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A review on SPICE Simulation Educational Tool to Enhance Student Centered Learning

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Abstract:-
Carrying out real-world software projects &simulation techniques in their academic studies helps students to understand what they will face in industry, and to experience first-hand the challenges involved when working collaboratively. Microelectronic circuits are integral components to electrical, electronics and computer undergraduate curriculums of science and engineering. Most of the instructional strategies used to help enhance student's educational tool knowledge and understanding. SPICE is an electrical and electronics circuit simulation tool that has been widely adopted for industrial applications and education. The effectiveness of SPICE simulation tools for incorporating simulation into lecture, in class active learning, as well as assignments, and industrial projects. The aim of this study is to analyze simulation tools for student centered learning using simulation program with integrated circuits emphasis (SPICE) reliability simulation method which shifts the focus of circuit analysis, functionality and characteristics. This educational tool can provide student teacher interactions, practical work in lab, assignments in classrooms and parallel effective communications.

Keywords:-
Student-centered learning, SPICE, active-learning, simulation educational tool, student teacher interactions.

I. INTRODUCTION

Teaching and learning process executed by an instructor or lecturer previously now replaced by student-centered learning (SCL) [1].Simulation-based educational products are excellent ''illustrative tools'', used exceedingly in student centered learning methodologies [2]. Simulation tool is help to students compatible with the technology jobs in order to solve real-world problems of the current era [3].In the fields of electronics, electrical and computer simulation is particularly important in the context of electronic design and in the design of systems that contain microelectronics, since fabricating such circuits is expensive and physical prototypes require a large investment of resources. Thus, simulation is tightly coupled with the circuit design process as a general standard of practice in industry [4].In particular; simulation is very valuable to introductory microelectronics courses, which are core to most electrical engineering and electronic science curriculums, as simulation provides students with deeper insights. With introductory microelectronics courses, students must transition from analyzing electrical circuits containing simple linear elements such as resistors, capacitors, and inductors to analyzing, for the first time, circuits that contain complex, non-linear components such as diodes, transistors, or logic gates. The behaviors of these non-linear components depend on a large number of parameters and have the ability to exhibit different behaviors based on a wide range of operating conditions [5, 6, 7].Current flow through these devices to the voltages across the terminals does not have linear relationship these electronic systems cannot be analyzed using straight forward linear algebra, and differential equations for circuit analysis, as in prerequisite courses [4].Voltage transfer characteristic curves, current voltage (I-V) curves analysis done by student. A novel approach to teaching microelectronics that entirely revolves around active learning based simulation in the classroom. The objective of instructional approach is not only to enhance students' ability to solve and analyze microelectronic circuits, but also to provide them with the intuition and deep ins… order to … effective real-world designers. The simulation environments most often used (i.e., SPICE simul… used both academia and industry [8, 9, 10].The norm in education is to incorporate SPICE circuit sin… new problems or as part of laboratory assignments. After theory is taught in lecture, students are g… do their own. To enhance students' educational experience created an active classroom in which techn… tion wh… traditional instruction [11]. The benefits to learning of active learning, or having students "do work" in class beyond listening and note-taking, have been well published within STEM education [12].

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II. LITERATURE REVIEW

The American Psychological Association identified learner-centered psychological principles. The domains of the learner-centered principles the meta cognitive and cognitive, affective, personal and social, developmental and individual differences factors emphasize both the learner and learning [13].Analysis of NAAC Accreditation System using ABCD framework [14].
Simulation-based educational products in academics are becoming wide spread and ample literature is available on this area. These