

Abstract Submitted
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Assessing Conceptual Knowledge for the Physics of Semiconductors EMANUELA ENE, Oklahoma State University — Following the trend in science and engineering education generated by the visible impact created by the Force Concept Inventory, the investigator developed a Physics of Semiconductors Concept Inventory (PSCI). PSCI fills the need of standardized concept tests for undergraduate education in photonics and electrical engineering. The structure of the PSCI test followed a concept map reflecting the input from a panel of experts from different universities and from a survey of textbooks currently used in engineering schools in the United States. Based on the statistical analysis of the scores and response patterns, the test was calibrated as an instrument to measure participants' cognitive ability independent of items' difficulty. The models employed were the Rasch Model and the Rasch Partial Credit Model. The estimation procedure employed was Conditional Maximum Likelihood. The analysis was carried on using algorithms written in the open-source language R. The current PSCI BETA test contains eighteen calibrated items covering six concepts of the physics of semiconductors. PSCI BETA may be used for three purposes: individual student diagnostic if applied at the beginning of a physics of semiconductors course; predictor for students' academic performance in the field of semiconductors if applied at the end of instruction; assessment instrument for instructional strategies if applied both for pre- and post-instruction. The PSCI BETA instrument can be applied in any English speaking college setting.

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