



CONSTRUCTION AND STANDARDIZATION OF THE EFFECTIVENESS OF THE BIOLOGY TEACHING SCALE

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ABSTRACT

This study explores the level of Effectiveness of teaching Biology among prospective Secondary and Higher Secondary Biology teachers. Effective teaching of Biology is essential to bring Fostering Scientific understanding, Critical Thinking, and Environmental Awareness among learners. It focuses on instructional strategies, the use of teaching aids, and the integration of experiential learning approaches. The study adopts a descriptive survey method, with a sample of 100 prospective Biology teachers selected through random sampling. A structured questionnaire was developed and administered to assess their Effective teaching levels in Biology across various dimensions. Statistical techniques such as Mean, standard deviation, t-test, and ANOVA were employed to analyze the data. These findings indicate that a Moderate level of Effectiveness in teaching biology exists among the respondents, there are significant differences based on variables such as Gender, Locality, Type of institution, years of Teaching Experience, and Level of Teaching. The results indicate that the Effectiveness of Biology in teaching is significantly influenced by the use of Activity-Based methods, practical exposure, and the incorporation of real-life context into instruction. The study highlights the need for strengthening teacher training programs by emphasizing innovative pedagogical practice. It concludes that improving teaching effectiveness can lead to enhanced student engagement, deeper conceptual understanding, and better learning outcomes in Biology.

Key Words : *Effectiveness, Biology teaching, Teachers' awareness, Critical thinking, Instructional strategies, Experiential learning.*

INTRODUCTION

The Effectiveness of teaching biology plays a crucial role in enhancing students' understanding, scientific skills, and interest in the subject. To ensure quality instruction, it is essential to systematically measure how effectively Biology is being taught. The construction and standardization of an Effectiveness of Teaching Biology Scale provides a scientific and reliable means to assess various dimensions of teaching, including instructional methods, use of teaching aids, classroom interaction, and evaluation practices. Developing such a standardized tool helps in obtaining valid and consistent data, thereby supporting improvements in teaching practices and contributing to better learning outcomes in Biology Education.

EFFECTIVENESS OF TEACHING BIOLOGY

The effectiveness of teaching Biology refers to the extent to which teaching methods, strategies, and resources successfully promote students' understanding the Biological



concepts, also develops scientific skills, and positive attitudes towards the subject. It involves the use of Activity-Based learning, practical experiences, real-life applications, and interactive teaching approaches that make learning meaningful and engaging. Effective Biology Teaching also encourages critical thinking, observation, and inquiry, enabling students to connect theoretical knowledge with the natural world and apply it in everyday life.

REVIEW OF RELATED LITERATURE

Sunita Arya & Manisha (2018). *A Comparative Study of the Effectiveness of Multimedia and Traditional Methods for Teaching Biology.* To compare the effectiveness of multimedia instruction versus traditional methods on student achievement in Biology. 40 class IX Biology students. Purposive selection of two groups. Comparative experimental design; achievement tests conducted before and after treatments. The experimental group taught with multimedia showed significantly higher achievement than the control group taught by traditional methods. Use of multimedia instructional packages to supplement traditional Biology instruction.

Shipra Rana & Dr. Nain Singh (2020). *Effectiveness of E-Content Package Developed For Teaching Biology at 11th Grade.* To evaluate the effectiveness of a specially developed E-content package compared to conventional classroom teaching in Biology. 60 11th-grade school students. Experimental and control groups. Experimental design using pre-test and post-test achievement scores. Students taught with the E-Content package achieved significantly higher pre-test scores than those taught via existing practices. Use ICT and E-Content as complementary tools in Biology instruction to improve learning outcomes.

MAIN OBJECTIVES OF THE STUDY

The study aims to construct and standardize an Effectiveness of Teaching Biology scale for prospective Secondary and Higher Secondary teachers. It seeks to establish the reliability and validity of the tool and to assess the dimensions of Effective Biology Teaching.

SAMPLE OF THE STUDY

One hundred Biology teachers working in Secondary and Higher Secondary schools in Kanchipuram District were randomly selected as a sample for the study.

