Original Article

Learning Android Programming through Active Learning Environment

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Abstract - *The traditional classroom environment has been transformed into an active learning environment in today's digital generation. The active learning environment leads to outcome-based education. The outcome-based education for teaching-learning aims to provide a well-articulated learner-centric approach and create an environment that facilitates lifelong learning. The purpose of the teaching-learning process is student-focused which promotes the requisite knowledge, skills, and attitudes. This paper presents an active learning problem-based method to teach Mobile Application Development to undergraduate students. In the first phase, each student is assigned challenging problems and is asked to design the User Interface (UI), Content Development (CD), and Page Navigation (PN) based on the concepts demonstrated in the classroom. The second part of implementation involves execution using animation and Unit testing that needs to be carried out by the students through an active and participatory role in their learning through learning communities. Through Active Learning Environment, the course outcomes are also achieved, which are assessed using direct and indirect measures.*

Keywords - *active learning, outcome-based education, Phases, Design, Implementation,*
*Course Outcomes, Direct Measure, Indirect Measure*s.

I. INTRODUCTION

The Teaching-Learning Process provides a path for the students to enhance their skills and exhibit new innovative ideas [1]. The OBE adaptation prepares the students to grab the driving force opportunities brought by the advancements in technology and globalization. In the course Mobile Application Development, the students are prepared for current technology requirements by learning the android programming from fundamentals to the testing of implementation before deploying to the app store through Active Learning Process.

II.DELIVERY METHOD EMPLOYED

The learning strategy for Android programming is blended through problem-based learning [2] in two phases, as shown in fig 1, which enables the students to achieve the course learning outcomes (Table-1), inducing cognitive process dimensions. The active learning approach focused on CO5 &CO6[3]
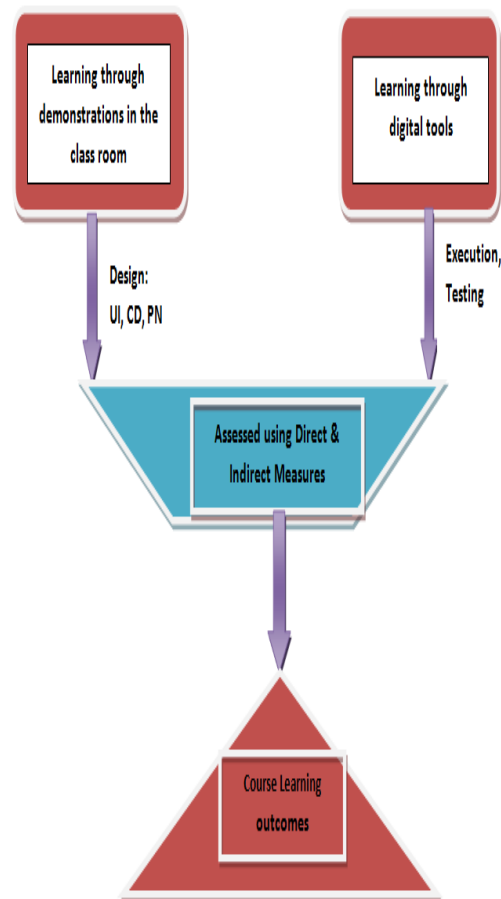

Fig. 1 Active learning process in two phases for android programming

Table 1.

CO1	Understand the components, controls, adapters, menus, packages, services, and related functionalities of Android for mobile application development.
CO2	Apply the knowledge of constructs in Java and XML to obtain feasible modules as a solution for engineering problems.
CO3	Analyze packages, project libraries, and services to obtain a framework for solving problems in the development of mobile applications.
CO4	Obtain the code patterns by investigating resources to arrive at valid conclusions.
CO5	Create GUI-based programs based on common controls, themes, actions, components, handlers, and mapping packages using Android Studio/SDK.
CO6	Design mobile Apps to provide real-world problems by incorporating multidisciplinary settings.

Table 2.

Rubrics	**Excellent**	**Good**	**Fair**
User Interface/Activity Design	The GUI is laid out in a logical manner that is both aesthetically pleasing and Functional. It is easy to locate all elements.	The GUI is laid out in a way that might be aesthetically pleasing and functional. It is easy to locate a few important elements.	The GUI is laid out in a way that might be aesthetically pleasing or functional.
Validation of user input	Validations have been carried out for all user inputs completely in all the WebPages	Most of the validations have been carried out for all form fields completely in all the WebPages	Few validations have been carried out for the form fields in the WebPages.
Content development	Specifies complete content development	Partially specifies complete content development	specifies few content development
Page Navigation	Links for navigation are clearly labeled, consistently placed, allow the reader to easily move from activity to related activities (forward and back), and take the reader where s/he expects to go. A user does not become lost.	Links for navigation are clearly labeled, allow the reader to easily move from activity to related activities (forward and back), and internal links take the reader where s/he expects to go. A user rarely becomes lost.	Links for navigation take the reader where s/he expects to go, but some needed links seem to be missing. A user sometimes gets lost.

