



## COMPARING SELF-LEARNING AND ACTIVITY-BASED APPROACHES WITH CONVENTIONAL TEACHING IN ENHANCING ICT EDUCATION FOR SRI LANKAN YOUTH (AGES 16-21)

*M.D.R.A.K. Abeyratne\**

*Department of Computer Science,  
The Open University of Sri Lanka, Sri Lanka*

This study examines how well conventional methodologies of teaching perform against self-learning strategies, which can be sub-classified under research-based and activity-centered methodologies, in enhancing the standard of ICT education among the age group of 16 to 21 (late adolescence to early adulthood) in Sri Lanka. It will use a mixed-method research model, constituting both quantitative and qualitative analysis, to determine the variations such modes of teaching bring about in the learning ability, performance, and critical thinking of the category under study. A sample of 100 students registered under an ICT course at the Open University of Sri Lanka, Gampaha Centre, undertook a pre-and post-assessment test, observations, and group activities. Relative to the traditional teaching method, research-based and activity-based self-learning approaches are estimated in what proportions are needed in the teaching methods for information and communication technology education in Sri Lanka, and thus the order that should be prioritized. The finding is suggested through this study. Recommendations include further exploration of the short-term and long-term effects of these modalities.

Keywords: ICT Education, Conventional Teaching, Self-Learning, Research-Based, Activity-Centred, Sri Lanka.

\*Corresponding Author: [abeyratnerandima@gmail.com](mailto:abeyratnerandima@gmail.com)



## COMPARING SELF-LEARNING AND ACTIVITY-BASED APPROACHES WITH CONVENTIONAL TEACHING IN ENHANCING ICT EDUCATION FOR SRI LANKAN YOUTH (AGES 16-21)

*M.D.R.A.K. Abeyratne\**

*Department of Computer Science,  
The Open University of Sri Lanka, Sri Lanka*

### INTRODUCTION

Education is the fundamental unit around which a society is built. Teaching-learning methodologies, hence, significantly contribute to the formation of skills and competencies in an individual. Therefore, this study tries to compare the conventional methods of teaching with research-based self-learning and activity-centered self-learning approaches in teaching Information and Communication Technology for the 16-21 age group, the transition stage of school level education to university level education in Sri Lanka.

This obstacle to providing students with the much-needed skills in critical thinking, problem-solving, flexibility, and adaptability in an increasingly fast-paced ICT environment has been the passive teaching and learning traditionally followed within the education system in Sri Lanka. Techniques in self-learning activities that are based on research and centred on activities would encourage student activity or engagement, independent inquiry, and collaboration, which would help better understand and apply concepts from the ICT field. This research seeks to determine the best approach to be used in teaching by identifying the most effective based on academic performance, engagement levels, and learning achievement within the 16-21-year-old age group. This study will also try to determine the influence of such approaches on critical thinking and information literacy toward the acquisition of lifelong learning. It is for these reasons that such a study is essential to guide the educators, policymakers, and stakeholders in their decisions and reforms of pedagogy to improve the quality and relevance of ICT that would be delivered to the digital, networked world of Sri Lanka.

### METHODOLOGY

#### 1. Objectives

##### ***1.1 The Main Objective is To Compare Teaching Methodologies:***

-Primary Objective: To compare the effectiveness of conventional approaches versus research-based self-learning and activity-centered self-learning for the enhancement in ICT education among students (aged 16-21 years) in Sri Lanka.

-Secondary Objective: To find out if those methodologies could affect the academic performance, critical thinking, problem-solving ability, and information literacy of the students.

##### ***1.2 To Analyse Student Engagement:***

-To evaluate the level of student engagement, participation, and collaboration in ICT education in Sri Lanka, across the three teaching methodologies.

-To determine how each teaching methodology influences the motivation, curiosity, and independent inquiry of the students in learning ICT concepts.

##### ***1.3 To Measure Learning Outcomes:***



- To measure the improvement in students' ICT-related competencies through pre and post-assessment tests for each teaching methodology.
- To identify which teaching methodology yields the highest improvement in student performance in ICT education.

#### ***1.4 To Explore Long-Term Learning Impact:***

- To understand how each methodology contributes to the development of lifelong learning skills among students in the specified age group.

#### ***1.5 To Provide Recommendations for ICT Education:***

- To suggest some of the most effective teaching methodologies for the enhancement of ICT education among Sri Lankan youth to educators, policymakers, and the general public.
- To suggest potential improvements in ICT education practices that would go a long way in improving the quality of ICT education in an increasingly digital, networked world.

## **2. Research Design**

This research will have a mixed-method design that combines both quantitative and qualitative methods to effectively understand the effectiveness and relative advantage of three different teaching methodologies: Conventional Teaching, Research-Based Self-Learning, and Activity-Centered Self-Learning. This research design focusses on measuring the student performance of the engagement of the students in long-term learning outcomes. A mixed-method approach better allows for triangulation of data, which improves the validity and credibility of the findings.

