

Experiential Learning Framework for Signals and Systems: An Attempt Towards Reaching Higher Levels of Cognition.

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Abstract: In this paper, we propose an experiential learning module for the course Signals and Systems (SNS). This course is designed in the second year of the Electronics and Communication Engineering stream and challenging course as it demands a higher level of cognition skills. Experiential learning is a series of activities that allow students to be actively involved in ensuring learning. The experiential learning module enhances the problem-solving skills towards reaching higher levels of cognition, moving from the lower levels of remembering, understanding. Typically, the conventional modes are teacher-centric, visual learners and sequential learners find challenges in stimulating their cognition skills. Towards this, we design an experiential learning framework with two techniques: Concept inventory and SNS with Python to facilitate sequential learners and visual learners respectively. The challenges associated with the deployment of our framework are time and resource management. The proposed framework facilitates achieving a higher level of cognitive skills; also the introduction of the simulating tool ensures the conceptual learning of the course beyond classroom learning.

Keywords: Cognition skills, Concept inventory, Python, Sequential learners, Visual learners

1. Introduction

Facilitation of the course content using traditional methods, i.e. chalk and talk method initiate only knowledge transfer of 100% for the creamy layer of students. The statistics reveal that 65% of the students are visual learners and the rest are sequential learners. It is the responsibility of a tutor to discover and implement different pedagogy methods to be inculcated with traditional teaching [1], [4]. Signals and Systems is one of the basic courses in the Electronics and Communication curriculum and the concepts in this course are closely associated with mathematics. This course is a prerequisite course for different core courses like DSP, Communication, VLSI, Wireless communication, etc. As a mathematically oriented subject, students found it challenging to link mathematics and Signals and Systems course concepts to solve given signal processing applications due to a lack of a higher level of cognition skills and visualization of the concepts. To improve their cognition skills Concept inventories were floated to build the competency among the learners to address problems of the course Signals and Systems. Typically, the problems are designed at different levels of Bloom's taxonomy, and

students are allowed to carry out this activity as a part of their continuous evaluation [2], [3]. The performance at different complexity levels is used to reframe the structure of the further synchronous sessions. To enhance their visualization skills of signals and systems concepts a programming language called Python was introduced. This approach develops a constructive framework in students' minds to represent the concepts behind mathematics logically. This approach provides the benefits of visualization of signals and its operations to the learners along with enhancing their coding skills. We consider the employer's feedback and choose Python as a supporting language for the course Signals and Systems. Implementation assignments including signal generation and its operations are designed and evaluated as part of their continuous evaluation. Experiential learning is appreciated by experts and also by students. Authors in [10], [11] discuss "Learning by doing" activity to ensure the learning beyond the classroom teaching.

For many years K.J.Somaiya Institute of Technology has placed prior emphasis on achieving almost all the educational outcomes demonstrated by the OBE framework. The activities introduced in the signals and systems course play a very significant role in programmatic accreditation and better assessment of learning outcomes for continual improvement. Major efforts as a facilitator are to provide a better assessment tool for enhancing the learning capability of the pupil as well as to extend the learning outcome assessment. To improve the overall assessment strategy of the course signals and systems an additional pedagogy method is introduced in this paper.

The content that is being covered fairly distributes from introducing the concept of signals, systems, and their analysis for continuous-time and discrete-time signals, its interaction with continuous-time and discrete-time systems, and related properties. Also, the students experience frequency domain existence for every time-domain representation that provides a lower level of abstraction in the form of trigonometric and exponential Fourier series, Fourier transforms, Z transforms and their applications. All these concepts are pretty challenging for a facilitator to convince the students because the course is more bent towards the conceptual analysis, contains a higher level of abstraction and a student needs to have a strong fundamental base in mathematical solving skills as well as comprehension of the meaning behind the mathematics as the students are being exposed to the frequency domain as well [7], [8]. A necessity to create a contemporary method

Experiential Learning Paper

SJ Ball



Experiential Learning Paper:

Using Experiential Learning in the Classroom Scott D. Wurdinger, 2005-04-13 While research and common sense tells us that experiential learning is more effective than the more traditional process of information assimilation where teachers lecture test and grade high school college and university teachers continue to use paper and pencil tests as their primary grading and assessment tool Many students fail to see the relevance of these sort of tests and are bored with passive methods of learning Using *Experiential Learning in the Classroom Practical Ideas for All Educators* explains what experiential learning is why it works and how it can be used in both high school and post secondary educational settings Tools for assessing experiential learning are also provided A must have resource for high school teachers and college professors

