INTEGRATION BETWEEN EDUCATION, LEARNING AND SOIL CHARACTERISTICS ON TECHNICAL COURSE IN BUILDINGS WITH THE USE OF MENTAL MAPS

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Abstract *— The purpose of this paper is to discuss the application of mind maps by teachers and students, especially in the preparation and execution of laboratory tests proposed in Soil Mechanical discipline. To this end, we analyzed articles and books on the subject, assisted discipline of classes in question in the responsible institution, drawn up useful maps and performed a case study with students of the Technical Course in Buildings, evaluating their acceptance of method compared to others. It was observed that there was no great difference of opinion, then discussed the conditions for this result, as well, according to the texts analyzed, the beneficial effects of mental maps, inclusive for teaching in general, given the characteristics of the current generations.*

Index Terms — Mental maps, Soil Mechanics, Teaching, learning.

INTRODUCTION

The innovative profile of recent generations enrolled in educational institutions influenced by a strong technological flow productivity generated the need for tools to assist teaching and learning, conditioning agility, efficiency and interest in the process. All texts enriched with sketched graphics, summarizing the information, such as mind maps, are a great method of support due to the dynamism and objectivity possibilities and it is very appropriate to the discipline of Soil Mechanics, due to the amount, variety and hierarchy of information to be organized, interrelated and associated calculations.

The mind maps arise in this context as a great tool developed so full by author Tony Buzan, as a planning tool and quicker thinking. According to [6], the model is very appropriate for education, including used for the preparation of lessons, simplified explanation of complex concepts and annotations review.

For Soil Mechanics discipline, the method is a great solution because of the quantity, variety and hierarchy of information to be organized, interrelated and associated calculations. Good understanding of the topics covered in this course is essential for obtaining data and consistent information, fundamental in the execution of works, mostly large, for the construction industry.

DEVELOPMENT

Mind maps

The mind maps are a tool to organize, lay out and highlight information for any kind of activity, from paper presentations note of daily tasks. The feature has keywords that are designed to capture memories, producing the creation of an individual's own knowledge, carrying the ease of memorization. According to [6] the efficiency of the method is in its dynamic shape and configuration of subdivisions, recurring in nature, so easy assimilation of the human being.

Even by [5], the mental map should be drawn up with a main idea in the center, from which stems parallel associations, which suffer the same relation to their subdivisions. Thus, the graphical representation of this system is similar to a "neuron" or "tree trunk" where there nodes interconnected by branches tapering as fall away from the main idea. It is important in this method using colors and images, stimulate memory, by a natural process of the mind that assimilates more easily information practices with the vision as an important resource.

The Mechanical Discipline of Soil in the Technical Course of Buildings

Soil Mechanics is a discipline present in the Technical Course in Building, common to civil engineering course, which, in their theoretical bases aims to know the different types of soil, diagnosing their properties and conditions in the natural state and after undergoing the procedure compression, while in the practical part identifies and characterizes the material by means of laboratory tests.

The course starts with notions of geology and its duration should provide students with ability to identify and recognize soils and their conditions autonomously, for essential information regarding the place of performance of a work, conditioning the type of treatment given to its soil

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and the most appropriate foundations and solutions to the works to be made.

Then, due to its relevance, it is important to be well understood, but because of the variety of information, a method of objective and concise layout as the mental map, or even illustrated flowcharts and conceptual maps, it is very convenient for the implementation of laboratory tests, for example. There are several ways to draw a mind map, since it is a text, and as nature, these reflect the style and understanding of the author, but an example can be seen in Figure 1, prepared for the case study.

FIGURE. 1

MENTAL MAP PREPARED FOR USE IN CASE STUDY, ACCORDING TO MOISTURE CONTENT OF TEST [1].

Thus, developed mental maps in this model for use in laboratory practice of Soil Mechanics, according to the guidelines of the Brazilian Association of Technical Standards (ABNT).

Case Study

The case study carried out in the research is constituted of applying a qualitative questionnaire after performing laboratory of Soil Mechanics tests, aiming to get Moisture content, Specific Gravity of grains, and Apparent Density of soil samples, according to the Brazilian Association of Technical Standards. The activity was held with three groups of students who attend Technician Buildings at CEFET-MG, all of which had to support the technical standards and the previous explanation and during execution, given by the professor, who teaches Soil Mechanics in CEFET-MG. The first group consisted of nine students, between sixteen and eighteen years, supported methods beyond common to the other two flowcharts classes also prepared by the teacher. The second group consists of nineteen students who had as an additional resource to the previous group mind map prepared for the research. The third group consisted of twenty-one students over eighteen, having differential to support only the mental maps.

After running the tests, students filled out a questionnaire with twelve positive connotation of questions regarding the support methods, whose answers were ratings between 1 and 10, and dealt with qualitative concepts such as practicality, dynamism, efficiency, convenience of organizing information and visuals and interest. For the answers, 1 meant "little considered," 5 "reasonably considered" and 10 "highly regarded", and there was the possibility of intermediate values (2 to 4 and 6 to 9).

These tools were used by groups of students, after prior explanation of the method and tests, and, on one occasion, questionnaires were applied evaluating positive characteristics such as agility, dynamism, ease of understanding and objectivity of the method. The first group that participated in the research used only technical standards and flow charts as support and had 91.1% of acceptance, while the second used in addition to these, the mental maps, with 87.4% acceptance, and with the same tools, third had 86.2% of acceptance. The percentages were derived from the average score of the questionnaires, gift graph of Figure 2. The results were very close and significant, indicating acceptance of all methods, however, slightly lower for mental maps, although it should consider margin of error.

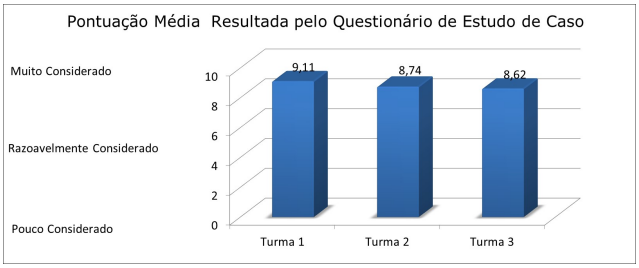

FIGURE. 2

GRÁFICO APRESENTANDO AS MÉDIAS OBTIDAS NOS QUESTIONÁRIOS DE ESTUDO DE CASO.

Observation Final

After the calculation of averages for questions and classes, it was observed that the average of the sum for each class was very close (109.33, 104.94 and 103.44 for classes 1, 2 and 3, respectively). However, the acceptance as the method of mental maps was slightly lower.

From this observation, we can infer that the method of mind maps as support for the Soil Mechanical discipline has acceptance by students, but there may be a slight preference for conventional writing methods, since the tool is little known and worked in the school environment, generating a long term understanding.

Thus, in a future study, it would be interesting to see the result of this case study for classes that have practice in the conduct of mind maps.

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