

Traditional and Innovative physics teaching approaches: a social representation study

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Abstract. In this work we investigate social representations from a group of physics teachers in training ($N = 98$) regarding traditional and innovative teaching approaches, combining complex network analysis and a likert questionnaire. Our results show representations on traditional approaches more related to pragmatic classes' material and innovative approaches represented focused on experiments. That indicates a reproduction of a well structured teaching culture in formal institutions.

1 Introduction

It is perceived from physics teachers that there is an established tradition in classrooms and school systems set to keep its own survival [1]. During their training, pre-service physics teachers form consensual views on both traditional and innovative approaches, producing social representations (SR) [2] on that. By exploring SR it is possible to get insights for rethink training strategies, at the institutional level. In this work we aim to investigate SR on traditional and innovative physics teaching approach from pre-service physics teachers in a public university in Brazil and its possible relation to implementations of both on their future teaching career.

2 Theoretical framework

The SR theory was proposed for exploring group's ideas and visions. SR are a phenomenon by which social reality is created anchoring and objectifying knowledge objects, converting the "unfamiliar" into familiar. It allows one to forms stable consensus, which can give identity to a group, helping to deal with life demands. Regarding its structure, SR can be both stable and dynamic, at the same time, differing nuclear and peripheral elements [3]. Lexical relational structures can be represented as complex word networks, revealing possible nuclear and periphery in the structure [4].

3 Methodology

The study took place in a Brazilian public university in São Paulo state. A group of 98 undergrad physics teacher in training was inquired during the 2017/2018 school year. Two research instrument was used: (a) a ten items likert-questionnaire regarding innovative/traditional approaches and (b) two word similarity networks taking from each student the first 5 evoked words regarding each teaching approach. Internal consistency indicators were computed. The data was processed using R [5] and specific packages.

4 Results and brief discussion

For the likert items, internal consistences were $\omega = .709$ and $\alpha = .607$ (Fig. 1, A). The network for "traditional" (Fig. 1, B) has 61 lexems with 296 relations. The terms blackboard, chalk and exercises indicate a central core anchored in classroom pragmatics. The "innovative" network (Fig. 1, C) showed 74 lexems with 303 relations, centered in the idea of experiments and dialogical aspects. [see Figure 1 in the attached PDF] It may be contradictory that a traditional aspect of physics, such as experiments, is recognized as innovative. At the same time, monological classes make a strong sense of tradition. Meanwhile debate and discussion, even though being a form of teaching since the first humans, is represented as innovative.

5 Final Considerations

Central core elements of a SR, are stable and resistant to changes. As pre-service teacher focus on traditional assumptions of what would be innovative, university curricula are demanded to consider students consensual world in order to be effective.

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