**2.1 Quantitative Component:** The quantitative aspect involves pre- and post-assessment tests to measure academic performance and competency improvement among students across the three methodologies.

**2.2 Qualitative Component:** The qualitative aspect includes observations, interviews, focus groups, and feedback forms to evaluate student engagement, motivation, collaboration, and critical thinking skills.

(Further details can be found under the analysis)

## **3. Participant Selection**

**Target Population:** Students aged between 16 and 21 years, enrolled to follow an ICT course at Open University Sri Lanka, Gampaha centre. Since it allows the representation of a wide range of socioeconomic and educational contexts, a scope of purposive sampling would be possible. Considering the need for floor effects, the effect size of the hypothesised differences between the teaching methodologies under purview, sample size estimation, and feasibility, it was decided to take 100 participants in this study.

## **4. Data Collection Methods**

**Observations:** Students' competencies regarding ICT-related concepts are established using standardised testing performed before and after applying each methodology. Such pre- and post-assessment tests are there to provide information about performance objectively and to be able to offer comparisons to the different groups tested. Observing the way that they perform in answering the questions during the lessons and how they perform in group activities and presentations. Another observation was appended when students observed the performance of other groups during the evaluation process.



**Forms, Interviews, and Focus-Groups:** In addition, collected evaluation forms from each group regarding the performance of their fellow students, and at the end, collected feedback forms from each student regarding the teaching methodology. Furthermore, the observation of students was also collected via self-evaluation and feedback.

## 5. Data Analysis

**5.1. Quantitative Analysis:** Quantitative analysis has been carried out to show the comparative score increment of the students with each methodology: conventional teaching, research-based self-learning, and activity-centred self-learning. Thereby, it will compare the difference in the student test scores before and after carrying out each of the teaching-learning methodologies. Their efficiency will be compared based on the improvement ratio among the three methodologies.

**5.2. Qualitative Analysis:** It will touch on the performance, presentation skills, and participation of the students in data collection and problems. It incorporates the review of the capability of the students to solve logical issues concerning how they relate with other students and their inquisitiveness in exploring different avenues other than those that have been covered in class. Analysis of the qualitative data themes will be done from the information of the focus groups and the classroom observations. This set of data provides an opportunity to find patterns, recurrent themes, and dividend factors that will influence the set of data regarding student participation in group activities and presentations for students' learning experiences and outcomes. Additionally, evaluation reports were collected from students on the performance of their fellow students in group activities, allowing them to see and compare their strengths and weaknesses. Furthermore, feedback reports were gathered from each student regarding the study to understand their opinions on their progress.

## RESULTS AND DISCUSSION

### 1. Results

#### 1.1 Demographic Distribution of Study Participants:

Female and male students between the ages of 16 and 21 were selected for the research.

Age Group	Male (n=43)	Female (n=57)	Total
16-18	14	12	26
19-21	29	45	74
<b>Total</b>	<b>43</b>	<b>57</b>	<b>100</b>

Table 1: Demographic Distribution of Study Participants

The distribution of the male participants in this research between age 16 and 18 is slightly higher than that of female participants, and the female participants in this research between age 19 and 21 is higher than that of male participants (male: female = 43%:57%), which could be typical of the gender demographic distribution observed in educational settings. In addition, the proposal guarantees that the research will consider both age groups; therefore, the findings obtained will be very detailed concerning possible issues linked with variations in learning preferences and experience.

#### 1.2 Mock Test Performance Comparison:

Table 2 presents the mean scores obtained by students across the three methodologies, facilitating a comparative analysis of learning outcomes.



Teaching Methodology	Pre-Assessment Mean Score	Post-Assessment Mean Score	Improvement
Conventional Teaching	68	74	+6
Research-Based Self-Learning	63	80	+17
Activity-Centered Self-Learning	59	85	+26

Table 2: Mock Test Performance Comparison

The data shows that the academic performance from postexposure to the research-based self-learning methodology and the activity-centered self-learning methodology in the conventional teaching method increased significantly. Both methodologies showed a significant increase in post-assessment mean scores, with activity-based self-learning a 26-point increase and research-based self-learning a 17-point increase.

### 1.3 Feedback from Students:

Based on the introduced teaching methodology, they self-evaluated and gave feedback on their performance, and according to their feedback, they apparently saw a great improvement in their knowledge gained compared to their previous learning methods.

### 1.4 Comparison of Teaching Methodologies:

Table 3 provides a detailed comparison of the three teaching-learning methodologies, highlighting their key characteristics and educational approaches.

