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Teaching-learning of remote sensing at UNESP-FE Ilha Solteira: A proposal based on the previous knowledge of academics

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ABSTRACT
The present work aims to present the results of the use of the teaching-learning techniques Posters in Group (CG) and Group of Observation versus Group of Verbalization (GOxGV), compared to the expository technique, applied in the disciplines that use remote sensing in Agronomy and Biological Sciences. The techniques in which the university students learned acting (CG) and (GOxGV), were applied between 1998 and 2015 and compared to the traditional expository technique used until 1997. It was found that teaching-learning was more efficient and pleasant than in the expository technique. In addition, the teacher had immediate feedback on student learning.

Keywords: Radiant energy, Satellite images, Learning techniques.

1 INTRODUCTION

In general, teachers reproduce what they learn or learned in their training, including the methodologies used to transmit knowledge, becoming professionals limited to reproduction, do not create new knowledge and education becomes exhaustive and repetitive (SILVA and WEIDE, 2011). Therefore, education has been seeking over the years to rely on methods or theoretical-practical orientations resulting from studies, with the aim of attributing more quality to pedagogical practices (PINTO et. al 2014). Thus these methods intend to lead to a reflection, between what is studied in the theoretical field and articulated with practice, thus facilitating learning. According to Santos et. al (2014) is significant for the formation of university students that during graduation they have the opportunity to be more active in their own training because they will make them think not only about the content, but also about the appropriate methodology for this content among other reflections. The current students are part of Generation Y, which has as one of the most striking characteristics the availability of access to a wide range of information through the internet, the rapid interaction and exchange of information through social networks, and the striking manifestations of their opinions. Thus, the forms of teaching learning should also be directed by the action and action of students and teachers, which implies in opting for policies aimed at student participation (SILVA, et. al, 2014). The

teaching techniques called Group Posters (GC) and the Verbalization Group versus Observation Group technique (GV x GO) are characterized by communication and multilateral interaction between students and the teacher, in addition to facilitating learning, because students learn by acting (ANASTASIOU; ALVES, 2006). This observational work aims to present the results of the use of two teaching-learning techniques (GC and GO x GV) compared to the traditional expository technique, applied in the area of Geotechnologies, in the period from 1988 to 2015.

2 METHODOLOGY

The study was developed in the courses of Agronomy and Biological Sciences of the Faculty of Engineering of Ilha Solteira in the period from 1988 to 2015, in the disciplines focused on the teaching of Remote Sensing in two moments: period I (1988 to 1997) where the expository technique was essentially used, and period II (1998 to 2015) where the learning techniques "Posters in Group (CG)" and "Observation Group versus Verbalization Group (GO x GV)" were used, allied to expository technique. To verify the efficiency of these techniques in learning, we used the criterion recommended by Steffen et al., (1981) which determines that the interpretation of remote sensing products depends on the understanding of the following elements: sensor, trajectory, target, source and radiant energy. The application of the techniques followed the protocols proposed by Anastasiou; Alves (2006), and are described below•: Group Posters (CG): For each group the following materials were provided: cardboard and atomic brush. Method: Groups of no more than five students were formed. Then the theme was provided: Remote Sensing: "what is it", "what is it for", "how does it work"? Subsequently, they were asked to talk about the topic and express themselves in schemes. The students thus expressed their ideas, opinions and perceptions on the posters. Then, one or more members of each group were asked to explain the proposed scheme to the others. In the next moment of the technique, the teacher performed the analysis of the content of the drawings and answered the questions formulated. • Verbalization Group "versus" Observation Group (GV x GO): Material: "The interaction of electromagnetic radiation with the plant: visible and near-infrared region" (FORMAGGIO et al. 1989). Method: The text was distributed one week in advance for them to study it outside the classroom. The students were divided into two groups, by simple lottery, limiting the size of each group to a maximum of 15 3 students and arranging them in two concentric circles. The internal group, called the Verbalization Group (SG), was assigned the function of discussing the text. The external group, called the Observation Group (GO), was assigned the function of only observing, listening and writing down the discussion of the Verbalization Group. The observers were instructed to observe, listen and write down: whether the concepts of the text discussed were all used and whether the verbalizers provided elements that made learning the topic meaningful. The verbalization session was 15 minutes. The observers then read aloud what they wrote down, without allowing themselves debates, clarification

questions, or other interventions. Verbalization resumed, with the groups reversing their functions. The professor closed the discussions and made a synthesis of the theme.

3 RESULTS AND DISCUSSION

With the application of the CG technique, the students demonstrated that they already understood the importance of the concepts: the sensor installed in an orbital platform; that there was no direct contact between the sensor and the targets; of the application of remote sensing products in target monitoring. With the use of this technique (GC), it was observed that the students understood several elements (STEFFEN et al. 1981), however they did not demonstrate knowledge about the importance of the radiation source and radiant energy. Thus, the teacher detected the levels of previous knowledge and the difficulties that the students would have in understanding these elements and selected the different techniques that facilitate learning. In the expository technique, the identification of the students' difficulties are usually detected only after the application of the evaluation, which occurs in the middle of the semester. In addition, it was observed that, through this GC technique, the members of the groups were able to express ideas, opinions and perceptions about remote sensing and demonstrated greater motivation during learning with the technique, as was also reported by (BORDENAVE; PEREIRA, 1978). At the end of the technique, the teacher compared the posters that expressed the students' knowledge on the subject with the paths taken by the radiant energy starting from the radiation source (Sun), interacting with the targets, reaching the sensor until the elaboration of a map (MOREIRA, 2011). Ass im the students realized, at the beginning of the semester, the steps to be understood for the correct use of remote sensing. By the GV x GO technique, the teacher had a feedback, of the level of knowledge that the students acquired with the reading of the text that addresses experiments with the basic concepts about the spectral behavior of agricultural targets, as well as its main difficulties 4 in the interpretation of these experiments, such as the effect of spectral reflectance, caused by the infiltration of water in the intercellular spaces of bean leaves (KNIPLING, 1970), which had not happened in the exhibition technique previously applied.

4 CONCLUSIONS

The use of the teaching-learning technique CG in the teaching of s e n s o r i a m e n t o remote, allowed immediate feedback enabling the teacher to facilitate student learning. The GOXGV technique developed the capacities of observation and criticism of group performance and of studying a little known subject, in a team, in a systematic way and assisted by the teacher who acts as coordinator and facilitator of learning. Thus, in the learning process, the use of participatory techniques is essential for the assimilation of contents and values for future professional performance.

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