CHAPTER: V

FINDINGS, CONCLUSIONS & SUGGESTIONS
5.0 INTRODUCTION

The researcher has arrived at the stage of listing the findings and drawing the conclusions after exercise of analyzing the data and putting insight to make objectives more fruitful and significant for a layman and technical person associated with the work of teaching and learning at various levels.

The writing of research findings is usually the concluding task of research endeavor. Everything has been combined together during writing of the findings. It is a matter of communicating what was done? What occurred? And what are the results mean, in a concise, understandable, accurate and logical manner. The process of summarizing the findings, arrival at conclusions, making recommendations and formulating proper generalizations for population to which these are applicable, is an important component of any research. It serves as references for the person involved in the research project to focus on the investigation perspectives of the problem. It has a dissemination function because it is crucial to future practical application of the findings. It aids the future workers to understand the general purpose and the findings of the study.

On the basis of the analysis and interpretation of data discussed in the previous chapter. Certain findings have been obtained and conclusions were drawn. The present chapter has been organized under the followings headings.

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5.1. Findings of the study

5.2. Conclusion

5.3. Educational Implications of the study

5.4. Limitations of the study

5.5. Suggestions for further researchers

5.6. An overview of the chapter.

5.1. FINDINGS OF THE STUDY

Being the nature of the study experimental, researcher has focused some concrete findings for the use of other researchers. The nature of Educational phenomena is different from the nature of physical phenomena. Physical phenomena are numerical or quantitative. On the other hand, educational phenomenons are abstract or qualitative. Qualitative phenomena in their turn are ambiguous and complex. It is due to this fact that clear results are not easily available in educational research. In order to achieve results from facts gathered through survey and other methods, several techniques are utilized; context analysis is one of them. In order to arrive at results from the collected data, it is necessary to classify it.

In accordance with the aims and objectives, the findings of the study are presented in following sections.

5.1.1 Findings Related to the Objective-1

To the fulfill the objective 1, the content analysis was done and after this process few topics from Biology text book of class XI were selected for the development of instructional material based on constructivist approach.

The selected topics have been given in the following flow chart.
5.1.2 Findings Related to the Objective-2

As the procedure is mentioned in chapter third, 12 lesson plans based on constructivist approach were developed by the researcher and these lesson plans contain following characteristics.
(A) These lesson plans was based on 5 E concept given by Biological Science Curriculum Study (BSCS)

(B) This learning material was students centered.

(C) Teacher’s role in this material was to create interest and generate curiosity in students.

(D) Teacher encouraged the students to explain concepts and defining the words.

(E) Allowed students to assess their own learning and group –process.

(F) This material was ready to be use by the teachers for teaching Biology at senior secondary level.

(G) These sample lesson plans based on constructivist approach are enclosed with this research reports in appendix no. I

5.1.3 Findings Related to the Objective-3

Two groups; one experimental and one controlled group of students of class XI Biology were taught. The earlier group was taught by developed instructional material bases on constructivist approach used and the later were taught with the traditional approach. The mean gain achievement of the two groups was compared by using 't' test. That was found significant at .01 level of significance which shows that teaching by with the help of developed instructional material based on constructivist approach was found effective than the traditional approach which means that the academic achievement of students would be better if they are taught through constructivist approach using the developed instructional material.

5.1.4 Findings Related to the Objective-4

In order to study the effect of developed instructional material on reaction of pupil teachers’ towards the constructivist approach, the pupil teachers were divided into two
groups; experimental and controlled. The experimental group was given orientation with the help of developed instructional material and the other group was given orientation without the developed instructional material. The mean scores on reaction scale of the two groups were compared with the help of 't' test. The difference between the two mean scores was found significant. It shows that experimental group reacted more positively towards constructivist approach, i.e. the developed instructional material is effective in improving the reaction of pupil teachers towards the constructivist approach.

5.1.5 Findings Related to the Objective-5

After the orientation programme, researcher wanted to know the willingness of pupil teachers towards the constructivist approach so after orientation programme researcher administered the willingness scale on experimental and controlled groups. The mean scores on Willingness scale of the two groups were compared with the help of 't' test. The difference between two means was found significant. It shows that the willingness of experimental group towards constructivist approach is higher than that of controlled group i.e. the developed instructional material is effective to improve the willingness of pupil teachers towards the use of constructivist approach in the classroom teaching.

5.2. CONCLUSIONS.

On the basis of the findings related to the objectives of the explorative research phases of the study; it can be summarized that the present day students as well as teachers are victims of overloaded academic syllabi. Students are expected to remember a large amount of incoherent informative facts without systematic arrangement of those factual quanta of knowledge prior to explaining them to students. As a result students generally
feel cognitively overburdened and gradually lose their interest in various academic streams.