Experiential Learning Morris T. Keeton, 1976 Proceedings of the 25th European Conference on Knowledge Management Dr. Nora Obermayer, Dr Andrea Bencsik, **Resources in Education** ,1998 **Experiential Learning** Universitat ha-Ivrit bi-Yerushalayim. Science Teaching Department, 1984 Joernaal Van Die Suid-Afrikaanse Instituut Van Siviele Ingenieurs ,2001 *Resources in Education* ,1997 *A Casebook on Practice in Internship Education* Holly Zanville, 1982 *Experiential Learning in Higher Education* Jeffrey A. Cantor, 1997 This report reviews the literature and research on the use of experiential learning in higher education focusing on classroom community linkages It defines experiential learning and reviews the current employment of experiential learning in higher education An introductory section explains the politics and policy issues of experiential learning at the higher education level and describes predominant forms of experiential education current levels of participation a conceptual framework and administrative issues and concerns The next two sections discuss the issues in programs using experiential learning in the arts and humanities social sciences health care social work science and engineering business education and technology programs The fourth section focuses on experiential learning in the context of service learning with emphasis on the linking of theory and practice and cross disciplinary pedagogical and instructional issues The fifth section reviews cooperative education initiatives which link classroom and community for benefits for faculty community students and businesses The final section provides a synthesis of successful practices This section stresses the importance of a systematic approach to designing experiential learning activities program administration and evaluation Contains approximately 120 references MDM Higher Education and the Real World Zelda F. Gamson, 1989 **Simulation & Games** ,1983 **Enhancing the Skills of Early Childhood Trainers: Rationale for experimental** Kate Torkington, 1995 **College Student Personnel Abstracts** ,1975 **Conference Proceedings** ,2004 **Improving University Teaching: Contributed papers** ,1984 **Making Sense of Experiential Learning** Susan Warner Weil, Ian McGill, 1989 Management & Accountancy Research Working Papers ,1983 *Yearbook of Adult and Continuing Education* ,1980-09 **Experiential Learning in a Traditional Classroom** Frederic P. Roberts, 2016 Experiential learning theory student driven learning methods and brain research

related to learning and memory support the use of experientially based learning activities in a traditional classroom. It is the author's opinion however that teachers rarely make use of such activities termed Learning Games in this paper as a means to help students learn, retain, and recall material presented in the classroom. Reasons include a lack of training and a perceived limit of time for the inclusion of experientially based teaching techniques. Others argue that experiential learning resembles unguided learning and places undue demands on student working memory that can hinder effective learning. This paper presents support for the use of Learning Games activities developed by the author based on research and the value of fun, play, and games to enhance the learning process. Significance of the study is to increase the acceptance of experiential learning in a traditional classroom, to dispel preconceived notions, and to expand on a teacher's diversity of teaching techniques to offer more opportunities for student learning. A mixed methods research design is used to evaluate student preference to experiential learning pedagogy to that of traditional classroom instruction. The results showed no significant difference in student preference between experiential and traditional pedagogy. Possible reasons include factors related to the school's culture and traditions, student demographics, teacher inexperience, and classroom environment. Heuristic inquiry reveals the researcher's teaching philosophy and methods incongruent to the research setting. leaves iii iv Abstracts of the Annual Meeting American Anthropological Association, 2008

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Table of Contents Experiential Learning Paper

1. Understanding the eBook Experiential Learning Paper
 - The Rise of Digital Reading Experiential Learning Paper
 - Advantages of eBooks Over Traditional Books
2. Identifying Experiential Learning Paper
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Experiential Learning Paper
 - User-Friendly Interface
4. Exploring eBook Recommendations from Experiential Learning Paper
 - Personalized Recommendations
 - Experiential Learning Paper User Reviews and Ratings
 - Experiential Learning Paper and Bestseller Lists
5. Accessing Experiential Learning Paper Free and Paid eBooks

- Experiential Learning Paper Public Domain eBooks
 - Experiential Learning Paper eBook Subscription Services
 - Experiential Learning Paper Budget-Friendly Options
6. Navigating Experiential Learning Paper eBook Formats
 - ePub, PDF, MOBI, and More
 - Experiential Learning Paper Compatibility with Devices
 - Experiential Learning Paper Enhanced eBook Features
 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Experiential Learning Paper
 - Highlighting and Note-Taking Experiential Learning Paper
 - Interactive Elements Experiential Learning Paper
 8. Staying Engaged with Experiential Learning Paper
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Experiential Learning Paper
 9. Balancing eBooks and Physical Books Experiential Learning Paper
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Experiential Learning Paper
 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
 11. Cultivating a Reading Routine Experiential Learning Paper
 - Setting Reading Goals Experiential Learning Paper
 - Carving Out Dedicated Reading Time
 12. Sourcing Reliable Information of Experiential Learning Paper
 - Fact-Checking eBook Content of Experiential Learning Paper
 - Distinguishing Credible Sources
 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development

- Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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