As a challenging problem, each student was assigned individually to create a laboratory learning application of computer science engineering branch for the practically oriented courses such as data structures lab, C programming lab, computer graphics, and analysis and design of algorithms, common syllabus of state university which at the end could be integrated course wise that facilitates remote access for rural students. The students carried out the tasks through the process of the following learning phases:

A.First Phase: Learning through demonstrations in the classroom environment process

The demonstration method of teaching shows learners how to do a task using sequential instructions to perform the tasks independently. Demonstrations provide examples that enhance lectures and offer effective hands-on, inquiry-based learning opportunities in classes and labs. Each student is assigned scenarios in the first week of the comprehensive Mobile Application Development Course. When using the demonstration model in the classroom, the topic being taught, such as the design of UI concepts, content development, and page navigation for an Email Application in android programming, performs the tasks step-by-step so that the learner will eventually be able to complete the same task independently. The eventual goal is for learners to duplicate the task and to problem-solve when unexpected obstacles or problems arise.

Plan of evaluation - Review1 for the phase1 with the following rubrics:

B.Second Phase: Learning through digital tools

Digital learning technologies develop students' proficiency in application learning and facilitate the widespread sharing of knowledge. In this phase, the Database Connectivity such as Mongo DB, execution through animation, and testing is incorporated through self-learning exploiting Digital Tools such as free online courses(MITx on edX,)videos, and forums.

Plan of evaluation – Review2 for the phase2 with the following rubrics:

Table 3.

Rubrics	**Excellent**	**Good**	**Fair**
Database Connectivity	Connectivity with efficient time management	Connectivity without time management	No connectivity
Execution	Demonstration of all the requirement specification functionalities through animated inputs and outputs	Demonstration of important requirement specification functionalities. through animated inputs and outputs	Demonstration of only a few basic requirement specification functionalities without animations
Testing	Testing successful for all the functionalities implemented	Testing successfully for only important functionalities implemented	Testing was not successful for any of the functionalities implemented

The review1 & review2 rubrics are assessed for 30% of CIE, which measures the course learning outcomes of the course Mobile Application Development [4] Another indirect measure to assess the impact of the Active Learning Environment process is through the course end survey [5].

C. Course end survey questions

i. Rate your understanding of Android activities and life cycle.
ii. What is your level of demonstrating the logic of the program using common controls?
iii. How do you rate your familiarity with Adapter Views and custom adapters?
iv. Gauge your implementation ability for dynamic menus, action bars, styles, and themes.
v. What is your programming skill to code fragments, packages, and processes?
vi. What is your proficiency in developing code patterns for sharing data?
vii. To what degree have you understood HTTP services and requests?
viii. Evaluate your knowledge of constructing programs using broadcast notifications.
ix. What is your coding expertise in creating a database and applying transactions?
x. How do you assess your implementation concepts on the mapping package?

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Excellent	30	26	24	23	24	22	21	27	24	26
Very Good	14	17	22	17	18	21	18	9	19	15
Good	13	13	11	17	15	13	15	19	14	15
Fair	0	1	0	0	0	1	3	2	0	1
Poor	0	0	0	0	0	0	0	0	0	0
Total Students	57	57	57	57	57	57	57	57	57	57
Attainment	85.96	83.86	84.5	82.10	83.2	82.45	80	81.40	83.50	83.15

The attainment of the course end survey questionnaires is between 81% to 85% which needs to be targeted further to attain above 90%

To evaluate the students' skills acquired through the Outcome-based approach, the pattern of the Semester End Question paper has been framed with a high level of Bloom's Taxonomy[6] as depicted in the table below and for which the results were obtained is as shown in the graph.

Table 4.

