



A Study On 8th Standard Students Difficulty In Drawing Biology Diagrams

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ABSTRACT

The ability to draw and interpret diagrams is a crucial skill in biology, as diagrams help students visualize and understand complex scientific concepts. However, many students struggle with scientific illustration, which affects their academic performance and conceptual clarity. This action research study aimed to identify the specific difficulties faced by 8th standard students in drawing biology diagrams and to implement effective strategies to improve their skills. A pre-test and post-test experimental design was employed with a sample of nine students from Government High School, Metagalli, Mysuru. Initial findings revealed low proficiency due to lack of practice, poor conceptual understanding, insufficient guidance, limited visual-spatial skills and low motivation. Targeted interventions including orientation, structured practice sessions, rubric-based feedback and visual aids were implemented over multiple sessions. The post-test results indicated a remarkable improvement in students' diagram-drawing skills, with scores rising from a pre-test range of 0–12 to a post-test range of 15–20. Students showed improved neatness, labeling, proportion and confidence. The study concludes that structured practice, continuous feedback and visual support are effective in enhancing students' ability to draw scientific diagrams, thereby improving their overall understanding and performance in biology.

Keywords: Biology Diagrams; Drawing Skills; Visual Learning; Feedback; Practice; Scientific Illustration.

Introduction

The ability to draw and interpret diagrams is essential in biology, as it helps students visualize and understand complex concepts. However, many 8th standard students struggle with scientific illustration, affecting their learning and performance. This action research investigates the difficulties faced by students in drawing biology diagrams and identifies factors such as cognitive understanding, motor coordination, instructional strategies and resource availability. Targeted interventions aim to improve students' skills and conceptual clarity. The findings will help educators adopt effective teaching strategies, use visual aids and provide

focused support to enhance students' diagram-drawing ability and strengthen their overall understanding of biology.

Need and Importance

This study is necessary to identify the causes of difficulty in drawing biology diagrams among 8th standard students and to develop effective strategies to address these difficulties. By improving students' ability to draw diagrams, we can enhance their understanding and performance in biology.

Importance of the Study:

The study is important for several reasons:

- 1) **Improved Student Understanding:** By identifying the difficulties faced by students in drawing biology diagrams, this study can help teachers develop targeted interventions to improve student understanding of biological concepts.
- 2) **Enhanced Teaching Practices:** The study can inform teaching practices and help teachers develop more effective strategies for teaching diagram drawing skills.
- 3) **Better Student Performance:** By improving students' ability to draw diagrams, this study can help students perform better in biology and develop a stronger foundation for future scientific studies.
- 4) **Contribute to Biology Education:** The study can contribute to our understanding of the challenges faced by students in biology education and inform the development of more effective teaching strategies.
- 5) **Improve Student Outcomes:** By improving students' ability to draw diagrams, this study can help improve student outcomes in biology and enhance their overall academic performance.

Causes of the Problem

The possible causes of difficulty in drawing biology diagrams among 8th standard students include:

- 1) **Insufficient guidance:** Students have not received proper guidance on making accurate biology diagrams.
- 2) **Limited visual-spatial skill:** Students have not had much exposure to properly drawn and labelled scientific diagrams.
- 3) **Poor understanding of concept:** Students do not have proper knowledge of scientific diagram and proper technique of drawing them.
- 4) **Lack of practice:** Students do not have regular practice of drawing scientific diagrams.
- 5) **Insufficient feedback:** Students have not received proper feedback on their diagram drawing skills.
- 6) **Lack of interest:** in drawing science diagrams as well as lack of awareness about the use and importance of diagrams in science

Prioritized Causes

Based on the review of related literature and preliminary observations, the causes will be prioritized and the most significant causes will be addressed:

- 1) Lack of Practice
- 2) Poor understanding of concepts
- 3) Limited visual-spatial skills
- 4) Insufficient guidance and feedback
- 5) Lack of interest

Objectives of the Study

- 1) To identify the causes for difficulty in drawing science diagram.
- 2) To analyze the causes for difficulty in drawing science diagram.
- 3) To develop strategies to overcome the difficulty in drawing science diagram.
- 4) To evaluate the effectiveness of strategies implemented.

Review of Related Literature

Okereke (2023) investigated the difficulties senior secondary students face in drawing specimens during Biology practicals, which often discourages their interest in the subject. The study, using a descriptive survey design, involved 270 SS3 students from two randomly selected schools in Imo State, Nigeria. Data were collected through the Biology Practical Drawing Test (BPDT), with a reliability coefficient of 0.65 and analyzed using descriptive statistics. Findings revealed major challenges such as incorrect specimen size, wrong titles, inaccurate magnification, poor outlines, labeling errors and lack of detail representation. The study recommended improving drawing skills by ensuring proper size, correct titles, accurate labeling, proper magnification, neat outlines and detailed representation.