PILOT STUDY

To assess the Effectiveness of teaching Biology in the status of Secondary and Higher Secondary teachers, the Effectiveness of Teaching Biology scale was constructed and validated by the investigator and the Research Supervisor. Relevant literature related to the effectiveness of Teaching Biology and its test construction procedures was analyzed for the construction of the tool. The Effectiveness of Teaching Biology scale was constructed after having a discussion with the Assistant Professors, Psychologists,



Biology Teachers, and experts in the field of Education. This scale was designed based on a five-point Likert-type instrument. Initially, fifty items were prepared. For Positive items, the scoring procedure for Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree is given as 5, 4, 3, 2, 1 respectively. In case of Negative items, the Scoring procedure for Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree is given as 1, 2, 3, 4, 5 respectively. The minimum score for the tool is fifty, and the maximum score for the tool is Two Hundred and fifty. The tool measures various dimensions in Teaching Biology.

ITEM ANALYSIS

The Effectiveness of Teaching Biology tool consists of Fifty items. There are forty-four positive items and Six Negative items. Each and every item has five responses, namely Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree.

Table 1. Scoring procedure of the Effectiveness of Teaching Biology scale

Response	Strongly Agree	Agree	Neutral	Disagree	Strongly disagree
Scores for Positive Items	5	4	3	2	1
Scores for Negative Items	1	2	3	4	5

Table 2. The responses thus calculated were analyzed by using critical ratio analysis(t-test)

't'- values of the item

Item Number	t-Value	Selected / Not Selected
1	1.33	Selected
2	2.26	Selected
3	1.97	Selected
4	2.44	Selected
5	1.23	Selected
6	1.38	Selected
7	2.77	Selected



8	2.45	Selected
9	2.42	Selected
10	2.15	Selected
11	2.38	Selected
12	1.08	Not Selected
13	1.98	Selected
14	2.57	Selected
15	2.76	Selected
16	2.72	Selected
17	3.15	Selected
18	2.79	Selected
19	2.33	Selected
20	1.09	Not Selected
21	2.76	Selected
22	3.12	Selected
23	2.19	Selected
24	2.92	Selected
25	2.05	Selected
26	1.07	Not Selected
27	2.63	Selected
28	2.76	Selected



29	3.12	Selected
30	2.09	Selected
31	2.35	Selected
32	2.50	Selected
33	2.33	Selected
34	1.12	Not Selected
35	2.17	Selected
36	3.03	Selected
37	2.98	Selected
38	2.56	Selected
39	2.99	Selected
40	0.21	Not Selected
41	2.63	Selected
42	2.10	Selected
43	2.87	Selected
44	3.24	Selected
45	0.86	Not Selected
46	2.02	Selected
47	2.59	Selected
48	3.01	Selected
49	1.94	Selected



50	2.18	Selected
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From the Effectiveness of Teaching Biology tool, the score of the items that satisfy 't' Value alone was taken for the main study.

DESCRIPTION OF THE FINAL TOOL

The final draft of the Effectiveness of teaching Biology scale consists of forty-four items. It consists of forty-four positive items and six Negative items. The scoring procedure of Positive items is 5, 4, 3, 2, 1 for Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree, respectively. The scoring procedure of negative items is 1, 2, 3, 4, 5 for Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree. The minimum score of the tool is 44, and the maximum is 220.

RELIABILITY OF THE TOOL

The reliability of the tool was established by using Cronbach's Alpha test. The reliability of the Effectiveness of Teaching Biology scale was found to be 0.937, which is considered to be highly reliable.

VALIDITY OF THE TOOL

The Effectiveness of Teaching Biology scale was validated by using the face validity method. To establish validity, the tool was distributed to experts, including Experienced Research Guides, Educational Technology Specialists, Senior Teacher Educators, Psychology Experts, and Senior faculty from the Biology Department. They were asked to check whether the items in the tool are related to the present study and also check whether it satisfies the objectives of the study based on the suggestions given by the experts. A few corrections were made in some items.

COCLUSION

The study concludes that prospective Biology Teachers in Kanchipuram District possess a Moderate level of Teaching Biology. With noticeable differences across key variables. Although such strategies and Teaching aids are widely available, they remain underutilized in teaching. Enhancing Effectiveness in Teaching Biology in Teacher Education can significantly improve the Effectiveness of Biology instruction. It helps the students to better understand the concepts and leads to their future development.

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