"Constructivism learning is recognized as a valuable technique to increase the depth of understanding of scientific ideas through students building their own knowledge through inquiry-based exercise" *(Brooks and Brooks, 1993).*

There is also evidence that students taught by constructivist methods learn Biology concepts better than those taught even by talented lecturers *(Hake, 1998).*

**Scott (1987)** defines a constructivist in Biology as one who "perceives students as active learners who come to science lessons already holding ideas about natural phenomena, which they use to make sense of everyday experiences. Such a process is one in which learners actively make sense of the world by constructing meaning."

It can be concluded from the findings of the study that constructivist approach in teaching Biology helps in improving the academic achievement of the students.

Another important conclusion of this study is that if teachers are provided with the pre-developed instructional material or lesson plans based on constructivist approach. They will react more positively towards this approach and will show high willingness to use it. Therefore, teacher educators should not only advocate the use of innovative methods but also develop some model lessons and instructional material so that teachers can show their willingness and come forwards to use that innovative method or technique.

5.3. EDUCATIONAL IMPLICATION OF THE STUDY.

Research for research sake is of little importance. From the point of view of applied aspects until and unless findings have some practical significance, research is futile and wastage of time. Educational research as such bears a little significance particularly if
its findings cannot be applied to educational practices. Certain educational implications can also be derived from the findings of the current investigation which are discussed in this section.

Constructivism has important implications for teaching:

➢ Teaching cannot be viewed as the transmission of knowledge from enlightened to unenlightened; constructivist teachers do not take the role of the “sage on the stage”. Rather, teachers act as “guide on the side” who provides students with opportunities to test the adequacy of their current understandings.

➢ If learning is based on prior knowledge, then teachers must note that knowledge provide learning environments that exploit inconsistencies between learners’ current understandings and the new experiences before them. This challenges teachers; for they cannot assume that all children understand something in the same way. Further, children may need different experience to advance to the different levels of understanding.

➢ If Students apply their current understandings in new situations in order to build new knowledge, then teachers must engage students in learning, bringing students’ current understandings to the forefront. Teachers can ensure that learning experiences incorporate problems that are important to students’ not those that are primarily important to teachers and the educational system. Teachers can also encourage group interaction, where the interplay among participants helps individuals students to become explicit about their own understanding by comparing it to their peers.
➤ If new knowledge is actively built, then time is needed to build it. Ample time facilitates students' reflection about new experience, how those experience line up against current understandings, and how a different understanding might provide students with an improved (not "correct") view of world.

➤ If learning is a constructive process, and instruction must be designed to provide opportunities for such construction, then what professional development practices can bring teachers to teach in students–centered ways?

It is also useful to remember the educators’ maxim. Teachers teach as they are taught, not as they are told to teach. Thus, trainers in constructivist professional development sessions model learning activities that teachers can apply in their own classrooms. It is not enough for trainers to describes new ways of teaching and expect teachers to translate from, task to action; it is more effective to engage teachers in activities that will lead to new actions in classrooms. Some other implications of constructivist approach are as followings,

➤ Children learn more, and enjoy learning more when they are actively involved, rather than passively listening. When they enjoy learning, they are more likely to retain learning.

➤ Students learn how to think and understand. Also, they have ownership of their own learning.

➤ Education works best when it concentrates on thinking and understanding, rather than on rote memorization. Constructivism concentrates on learning how to think and understand.
Constructivist learning is transferable. In constructivist classrooms, students create organizing principles that they can take with them to other learning settings.

Constructivism applies natural curiosity to real world situations. It promotes social and communications skill within a group setting.

Constructivism gives students ownership of what they learn, since learning is based on students' questions and explorations, and often the students have a hand in designing the assessments as well. Constructivist assessment engages the students' initiatives and personal investment in their journals, research reports, physical model and artistic representations. Engaging the creative instincts develops students' abilities to express knowledge through a variety of ways. The students are also more likely to retain and transfer the new knowledge to real life.

By grounding learning activities in an authentic, real world context, constructivism stimulates and engages students. Students in constructivist classrooms learn to question thing and to apply their natural curiosity to the world.

Constructivist promotes social and communication skills by creating a classroom environment that emphasizes collaboration and exchange of ideas.

Students must learn how to articulate their ideas clearly as well as to collaborate on tasks effectively by sharing in group projects. Students must, therefore, exchange with others and to evaluate their contributions in a socially acceptable manner. This is essential to success in the real world, since they will always be
exposed to a variety of experience in which they will have to cooperate and navigate among the ideas of other.

The findings of study will be significant in the following ways.

**For Teachers.**

It is a fact that teacher’s performance is most crucial input in the field of Education. The teacher can plan, develop and implement various student centered activities, so as to promote positive attitude towards Biology. The better art of teaching can be achieved by teachers by adopting such innovative approaches of teaching. Teachers can develop lesson plans based on this approach for teaching Biology at various levels.

