Scholarly Research Journal for Interdisciplinary Studies,
Online ISSN 2278-8808, SJIF 2019 = 6.38, www.srjis.com
PEER REVIEWED & REFERRED JOURNAL, NOV-DEC, 2019, VOL- 7/55

INTEGRATION OF ICT IN PEDAGOGY ENHANCING THE SKILL OF PREPARING DIAGRAMS OF BIOLOGY AMONG HIGH SCHOOL STUDENTS

Mugdha Sangelkar, Ph. D.
Pal Rajendra B.Ed College, Mumbai-400101

CHAPTER 1

INTRODUCTION

1.1 Introduction:

Role and Introduction of Drawing Diagrams:

A diagram is essentially a picture that communicates information and often explains statistical data, other important information, how a particular system functions with less of strain on resources.

Importance of Science Subject:

Science allows students to explore their world and discover new things. It is also an active subject, containing activities such as hands-on labs and experiments.

Skills Needed:

Skills needed to learn to draw diagram are listening skills, observing skills, reading skills, drawing skills and writing skills.

Highlight:

Need to highlight on the drawing skills.

1.2 Need of the study:

Place of drawing diagrams in present competitive world and why drawing skill is important for this. Problem faced by English medium students in drawing diagrams. Therefore, keeping in view the importance of drawing diagrams in competitive world, the present study aims to identify the difficulties in drawing diagrams by the students and to give remedial measures for the improvement in drawing diagrams.

1.3 Statement of Aim:

Enhancing the Skill of Preparing Diagrams of Biology Among High School Students

1.4 Operational Definitions of the Key Words:

1. Enhancing: In the present study, enhancing the drawing and labelling with speed and accuracy and remembering diagrams and labelling.

2. Skill: Ability or expertise of preparing diagrams.
3. Preparing Diagrams: Drawing and labelling diagrams of Biology correctly.
4. Biology: It refers to the subject taught in standard 8th of State Board.
5. High School Students: It refers to the students of 8th standard who are receiving education at Pal Rajendra English High School.

1.5 Objectives of the Study:

1. To identify the difficulties in preparing diagrams faced by 8th standard Pal Rajendra English High School students.
2. To enhance the skill of preparing diagrams by providing remedial measures.
3. To find out the difference between the Pre-test and Post-test scores of 8th Standard Pal Rajendra English High School students in drawing diagrams.

1.6 Hypothesis of the Study:

Null Hypothesis: HO1: Students of 8thGrade do not face any difficulties in drawing diagrams.

HO2: There is no improvement in students in preparing diagrams even after remedial teaching.

HO2: There is no difference between the Pre-test scores and Post-test scores of 8thstandard students in drawing diagrams.

1.7 Delimitation of the Study:

1. The present study is limited to one school of Mumbai city i.e. Pal Rajendra English High School.
2. The present study is focussed only on the 8th standard Pal Rajendra English High School students.
3. The present study is limited to the difficulties related to the Skill of Drawing diagrams in Biology.
4. The study consists of only 31 students.
5. This present study is limited to the students of session 2018-2019.
6. The present study is limited to English Medium students. 7. The present study is limited to S.S.C. Board students.

CHAPTER 2

REVIEW OF RELATED LITERATURE:

The review of related literature is the most essential step when undertaking a research project. It provides a brief and critical appraisal of related studies and shows how the study contributes to the knowledge available in this particular field. It is as valuable as it helps the researcher to understand useful concepts, tools, techniques and the method which they are used in the study. Related literature forms the necessary background for the research and serves as a guidance of required knowledge with which the researcher must be acquainted. Different teaching methodologies, psychology, various journals, educational year books, dissertations, abstracts, web sites etc. were conducted to find out whether similar studies or studies of a comparable nature have been conducted elsewhere. It was found that studies in art and drawing skill based instructional approach are very rare. However, a brief literature on such methods, approaches and strategies of teaching were presented along with the available studies even though they are not directly related to drawing skill oriented instructional approach.

Literature Survey

Meier (1939) discussed the importance of encouragement, nurturing and modelling in the development of artistically talented individuals. Artistically talented people are influenced by a number of factors which are inherited, acquired, and learned. Carlson (1963) observed that fourth, fifth and sixth graders who were provided special stimulus materials (pictures, records, toys) wrote longer and more original compositions and used a more versatile vocabulary than students in the control group who were writing on an assigned topic. Olson (1968) found that teaching children drawing rules resulted in a significant improvement in their ability to make drawings. There is some evidence that children use rules when drawing.

