

Name: Sajuddin Saifi

Supervisor's Name: Dr. Dori Lal

Name of the Department: Department of Teacher Training & Non-Formal Education (IASE),
faculty of Education, JMI

Ph.D. Topic/Title: Development of competency-based Learning (CBL) Module in
Mathematics for Secondary School Students

Keywords: *Competency-Based Learning, CBL Module, Mathematics, Mathematics Education*

Findings

Objective 1: The relation between content from previous concepts is one of the challenges students face in mathematics. The last class did not find anything related to the earlier concept. Most students find it challenging to write mathematical equations from word problems. This shows the lack of relevance of word problems to students' daily lives and to the formation of equations. Keeping these challenges in mind, five chapters of class IX were selected through a survey: coordinate geometry, linear equations of two variables, triangles, surface area and volume, and statistics.

Objective 2: After knowing the need and analysing the content, the competency-based learning module was developed. The 6Is module was designed to identify the steps to build learners' competency.

SN	Phases	Purpose
1.	Initiation	This phase starts with a formal discussion to draw attention and readiness for teaching learning
2.	Interaction	Making connections between previously learn concepts or experiences of learners
3.	Illustration	Explain the mathematical concepts by differentiated learning approaches.
4.	Implementation	Applying mathematics skills/concepts to solve problems
5.	Internalisation	Integrating mathematical concepts into thinking and applying the same in solving mathematical problems using mathematics and correlating mathematics with other situations
6.	Internal assessment	Evaluating competencies, feedback, and further improvement

Objective 3:

- Before starting the intervention, a Pretest was conducted to randomize the groups. The mean score of the control group was 19.23 with a standard deviation of 2.83. while the experimental group score was 19.78 and the standard deviation was 2.55. The t-value for the Pretest of the two groups was 1.374 ($p=0.174>0.05$), showing no significant difference.
- Performance of control group shows a marginal improvement with mean of the score of the test in general test 26.63 and standard deviation 2.966. Experimental group shows a significant improvement in general tests reaching the mean score of 30.39 and standard deviation of 2.877. The difference between two groups 3.780 and standard deviation 4.119 shows high variation in spreading of scores. T-values 7.048, $p=0.000 < 0.001$. The mathematical concepts students have learner in their previous classes do not significantly affect the learning outcomes of the students F-value .394 ($p=.532 > 0.05$) while method of teaching/Module has a significant impact on the performance of students with F- value (53.963) and $p=0.000 < 0.001$.
- Mean score of the control group in the competency-based test was 21.83 with a standard deviation of 2.606. while the experimental group reached a mean of 26.75 and a standard deviation of 2.970 with a t-value of 10.075 ($p=0.000 < .001$). showing the intervention's significant impact and the module's effectiveness. This can be interpreted as meaning that the intervention given to the experimental group has a significant and positive effect on learners in both the general and competence parts. Results show that previous concepts affect the learning outcome F-values=27.841, $p=0.000 < 0.001$. And if students are exposed to a competency-based learning environment, their learning outcomes and competencies improve. F-value = 86.477, $p=0.000 < 0.001$, which is statistically significant.

Objective 4:

- Comparing the attitude of the control group and the experimental group. The mean score of the control group was 73.30 with a standard deviation of 12.830, while the mean score of the experimental group was 80.80 with a standard deviation of 10.839. Calculated t-value was 3.705 ($p=0.000 < 0.001$), statistically significant. This shows that the intervention was effective in developing students' positive attitudes towards mathematics.