**For Teacher training programmes.**

Both pre-service and in service training programmes, teachers can be empowered to plan and implement constructivist approach in particular Biology subject in classroom situations. Teacher educators can develop lesson plans based on constructivist approach for teaching Biology at various levels like primary, upper primary and secondary. Syllabi of Biology teaching at different levels should be revised and constructivism approach must be included in this.

**For Text book writers.**

It will help text book writers to write text book in sequential order by keeping in mind constructivist approach.

**For Students.**

Constructivist principles based teaching will develop independent thinking among students. It will facilitate higher order thinking among them.
5.4. LIMITATIONS OF THE STUDY.

Many a times a work cannot be carried out as perfectly as it was intended to be due to lack of resources, knowledge and expertise.

Human beings are liable to various shortcomings. It is a universal fact that no study in humanities is free from limitations. Every aspect of changing surroundings affects the human behaviour and therefore, to reach any perfect conclusions in behavioral science is not possible. Therefore some of the limitations which the researcher came across due to paucity of time and resources while conducting this study. The present study also has some limitations which are honestly accepted in the following points.

(i) Limited time period available.

The major limitation which the researcher came across was of time. Due to this limitation only few topics taken in the developed instructional material based on constructivist approach more topics other then these topics.

(ii) Shortage of literature and research theses on constructivism approach in the libraries.

Although there is abundance of literature, research articles, book etc. related to constructivism approach on internet but the researcher felt a shortage of them in the libraries.

(iii) Unavailability of good intermediated level Biology text books in Agra.

Only a few Indian authors' books for intermediate level Biology in UP Board are available in Agra whereas there is vast collection of books in different Board Available in cities like Delhi, etc.
(ii) Secondary school of Agra which offers Biology.
In this study only those schools were selected which offer Biology at Senior Secondary level and are located in Agra city under Uttar Pradesh Madhyamic Shiksha Parishad, Allahabad.

(iii) The study was delimited to the city Agra. However the experts’ opinion was taken from national level veterans in different phases of the study i.e. content analysis and development of instructional material.

(iv) The researcher could not implement the entire text book of Biology for testing the effectiveness of developed instructional material. Only five sub-units were randomly selected because of shortage of periods.

(v) The researcher did not find any readymade tool for the purpose of present research. All the tools were prepared by the researcher. Not with standing, the reliability and validity of each testing instrument was well ascertained.

(vi) The study is delimited to class XI Biology subject.

(vii) B. Ed students were taken as pupil teachers.

5.5 SUGGESTIONS FOR FURTHER RESEARCHERS

Whatever explored in any study is expected to help future researchers. Some suggestions to remodel the present piece of work are given below.

1-The study has been delimited up to the region of Agra, U.P. Such type of studies can be conducted at the broader platform such as regional level or national level.

2-The coming researchers can develop constructivist based instructional material on the entire syllabus as the present study covers only 12 topics.
3- Instructional Material based on Constructivism approach can be developed for other academic subjects like Physics, Chemistry, Hindi Mathematics, English, etc.

4- Instructional Material based on Constructivism approach can be developed for various others classes.

5-A comparative study to assess the effectiveness of Instructional Material based on Constructivist approach on boys and girls of different achievement level can be conducted.

6- A comparative study can be done to find the effect of Instructional Material based on Constructivist approach on students of different levels of academic achievement.

7- A Comparative study of perception of male and female students towards constructivist teaching practices can be done.

8- A study to modify and validate an actual and preferred version of the constructivist learning Environment for the use at the secondary and senior secondary phase of schooling in India can be done.

9- A study into the impact of constructivist approach on teachers’ and learners’ attitude can be done.

5.6. AN OVERVIEW OF THE CHAPTER.

Being the last chapter of the thesis, in this chapter the researcher has explained the major findings of the study along with their educational implications for various sections of the society. Limitations of the present study and suggestions for future researchers have also been given in this chapter. The findings related to various objectives of the study have surprisingly reflected that students are more interested to learn through constructivist approach than traditional approach. They are themselves
interested in using the scientific facts learnt for understanding various aspect of nature, day to day life and also for getting to know about metaphysical realms (also suggested by Indian Science survey-2005). They are not satisfied with the present methods of teaching just by lecturing and experimentations. In the present time of advanced technology they also want to have its implications for improving learning-teaching activities. Most of them were found complaining about the pressure of overloaded syllabi. This has indirectly adversely affected their interest in reading habits which further affects their studies negatively. It is hoped that the developed Instructional Material based on Constructivism approach will help the present and future students, pupil teachers and material procedure to enhance the effectiveness of Biology teaching-learning through Constructivist Approach.