The following literature was reviewed:

Title: Student Difficulties with the Interpretation of a Textbook Diagram of Immunoglobulin

Name of the researcher: Konrad J. Schonborn, Trevor R. Anderson and Diane J.Grayson

Year: 2000

Sample and Sampling Method: Mixed method

Tools used: Pre-test and Post-test

Objective: To identify and classify students‟ conceptual and reasoning difficulties with the interpretation of various types of diagrams representing the structure of immunoglobulin G.

Result: The difficulties identified in this study suggest that there are at least three factors affecting the ability of students to interpret a diagram, the ability of students to reason with the diagram, students‟ understanding (or lack thereof) of the concepts of relevance to the diagram, and the mode in which the desired phenomenon is represented diagrammatically. These three factors are interdependent; making it difficult to establish which factor is playing the major role. Nonetheless, it is useful to consider each factor independently to develop a clearer idea of where the difficulties lie and how they could be remediated.

Conclusion: In conclusion, the findings presented in this paper confirm the results of other studies, which show that incorrect interpretation of, and reasoning with, diagrams in science can lead to misunderstandings and conceptual difficulties. Future research will focus on student difficulties with other diagrams in biochemistry with a view to devising criteria for evaluating the effectiveness of diagrams in achieving the intended understanding and learning outcomes in biochemistry. The results of such research will hopefully yield guidelines on how diagrams should best be used by teachers and learners and designed by textbook writers.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Meaning and Types of Research Method:

Once the researcher has identified the problem area for study and specified the goals and objectives for the study, he or she then comes to the core of the study which is research methodology. The methodology is the most important phase of the research process. In that it gives guidance as to how the study will be conducted.

Research methods can be called as planning and execution undertaken by researcher to solve a specific research problem. It involves research method, sample and sampling technique, tools for research, data collection and data analysis methods. The research problem can be past oriented, present oriented or future oriented. Thus, on the basis of the conclusions, the research methods are divided into three categories as given under:

- Historical Method
- Descriptive Method
- Experimental Method

- **Historical method:** Historical method provides a method of investigating to discover and describe and interpret what existed in the past. Historical research attempts to establish facts so as to arrive at conclusion concerning past events. To conduct

historical research primary sources of data are commonly used. They are the eye witness accounts. Primary sources of data include relics or remains, documents such as laws, official minutes, films, recordings and research reports etc.

- **Descriptive method:** According to John W. Best, "A descriptive study describes and interprets what is? "it is concerned with conditions and relationships that exist, opinions that are held, processes that are going on, effects that are evident or trends that are developing. It is primarily considered with the present, although it often considers past events and influences as they relate to current conditions. Generally, survey method is used for data collection in this type of research study.
- **Experimental method:**The research in which effect of one factor on the other studied is called the experimental research. In scientific terms, experimental research means examining the hypothesis, indicating the cause and effect relation. According to Kerlinger(1953), "An experiment is taken to make an scientific investigation in which investigator manipulates and controls one or more independent variables and observes the dependent variable or variables for variation concomitant to the manipulation of the independent variable." It is only method of research that can truly test the hypothesis concerning the cause and effect relationships. It represents the most valid approach to the solution of educational problems both practical and theoretical and to the advancement of education as a science.

  Experimental design is the blue print of the procedures that enable the researcher to test hypothesis by reaching valid conclusions about relationships between independent and dependent variables. Three categories of experimental design are as follows:

  - Pre - experimental design
  - True - experimental design
  - Quasi - experimental design

  Selection of a particular design is based on the purpose of experiment, the type of variables to be manipulated and the conditions or limiting factors under which it is conducted.

3.2 Selection of research methodology:

Experimental research method was chosen to conduct the present study. Within the experimental research design pre experimental design i.e. one group pre-test post-test design is used.

One-group pre-test – post-test design

In this design the researcher administers a pre-test, then the treatment and finally a post-test. The effects of treatment are judged by the difference between the pretest and post-test scores. The design is represented as follows: O1 X O 2

Where O1 - Pre-test

X - Treatment O2 – Post-test

3.3 Sample and Sampling Technique

3.3.1 Sample:

A sample is small portion of the population that is selected for observation and analysis. The sample comprises of 31 students of Std. 8th from Pal Rajendra English High School.

3.3.2 Sampling Technique:

Sampling technique is the strategy chosen for selecting samples based on logistics, ethics and paradigm of the researcher. Generally two types of sampling techniques are used, which are as follows.

PROBABILITY SAMPLING	**NON-PROBABILITY SAMPLING**
Simple Random Sampling	Quota Sampling
Systematic Sampling	Incidental Sampling
Stratified Sampling	Convenience or Chunk Sampling
Cluster Sampling	Purposive Sampling
Multi Stages Sampling	Judgemental Sampling

Purposive Sampling Technique was applied to select Pal Rajendra High School and class 8 th Students were chosen by using Simple Random Sampling Technique.

