THE STANDARD E-LEARNING TECHNIQUES ON VLSI DESIGN

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ABSTRACT
E-learning platform provides anywhere, anytime easy access for upgradation of knowledge and skills. It provides a platform wherein the individual gets a customized package related to key thematic areas, through a self-guided process. Despite this, it is felt that the system of E- learning can be made more effective and result-oriented particularly in the Indian context. Number of new innovative strategies are developed for E-learning. Educational systems are thus looking to e-learning programs to substantially improve the quality and content of their education. Integrating e-learning to existing educational system can, however, be a major challenge. In the existing educational system, Very-large-scale integration (VLSI) is the process of creating an **integrated circuit** (IC) by combining thousands of **transistors** into a single chip. With the advent of very large scale integration (VLSI) designs, the number of applications of integrated circuits (ICs) in high-performance computing, controls, telecommunications, image and video processing, and consumer electronics has been rising at a very fast pace. There are number of online courses offered in VLSI design but not standard. This present paper tries to suggest one of the standard E-learning system in VLSI called IEEE (Institute of Electrical and Electronics Engineers) blended learning program to improve the quality and content of education in VLSI design.
Keywords: E-learning, IEEE, Blended learning program, VLSI.

1. Introduction:

Educational systems are looking to e-learning programs to improve the quality and content of their education [3-5]. VLSI is one of the broad field in an education system and need to be more specific as there cannot be just one course to learn all of it. There are many online courses in VLSI [1]. They are 1. Courses on SystemVerilog, Assertions, Coverage, OVM and UVM Verification Excellence, 2. Digital Design courses from IITM on NPTER NPTEL - Electronics & Communication Engineering, 3. Verification courses on Verification Academy – The most comprehensive resource for verification training. The only catch here is you need a corporate email id to login, 4. Physical Design courses from Udemy - VLSI Academy – Physical Design – Udemy. These online course focus on how to build an EDA tool. It will require programming experience (C++, Java) and basic knowledge of data structures and algorithms. An understanding of basic digital design: Boolean algebra, Kmaps, gates and flip flops, finite state machine design. Linear algebra and calculus at the level of a junior or senior in engineering. Exposure to basic VLSI at an undergraduate level is nice -- but it's not necessary. These courses are self-contained, but students with some VLSI will be able to skip some background material. VLSI Guru is the best VLSI training institute in Bangalore, offering courses on System on Chip (SoC) Design and verification flow; Online VLSI course with complete flexibility on Student Schedule. But these online courses are not standardized which is required for final implementation and validation of final product development in VLSI.

The objective of this work is

- To identify the standard E-learning tool called IEEE blended learning program for VLSI design.
- To study the E-learning tool about the various programs, advantages and requirements
- To analyze and prove the efficiency of that tool by making comparison of that E-learning tool with all other online courses.

Thus this paper is divided into 4 sections. Section 2 deals with introduction, various programs and advantages of IEEE blended learning program for VLSI design tool. Section 3 deals with the requirements of the same E-learning tool. Section 4 is about views on the same E-learning tool by Industry experts, Institute and E-learners on VLSI. Section 5 is on result analysis and discussion about the efficiency and percentage of learners of that IEEE blended learning program for VLSI design tool. Finally section 6

concluded that IEEE blended learning program for VLSI is a standard choice to provide a good opportunity for VLSI students to build the standard products by learning this E-learning tool.

2.   IEEE BLENDED LEARNING PROGRAM

The **IEEE Blended Learning Program in VLSI** [2] employs the latest in applied and immersive e-Learning techniques in combination with extensive hands-on practice. This engaging online learning approach to reinforce core concepts is then coupled with highly effective and proven in-person instruction and hands-on applied training in a lab. VLSI professionals and students build competency and skills necessary to create complex products with the leading EDA tools used in the semiconductor industry

2.1 Various programs in IEEE blended learning program:

This dual in-depth blended-learning approach complements academic learning with training in industrial practices to prepare engineering students and professionals for a successful career in the semiconductor industry. The program includes[2]:

- Infrastructure comprised of core labs and facilities equipped with the latest Electronic Design Automation (EDA) tools.
- Instructors with many years of experience in the industry.
- Curriculum designed using industry input and reviewed by leading IEEE experts from academia and the VLSI industry.
- Q&A with industry experts.

2.2 Advantages of IEEE blended learning program:

With the **Blended Learning Program in VLSI,** learners have the convenience of "anytime" learning using an advanced online e-Learning platform. This proven approach provides students the confidence to build a career in the semiconductor field and equips engineering professionals with the skills to quickly become much more productive in their work. The Blended Learning Program in VLSI is based on a best practice structure designed to optimize the learning experience. The program introduces concepts in an easy to understand manner and reinforces application of those concepts at every stage — during practice in a simulation environment, assessments, and hands-on labs to make the training highly effective. This approach makes the program more engaging and rewarding for students, further increasing its training effectiveness and accelerating the learning process. The other advantages of this E-learning program is

- Learn relevant materials developed by industry experts

- Check your understanding through assessments at each stage

- Learn to apply concepts in instructor –Led Labs

- Master concepts through immersive e-learning

- Showcase the knowledge through IEEE certificate of completion

- Understand your competencies through performance analytics.