Dhar and Gowramma (2017) emphasized that science learning is incomplete without skills like observation, interpretation and analysis, which are expressed through drawing and labelling-especially crucial in biology due to its complexity. The study investigated students' strengths and weaknesses in drawing and labelling skills and assessed improvements after intervention. Using a pre-test post-test single group design, Class VII students were purposively sampled. Data were analyzed using descriptive and inferential statistics. Results revealed most students lacked all ten tested skills, affecting conceptual understanding and performance. Post-intervention, skill levels improved, though with individual variations. The study highlights the need for diverse strategies to effectively develop students' drawing and labelling skills.

Kragten M. & Others (2014), Process diagrams are important tools in biology for explaining processes such as protein synthesis, compound cycles and the like. The aim of the present study was to measure the ability to solve process-diagram problems in biology and its relationship with prior knowledge, spatial ability and working memory. For this purpose, we developed a test that represents process diagrams and adjacent tasks used in secondary education biology. Results show that the ability to solve process-diagram problems is

correlated to prior knowledge, spatial abilities and visuospatial working memory capacity. A difference in impact of spatial skills was demonstrated for the level of cognitive demand when solving process-diagram problems.

Research Methodology

Quantitative research method is adopted and Experimental Research Design is employed. Pre-Test and Post-Test design is implemented to assess students ability to draw biology diagrams before and after an intervention.

Experimental group: 8th standard students who received a specialized intervention to improved their ability to draw biology diagrams.

Sampling: The population of the class is 30 students & the sample of the study is the 09 students pursuing in 8th Class of Government High School, Metagalli which belongs to Hinkal Hundi Cluster, Mysuru Rural Block.

Research Tool

The researcher used following tools:

1) Rubric to evaluate the quality of diagrams: Rubric Evaluation is a systematic method of assessing students' performance using a set of clearly defined criteria and levels of achievement. It helps teachers evaluate complex skills, assignments, or projects in a consistent, objective and transparent way.

Criteria for assessment: Neat diagrams are drew by pencil with out any mistakes.

2) Researcher developed Achievement Test Questionnaire for **Pre-Test & Post-Test.**

Procedure

The study used an action research methodology, which involved a cyclical process of planned, action, observation and reflection.

1) Plan: Identified the problem, review of literature and developed a plan to address the difficulties faced by 8th standard students in drawing biology diagrams.

2) Action: Implemented the plan, which may include interventions such as additional practice, feedback and the use of visual aids.

3) Observation: Collected data on the effectiveness of the interventions, including student work samples, observations and surveys.

4) Reflection: Analyzed the data, identified areas for improvement and refining the plan.

The studied has involved the followed procedures:

Step 1: Preparation

1) Identified participants: Selected 8th standard students as samples the study.

2) Obtained necessary permissions: Obtained permission from GHS Metagalli for conducting Action Research.

3) Prepared research tools: Developed questionnaire which consists diagram-drawing tasks for Pre-Test and Post-Test.

Step 2: Pre-test

- 1) Administered pre-test: Gave students a pre-test to assess their ability to draw biology diagrams.
- 2) Collected pre-test data: Collected and recorded pre-test data.

Step 3: Intervention

- 1) Implemented intervention: Provided students with strategy-based instruction and practiced exercises to improve their diagram-drawing skills.
- 2) Delivered feedback: Provided students with feedback on their diagram-drawing skills.

Step 4: Post-test

- 1) Administered post-test: Gave a post-test to assess the ability to draw biology diagrams after the intervention among samples.
- 2) Collected post-test data: Collected and recorded post-test data.

Step 5: Data Analysis

- 1) Analyzed data: Used statistical techniques to analyzed pre-test and post-test data.
- 2) Compared results: Compared pre-test and post-test results to determine the effectiveness of the intervention.

Step 6: Conclusion

- 1) Drawing Recommendations & Conclusions: Draw research based recommendations & conclusions on the effectiveness of the intervention.

Action Plan**Table-1: Details of Action Plan**

Sl. No.	Activity Name	Duration	Days
01.	Orientation on diagrams	45 min.	1
02.	Practicing Session-1	45 min.	3
03.	Practicing Session-2	45 min.	3

Description of Action Plans**01) Orientation about diagrams:**

Gave some instructions about diagrams as per textbook like how to draw neat diagram, labelling etc. During the orientation phase, the researcher familiarized the students with the objectives and purpose of the study. The importance of 8th standard biology diagrams in understanding scientific concepts and in improving observation and representation skills was explained to them. The students were informed about how accurate diagram drawing contributes to better comprehension and performance in biology. The researcher discussed common problems such as improper labeling, incorrect proportions, lack of neatness and confusion in identifying parts of diagrams. This orientation helped students become aware of their own challenges and motivated them to participate actively in the forthcoming activities.

02) Practiced Session-1:

During the practice session, rubric tools were used to guide and assess the students' improvement in drawing biology diagrams. The researcher introduced the rubric that contained specific criteria such as accuracy, labeling, neatness, proportion and presentation. Each criterion had four levels of performance—Excellent, Good, Fair and Poor—along with clear descriptions to help students understand the expectations. Implemented intervention: Provided students with strategy-based instruction and practice exercises to improve their diagram-drawing skills.