3.4 Data collection

3.4.1 Tools for data collection:

The researcher used Self-Constructed Pre-test and Post-test Questionnaire. Following Questionnaire (Appendix A and B) were used for data collection:

1. Pre-test Questionnaire.
2. Post-test Questionnaire.

3.4.2 Administration of tools:

At first permission was sought from the Principal of the school to conduct the present study. Then the class teacher was contacted and permission was to administer the tool was taken from him/her. The researcher gave necessary instructions to the students regarding the pre-test or post-test questionnaire. The data was collected from 31 students. (Appendix C).

3.5 Method of data analysis:

Experimental Method was used to analyse the Pre-test and Post-test scores of students.

CHAPTER 4

ANALYSIS AND INTERPRETATION OF DATA

Objective1: To identify the difficulties in preparing diagrams faced by 8th standard PalRajendra English High School students.

Null Hypothesis (HO1): Students of 8th Grade do not face any difficulties drawing diagrams.

Table 4.1

ANALYSIS OF PRE-TEST SCORES OF THE STUDENTS

Sr No	**Test**	**Total Number of the students(N)**	**Mean (M1)**
1	Pre-test	31	9.03

Interpretation:

Table 4.1 shows that the mean scores acquired by the students in Pre-test is 9.03. This shows that the students of class 8th face problem in preparing Diagrams. The Null Hypotheses 1 isrejected.

Objective 2: To enhance the skill of preparing diagrams by providing remedial measures.

Null Hypothesis (HO2): There is no improvement in students in preparing diagrams even after remedial teaching.

Table 4.2

MEAN VALUE OF THE SCORES ACQUIRED BY THE STUDENTS IN POST-TEST

Sr No	**Test**	**Total Number of the students(N)**	**Mean (M2)**
1	Post-test	31	18.19

Interpretation:

Table 4.2 shows the Post-test scores of class 8th in Drawing Diagrams. The mean scoreacquired by the students is 18.19. This shows that there is remarkable improvement in preparingdiagrams after remedial measures. Therefore,the Null Hypothesis (2) is rejected.

Objective 3: To find out the difference between the Pre-test and Post-test scores of 8th StandardPal Rajendra English High School students in drawing diagrams.

Null Hypothesis (HO3): There is no difference between the Pre-test scores and Post-test scores of 8th standard students in drawing diagrams.

Table 4.3

DIFFERENCE BETWEEN MEAN VALUES OF THE SCORES ACQUIRED BY STUDENTS IN PRE-TEST AND POST –TEST

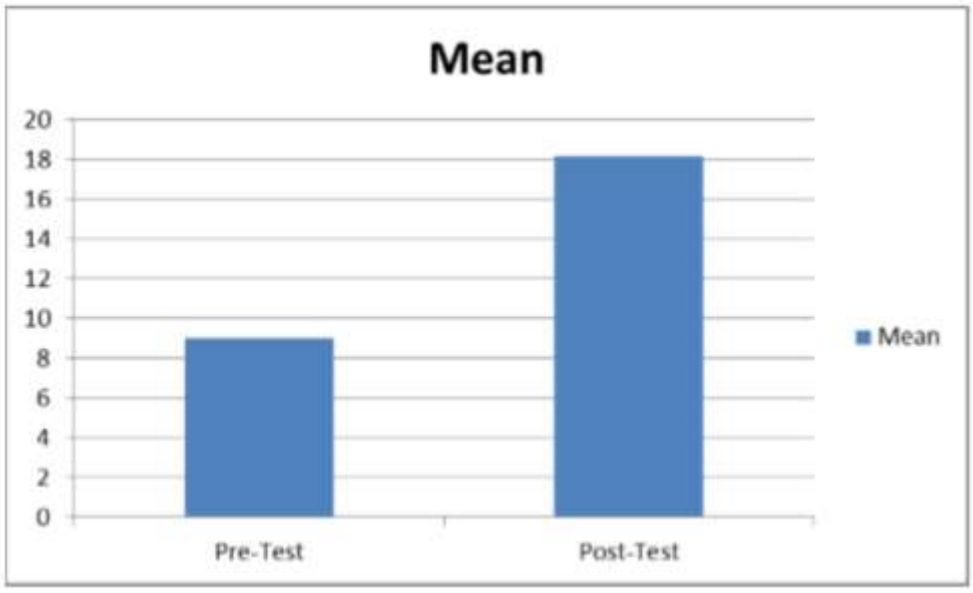
Sr. No	Test	Total No. of Students	Mean	Difference of Mean (M2-M1)
1	Pre-Test	31	9.03	9.16
2	Post-Test	31	18.19	

Interpretation:

Mean of the Pre-test and Post-test of students is calculated in table 4.3. It is clear that mean of Post-test scores (17.4) is higher than that of mean of Pre-test scores (8.79). The difference in the mean is 8.61. The Null Hypotheses 3 is rejected. This shows that there is a remarkable improvement in student‟s performance as an effect of remedial measures. The graphical representation is given below.