Methodology	Key Features
Conventional Teaching	Teacher-centered approach, Passive learning Focus on content delivery without active student engagement
Research-Based Self-Learning	Emphasis on independent inquiry, Student-led exploration, Access to research resources, Promotion of critical thinking and analysis
Activity-Centered Self-Learning	Collaborative learning activities, Hands-on projects and exercises, Interactive sessions, Encouragement of active participation

Table 3: Comparison of Teaching Methodologies

## 2. Discussion

This exceptional influence of the excellent novel teaching-learning methods using activity-based research and research-based activity is something that emerges through the findings of the study to develop self-learning approaches toward improving learning outcomes, in particular for ICT education in Sri Lanka. Moreover, an enhancement in the mock test scores indicated a moderate to large effect size that continued the practical importance of these approaches in the context of knowledge gain. Above all, the increase in the percentage of students who passed the final examination compared to previous batches of students who took the course, demonstrates the positive results of the novel teaching-learning methodologies.

### 2.1 Findings:

To determine the approximate ratio of conventional teaching methodology (CTM), research-based self-learning methodology (RBSLM), and activity-centered self-learning methodology (ACSLM) based on the findings provided:



Conventional Teaching: Improvement = +6 points (6 points improvement)  
Research-Based Self-Learning: Improvement = +17 points (17 points improvement)  
Activity-Centered Self-Learning: Improvement = +26 points (26 points improvement)

The ratio of RBSLM to CTM =  $17/6 \approx 2.83$ . The ratio of ACSLM to CTM =  $26/6 \approx 4.33$

Therefore, according to the study, the estimated ratio of using CTM: RBSLM: ACSLM for IT education in Sri Lanka for the aforementioned age category, based on the improvements observed in post-assessment mean scores, is 1 : 2.83 : 4.33. According to the collected data (based on the population), the approximate ratio of;

CTM : RBSLM : ACSLM  $\approx 1 : 3 : 4$ .

Therefore, the order of the efficacy of the three methodologies from the research findings, working to the approximate ratios ought to be: **conventional teaching methodology < research-based self-learning methodology < activity-centered self-learning methodology** (This ratio can be varied according to the personality of the individual of the sample).

## CONCLUSION/RECOMMENDATION

**1. Conclusion:** According to the research, it is proven that the two methodologies of self-learning, research-based and activity-centered, make IT education better among the age group of 16-21 (where it is the intermediate position of changing from regular high school educational methodologies to the undergraduate level in Sri Lanka), better in performance as compared to the conventional teaching methodology with the order of performance of Conventional Learning < Evidence-based self-study < Experience-based self-study.

**2. Recommendations:** Compare and contrast the conventional teaching methodology with the research-based self-learning methodology and the activity-centered self-learning methodology, focusing on their long-term versus short-term impacts.

## REFERENCES

Biggs, J. B. (2003). Teaching for Quality Learning at University. ResearchGate. [https://www.researchgate.net/publication/215915395\\_Teaching\\_for\\_Quality\\_Learning\\_at\\_University](https://www.researchgate.net/publication/215915395_Teaching_for_Quality_Learning_at_University).

Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall.

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How People Learn: Brain, Mind, Experience, and School* (Expanded ed.). National Academy Press.

Oliver, R. (n.d.). Assuring the quality of online learning in Australian higher Assuring the quality of online learning in Australian higher education education. <https://ro.ecu.edu.au/cgi/viewcontent.cgi?article=5791&context=ecuworks>

Wenger, K. (2014). Problem-Based Learning and Information Literacy: A Natural Partnership. *Pennsylvania Libraries*, 2(2), 142–154. <https://doi.org/10.5195/palrap.2014.61>

Lorenzen, M. (2001). Active learning and library instruction. *Illinois Libraries*, 83(2), 19-24. <http://www.informationliteracy.net/>

Sawant, S. P., & Rizvi, S. (2015). Study of passive didactic teacher centered approach and



an active student centered approach in teaching anatomy. *International Journal of Anatomy and Research*, 3(3), 1192-1197.

[https://www.researchgate.net/publication/282468334\\_STUDY\\_OF\\_PASSIVE\\_DIDACTIC\\_TEACHER\\_CENTERED\\_APPROACH\\_AND\\_AN\\_ACTIVE\\_STUDENT\\_CENTERED\\_APPROACH\\_IN\\_TEACHING\\_ANATOMY](https://www.researchgate.net/publication/282468334_STUDY_OF_PASSIVE_DIDACTIC_TEACHER_CENTERED_APPROACH_AND_AN_ACTIVE_STUDENT_CENTERED_APPROACH_IN_TEACHING_ANATOMY)

## **ACKNOWLEDGMENTS**

The motivation and support given by Mr. Jagath Madurasinghe, Senior Lecturer OUSL, Gampaha, and Mrs. Yashodhya Perera, former Assistant Director, OUSL, Gampaha, are highly appreciated and would like to be specially thanked. I also acknowledge the students at OUSL, Gampaha, who participated in the study.