Rasch analysis for high school engineering students

Rubén SÁNCHEZ SÁNCHEZ,

Instituto Politécnico Nacional, Legaria #694, Col. Irrigación, Del. Miguel Hidalgo, C.P. 11,500, Mexico City, Mexico.

Diego FernandoBECERRA RODRÍGUEZ

Colegio I. E. D. Antonio Nariño, Cra. 77 A No. 67-17, Bogotá, Colombia.

Abstract. The Rasch Model can be used in the measurement of the student's level of learning of Physics. This work is proposed to visualize the progress in the knowledge of a course of Electricity and Magnetism of high school level taken by students of the Colombian School Antonio Nariño.

1 Rasch Model and Physics Education

In this work we propose a schemeof knowledge assessment forengineering students in theTopics of Electricity and Magnetism at the Antonio Nariño school in Bogotá, Colombia [1].

The scheme that we propose is based on the Rasch Model (RM) [2],same that we can use in the evaluation for students.The idea is to estimate student learning, by measuring a characteristic curve of probability of success, for a question given in a test prepared for the subject of study.

The model can estimate the student's ability parameter [3] and analyze how it can correctly answer a given question, taking into account its degree of difficulty. In this way, you can assess the student's level of learning, and see if it has a reasonable level of use of the study topics seen.

In the didactic activities, a methodology is carried outof study based on the Active Learning of Physics[4], and also supportedwith PhET simulations from the University of Colorado in the United States.

Commonly, the Active Learning of Physics [4], is carried out with real laboratory instruments.The reason for using simulations, in this case, instead of real laboratory equipment, has to do with the budget available to the school, which is limited to get all the material required by the Physics Laboratory.For this reason, the didactic methodology used in this case can be considered as a variation of the original methodology of the Active Learning of Physics used by Sokoloff and other Physics Education researchers.

During the teaching sequence, the PODS earning cycle is employed to encourage students to participate actively in the class, and can himself (according to theory), construct their own knowledge.

Once the professor has given the lecture of his material with this didactic methodology, he can use the Rasch model (RM) to estimate the abilities and skills learned by the student in topics of Electricity and Magnetism.

The Rasch model is a very simple example of a measuring instrument, but at the same time it is a very powerful means of verifying knowledge [3]. In particular, we can use it to assess the knowledge in Physics of a student of engineering careers, as we are proposing.

The curves of the Rasch model measure the student's ability for a specific subject of study and can estimate their level of ability in that area of study.

In Figure 1, a characteristic curve of the Rasch Model is shown [5].As can be seen, the probability of the student's correct answer to an evaluative question varies according to the degree of difficulty that question has.

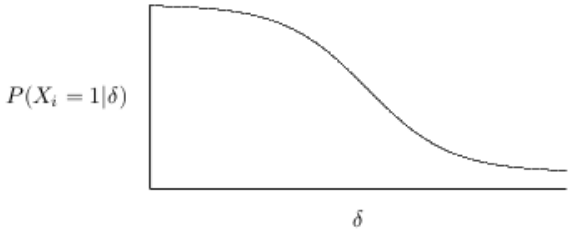

Fig. 1 Characteristic curve of Rasch Model. The horizontal axis represents the difficulty level parameter of the question. The vertical axis represents the probability that the student responds well to the question. The student's ability is fixed.

2 Conclusion

Therefore, the Rasch scheme is a knowledge evaluation model, which helps the Physics teacher to graphically visualize the way in which his students acquire knowledge, within the area of Physics that is being studied, and contributes to the design of assessment instruments, in this case, in the area of Electricity and Magnetism.

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