3.   REQUIREMENTS OF IEEE BLENDED LEARNING PROGRAM:

3.1 Hardware Requirements

In order to use the Blended Learning Platform, a laptop or a desktop computer with following configuration is recommended:

1. Any processor with dual core or above configuration
2. 512 MB RAM (2-4 GB recommended)
3. LAN / WAN, Wi-Fi, or 2G/3G (Minimum 256 kbps connection). Note that the performance with lower speeds might be significantly degraded
4. Sound card and speakers to listen to the audio during e-Learning
5. Screen resolution – 1024 x 768 or higher

3.2 Software Requirements

1. Flash player 9 or above
2. One of the following browsers
   1. Windows
      1. Internet Explorer 9.0 or above
      2. Mozilla Firefox 10 or above
      3. Google Chrome 15 or above
   2. Linux / Mac
      1. Mozilla Firefox 10 or above
      2. Google Chrome 15 or above
3. Pop-up blocker must be disabled
4. Speakers must be configured correctly for listening to the audio during e-Learning.

4.   VIEWS ON IEEE BLENDED LEARNING PROGRAM:

Some of industry experts, students, the E-learner after gone through this IEEE blended learning program and gave their opinions which makes us to understand standard and the importance of e-IEEE blended learning program are given below [2].

"Great initiative to bridge the gap between academia and industry. The program is a step in the right direction to get students ready to face the industry faster and become more productive."-**Mani Srinivasan, Director of Global Design Services and Product Organization, IBM.**

"What makes the course unique is that all course material is thoroughly reviewed by leading IEEE experts from industry and academia before it is incorporated in the training program. This initiative will truly help India achieve a leadership position in the industry and help accelerate growth in the ESDM sector."-**YatinTrivedi, Director of Standards and Interoperability Program, Synopsys.**

"e-Learning was superb and innovative. This initiative by IEEE is very appreciable. The concept of the 'topic' is exceptional. The lab sessions were great – the tutors were very helpful. This program is the bridge between industry and academia. We were unable to express what the industry needed before taking this program – now we understand not just what the industry wants, but what we are expected to tell students."- **Chetan Huchegowda - ECE, CMRIT.**

The program can provide early experiences and deeper perspectives on the practical technology challenges in the industry. Thus, the students are better prepared to hit the ground running when they are hired by a company."-**Vivek De, An Intel Fellow and Director of Circuit Technology Research, Intel Labs.**

E-Learning course was a nice experience. We didn't have to sit in a classroom and rush through the topics. It was really nice to learn at my own pace. The labs were good, upto the industry standards and got a glimpse of how my working environment would be. The three things I liked about IEEE Blended Learning Course: There were not many students in the classroom and the learning process was slow and steady. The trainers were very helpful and cleared all doubts at any point of time. Great lab infrastructure and worked on Microsystem for the first time."- Student.

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"Looking to improve your practical skills and advance your career in VLSI, IEEE Blended Learning Program can help you gain the practical, hands-on skills top technology companies are looking for. The video in this program also features some of the students learning experiences and how the program added value to their engineering degree"-Professor.

