedia, slide show, books, chalkboard, texts, and computer, a 'traditional technology', when literature shows that students are increasingly demanding interconnection and the use of social networks (Ansar, Khan, 2020). The most used forms of assessment were written test, written work, and class participation. Interdisciplinarity, is adopted by the minority of professors. Teaching based on lectures, solving exercises, memorizing content, with rigid assessment permeates higher education in Brazil (Pimenta, Anastasiou, 2002). Veiga (2006) affirms that the teacher cannot have a defined didactic, they must be creative for helping students to develop knowledge and acquire skills (Haydt, 2006). Active methodologies generally favor the student's independence, curiosity, decision-making, and reflection (Minayo, 2014). For this aim, continuous transformation is needed (Dias-Lima et al., 2019). Transformation, however, faces resistances, as conditions, interests, values, moralities, philosophies and knowledge of students, teachers, and institutions (Valério, 2018). Ferreira and Morosini (2019), analyzing teachers' perceptions on active methodologies, observed that professors are comfortable in giving the central place for students. Active methodologies help teachers to work themes beyond the content, as social and cognitive ones (Oliveira, 2009). Teaching techniques consist in procedures to reach the method success (Malheiros, 2012) to make the class more dynamic and attractive (Nicola, Paniz, 2016). Teacher needs to reflect didactically on his practice, avoiding using the same resources and techniques (Gomes, Without prejudice for disciplines, interdisciplinary practice can conduce students view towards universality (Lück, 2001). The regular apply of interdisciplinary strategies was most identified as the correlation of contents of two disciplines. Possible causes for the non-use of interdisciplinarity by the majority were reported: difficulty in dialoguing, students' lack of interest, rigid curricular structures, excess of theoretical content, lack of institutional support. These results are in line with Souza et al. (2012) which suggest that interdisciplinary actions need pedagogical guidelines, compromised staff, and engaged institutional managers.

Comparisons: Humanities, literature and arts and social applied areas were most likely to use traditional methodologies. This result is in line with Marques et al. (2021), in an extensive systematic review on the use of active methodologies, which observed higher use in medicine and nursing (34.3%), engineering (22.9%) and pharmacy (14.3%). Teachers with more didactic training have greater use of active methodologies ($p<0.05$). This result reinforces the relevance of commitment, once active methodologies require training and time (Althaus, Bagio, 2017). Analyzing the publications in a scientific event, Cortela (2016) described that teachers see in innovative practices a good potential for learning process qualifying.

Study Limitations and Potential Benefits: The self-administered questionnaire using an electronic tool may influenced some answers. A more extensive questionnaire should rise other relevant aspects. These results can contribute to institutional planning and serve as reference for other higher education institutions. Another potential benefit is helping teachers in their careers and pedagogical planning.

CONCLUSIONS

Although this sample has a large percentage of professors with PhD, a significant number, reported a lack of pedagogical training. Most of teachers are satisfied with their own performance and there is dissatisfaction with the structure of classrooms and laboratories. Most of the teachers did not have teaching license graduation, but had some didactic training, which ranged from short courses to specializations. The great diversity of methods and resources used by teachers suggests that there is a seek for better practices, but classes and assessments methodologies remain quite traditional. Most of the teachers do not adopt regular interdisciplinary activities in their work, this practice is superficial and faces many barriers. Comparison results showed that humanities and social sciences use more traditional methodologies than others; and professors with more pedagogical training are more likely to apply innovative practices.

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