Example: Practiced important diagrams of **Bacteria, Chlamydomonas, Spirogyra, Amoeba, Paramecium**.

Delivered feedback: Provided students with feedback on their diagram-drawing skills.

03) Practiced Session-2:

Followed same as previous session & cover remained diagrams of, **Bread mould, Penicillium, Aspergillus, Virus**.

Data Analysis

Table-2: Performance of the Students in Pre-Test & Post-Test

Sl. No.	Name of the Students	Pre Test	Post Test
1	Student A1	6	20
2	Student A2	8	20
3	Student A3	8	16
4	Student A4	17	20
5	Student A5	4	18
6	Student A6	17	19
7	Student A7	2	15
8	Student A8	8	20
9	Student A9	8	17

Graphical Representation

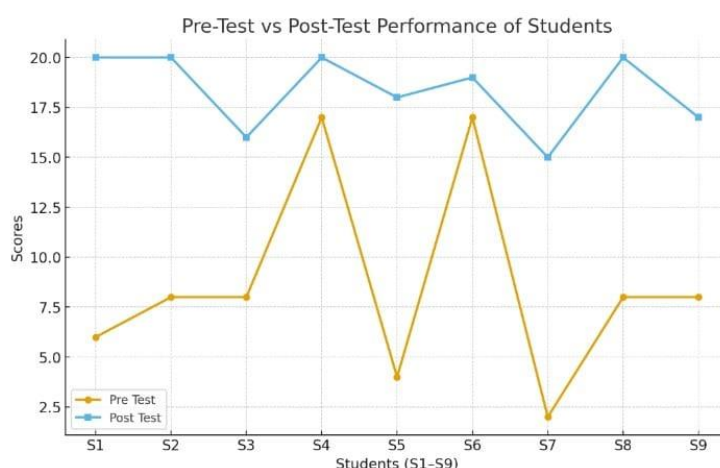


Figure-2: Graph representing student's performance in Pre-Test & Post-Test

Interpretation of Results

The data analysis clearly indicated that the intervention program (practice sessions, feedback and use of visual aids) had a significant positive impact on students' ability to draw biology diagrams. The pre-test scores ranged from 0–12, showing that students initially had very poor skills in diagram drawing, with most unable to produce accurate or neatly labelled diagrams. This confirmed the earlier assumption that lack of practice, insufficient guidance and poor conceptual understanding were major barriers.

After the intervention, the post-test scores ranged from 15–20, showing a remarkable improvement. This reflected that students not only acquired the basic skills of neatness, proportion and labeling but also gained confidence in attempting diagrams that they had previously avoided. The consistent rise across all students demonstrated that the strategies implemented such as step-by-step teaching, regular practice and constructive feedback-were effective in overcoming the identified challenges.

Research Findings

1. Improvement in Performance:

- Pre-test scores had ranged from 0–12, showing poor initial performance.
- Post-test scores had improved significantly, ranging from 15–20, which indicated that the intervention was effective.

2. Effectiveness of Intervention:

- Nearly all students had shown a 100% improvement, proving that practice sessions, feedback and visual aids had helped them enhance their diagram-drawing skills.

3. Major Causes Identified:

- Lack of practice and insufficient guidance had been the most dominant causes of difficulty.
- Limited visual-spatial skills and poor understanding of concepts had also contributed.
- Lack of feedback and interest had reduced students' motivation to draw diagrams.

4. Change in Confidence Level:

- Students who were initially hesitant to attempt diagrams had gained confidence after receiving structured practice and guidance.

5. Role of Teaching Strategy:

- Strategy-based instruction (step-by-step drawing, labeling and feedback) had proved far more effective than traditional lecture-based teaching.

Suggestions

- 1) Firstly teachers should select students who suffering from drawing skill.
- 2) Give orientation about 8th standard biology diagrams and their importance.
- 3) Conduct Pre-Test for selected students and collect data.
- 4) Practice session should starts by teachers based on student's data (previous class test sample papers), & draw diagrams on black board in a easy way by using **Rubrics** methods
- 5) Observe all student's performance while doing practicing session and notice errors & correct mistakes immediately.

- 6) Continue in next class as practicing session & covers remaining diagrams. Follow same as previous session
- 7) After completion of practice session wait for 2-3 weeks then give Post-Test for students
- 8) Collect post test data and observe student's performance.

Conclusion

A conducive learning environment is pivotal for fostering the holistic growth and development of students. Education, particularly in the realm of science, holds immense importance in equipping students with essential skills and knowledge for their future endeavours. By employing various data collection methods, the researcher has unearthed several factors contributing to students' low achievement in scientific diagram drawing. These factors include deficiencies in teaching methodology, highlighting the need for improved instructional strategies and support for educators.

In conclusion, addressing the challenge of poor scientific diagram drawing skills requires a concerted effort from educators. By working together to implement evidence-based interventions and create an enriching learning environment, we can ensure that all students have the opportunity to succeed and thrive in their scientific pursuits.

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