5.   RESULTS AND DISCUSSIONS

Here is a graph in Fig 1. shows the efficiency of this IEEE Blended Learning Program tool for VLSI compared to other VLSI online courses from the reviews of institute and industry experts and learners. The Fig. 2 shows the percentage of learner improvement in IEEE blended learning program after 2013. The result reveals that the efficiency of IEEE blended learning program for VLSI design is high as 90% and the percentage of learners of the same is also improved from 25% to 90% after 2013. Thus this reveals that VLSI experts can easily earn and develop their standard product by learning this E-learning tool.
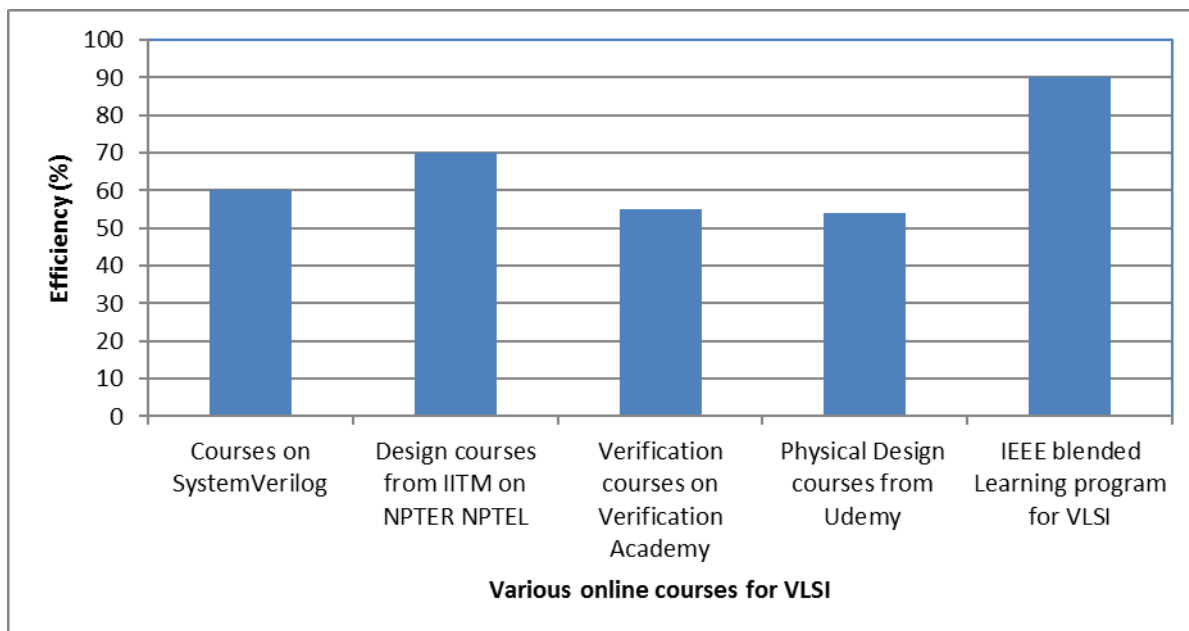
Fig 1. Efficiency of Various online courses for VLSI design
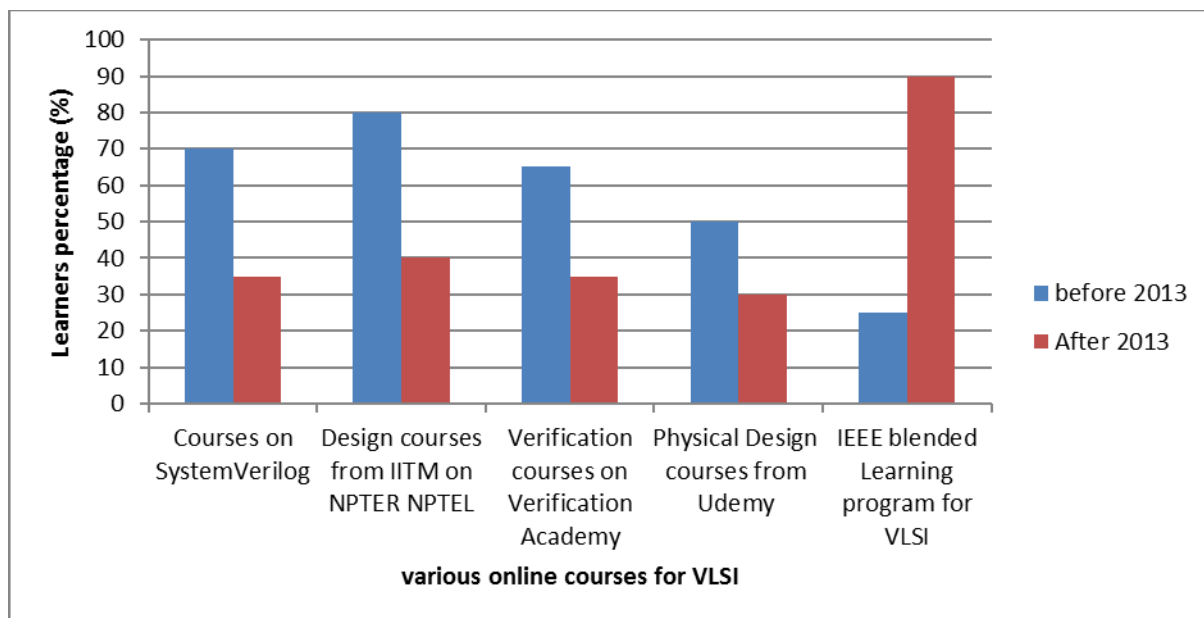
Fig 2. Analysis on percentage of learners of various online courses for VLSI

6.   CONCLUSION

E-Learning is a broad term that encompasses many teaching approaches, types of technologies and administrative practices. A challenge in analyzing E-learning is that the technologies and their educational applications are developing extremely rapidly. Today number of E-learning courses are available. But standardization of the course and it is incorporated with educational systems is a problem. So this paper gives a view of standard E-learning program in the field of VLSI called IEEE blended learning program. With the IEEE Blended Learning Program, we can adapt to the newest technologies and enjoy valuable instructional E-learning techniques. Also, we attain extensive hands-on practice to build competency and the skills necessary to create complex products with the leading EDA tools used in the semiconductor industry.

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