		Remember/ Understand	Apply Knowledge	Analyze	Design	Any other (Specify)	Total marks
S E E	Q1 a		(i)(08)	(ii)(04)			12 08
	Q1 b		✓ (08)				
	Q2 a	✓ (10)					10 10
	Q2 b				✓ (10)		
	Q3 a			(12)			12
	Q3 b		✓ (08)				08
	Q4 a	✓ (10)					10
	Q4 b			10	✓		10

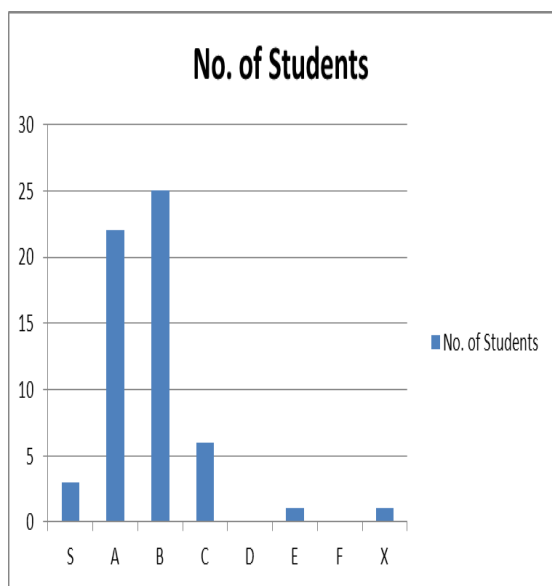|						
Q 5 a	✓ (12)					12
Q 5 b				08		08
Q 6 a	✓ (10)					10
Q 6 b				✓ (10)		10
Q 7 a		08				08
Q 7 b	✓ (12)					12
Total Marks	54	32	26	28		140

Fig. 2 Results Graph

The outcome of assigning the app development is that compared with the previous batch, most of the students were placed in top companies, and some of them got internships in APP development, which led to 100% placement in that batch. Since previous batch of students had only theoretical approach to Mobile App Development course, the placements have deteriorated and also the APP development had more impact on higher studies [7]

III.CONCLUSION

Students and faculties benefit from a transformative education enabled by new digital technologies and innovative approaches to learning. The adaptation of OBE enables the course learning outcomes. It prepares the students to learn and enhance their skills to compete with the challenging real-world applications in the digital generation.

REFERENCES

[1] Bonwell CC and Eison JA (1991) Active Learning: Creating Excitement in the Classroom. Washington, DC: School of Education and Human Development, George Washington University.

[2] Bradford M (2005) Motivating students through project-based service-learning. THE Journal 32(6): 29–31.

[3] Nkhoma M, Sriratanaviriyakul N, Pham CH and Khai LT (2014) Examining the mediating role of learning engagement, learning process and learning experience on the learning outcomes through localized real case studies. Education+ Training 56(4): 287-302.

[4] Dunning PT (2014) Developing competency-based assessment approach for student learning. Teaching Public Administration 32(1): 55–67.

[5] Handelsman MM, Briggs WL, Sullivan N, et al. (2005) A measure of college student course engagement. The Journal of Educational Research 98(3): 184–92.

[6] Krathwohl, DR (2002) A revision of Bloom's taxonomy: An overview. Theory into Practice 41(4): 212–25. Google Scholar, Crossref, ISI

[7] Kember D and Leung DYP (2005) The influence of active learning experiences on the development of graduate capabilities. Studies in Higher Education 30(2): 155–70.

[8] Machemer, P, Crawford, P (2007) Student perceptions of active learning in a large cross-disciplinary classroom. Active Learning in Higher Education 8(1): 19–30. Google Scholar, SAGE Journals

[9] Grave BS (2011) the effect of student time allocation on academic achievement. Education Economics 19(3):291–310.

[10] Honkimaki S, Tynjala P and Valkonen S (2004) University students' study orientations, learning experiences, and success in innovative courses. Studies in Higher Education 29(4): 431–49.

[11] A.Adedina, L. Bolaji, and T. Oyetoro, " Computer Assisted Instruction" Retrieved on the 16th October 2010 from www.info.com.

[12] I.A.Adeleke, M. A. Rahman, and I.O. Muraina, " Fundamentals of Computing," Lagos, Paranormal Communications, 82-88, 2011.

[13] A.B.Adewumi," The Computer Age", Retrieved on the 16th October, 2010 from www.wikipedia/encyclopedia/ computerage, 2008.

[14] Association for Educational Communications and Technology, Educational technology: Definition and glossary of terms (Vol. 1). Washington, D.C.: Association for Educational Communications and Technology, 1977.

[15] S.A.Bakar, "Teaching Multimedia Through Computer Supported Collaborative Work (CSCW)," Paper presented at the International Conference on IT & Multimedia (ICIMU, 98), 28-29,1998.