Figure 1

DIFFERENCE BETWEEN MEAN VALUE OF THE SCORES ACQUIRED BY STUDENTS IN PRE-TEST AND POST -TEST



CHAPTER 5

SUMMARY AND CONCLUSIONS

The research has shown that school science teachers do not have adequate training to deliver quality education in drawing diagrams to their pupils. From this finding it might be concluded that this could be one of the reasons why such resources might not be used in school. Further the research has shown that the school under research lacked adequate funding to purchase teaching/learning resources such as charts, specimens and text books for

use by teachers during lessons. It was also seen that in terms of availability of teaching/learning resources, high schools were grossly under resourced in terms of basic facilities such as text books and equipment. This scenario has greatly affected teaching and learning for both teachers and students respectively. The research has also shown that although the majority of the students have access to teaching and learning resources, schools, have only basic tools, which are also not enough for students and teachers.

The research also found out that most teachers could not improvise teaching/learning resources for their teaching and did not even borrow some teaching/learning resources from other schools. This can be concluded that high school teachers lacked time and proper equipment which they could not afford from their school budget. As regards the most popular teaching/learning resources the research revealed that there were the usual text books and few wall charts. This in itself shows the seriousness of lack of information for the students and teachers from other sources.

This research has also shown that drawing aids teaching/learning resources such as TV, CDs and computers were not there in this school and therefore could not be used by both teachers and students for teaching and learning respectively. This research has also shown that the use of ICT and internet was not yet popular in schools. The findings of the research have shown that there are very few teachers who are trained in the use of ICT, therefore, teachers in high schools are not able to discuss the types of software packages to be used in teaching in high schools.

5.1 Statement of Aim:

"Enhancing the Skill of Preparing Diagrams Of Biology Among High School Students"

5.2 Objectives:

1. To identify the difficulties in preparing diagrams faced by 8thstandard Pal Rajendra English High School students.
2. To enhance the skill of preparing diagrams by providing remedial measures.
3. To find out the difference between the Pre-test and Post-test scores of 8thStandard Pal Rajendra English High School students in drawing diagrams.

5.3 Hypothesis of the Study:

Null Hypothesis:

- **HO1:** Students of 8th Grade do not face any difficulties in drawing diagrams.
- **HO2:** There is no improvement in students in preparing diagrams even after remedial teaching.

- **HO3:** There is no difference between the Pre-test scores and Post-test scoresof 8th standard students in drawing diagrams.

5.4 Conclusions:

1. The research concluded that using visual aids, chart papers, Computers with proper training in drawing and remembering diagrams, stimulates thinking and improves diagram drawing skills of the students.
2. Effective use of correct drawing methods by teachers substitutes monotonous learning environments.
3. Students develop and increase personal understanding of the areas of learning when they experience a successful and pleasant learning in the classroom. 4. Students find training on drawing diagrams sessions useful and relevant when it has some direct relation to the course content.

5.5 Suggestions:

From the research it is clear that everyone surrounding the student in the study, has to take necessary measures for understanding the basic concept of diagrams.

5.6 General Suggestions:

For Teachers:

1. The school management has to provide Remedial teaching classes.
2. The school management has to take initiative to organize Science Club and Science Fair and Science Lab.
3. The school management has to arrange small trips for Science for creative learning.
4. Teachers must give importance to the student‟s opinion regarding the diagrammatic representations understanding.
5. The school, college and university administration authority must share the opinions of the students regarding the usage of improved drawing techniques that will be helpful in enhancing the learning system.
6. Refresher courses, workshops and conferences may be arranged for the teachers for improving their skills of using correct drawing techniques to the needs of students.

For Students:

1. Students should understand the importance of drawing diagrams.
2. Students should follow instructions given by teacher.

5.7 Suggestions for further studies:

1. Researches can be conducted in other schools, other schools of other districts and other states.
2. Researcher can also be chosen samples from ICSE or CBSE board.
3. Study can be conducted on other topics.
4. Study can be based on higher secondary students.
5. Study can be taken on other subjects like Physics, Chemistry etc.

BIBLOGRAPHY

Books:

Science Textbook for Class 8th Handbook of Drawing The practice and science of Drawing

WEBLIOGRAPHY

Internet:

www.google.com
www.wikipedia.org
http://ncert.nic.in/ncerts/l/kebo102.pdf
https://www.toppr.com/guides/biology/diversity-in-living-organisms/five-kingdomclassification/
https://intl.siyavula.com/read/science/grade-10-lifesciences/biodiversity-and-classification