Journal of Positive School Psychology http://journalppw.com
2021, Vol. 5, No. 2, 258-267

Assessment Of Effectiveness Of Instructional Design On Botany Among Xi Standard Boys Students

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ABSTRACT
This study assesses effectiveness of instructional design on botany among XI standard boys students. The sample of the study consists of 120 XI standard students and they are drawn from two Government higher secondary schools In order to study the objectives, Solomon four group experimental design has employed. The XI standard students in control group were taught Root and Shoot System in Botany by using Conventional Design. The XI standard students in experimental group were taught Root and Shoot System in Botany by using Instructional Design through Virtual Reality Video, The results elucidate that The XI Standard boys in experimental groups of both PPT design and PT design have excelled in learning of Root and Shoot System in Botany by means of Instructional Design through Virtual Reality Video than control groups have gone through in learning of Root and Shoot System in Botany in Conventional Design in both PPT design and PT design. It is concluded that Instructional Design is highly effective for learning Root and Shoot System in Botany among XI standard boys students.

Key Words: Effectiveness, Instructional Design, Solomon Four Group Design, Virtual Reality Video

1. INTRODUCTION

Teachers are largely focusing on understanding of scientific notion of subject as the most significant objective of teaching science subject. The conceptual idea and thinking in common and specific practical idea are required to teach and learn science subject. Teachers and students are experiencing various difficulties in teaching and learning science subject (Mahmoud, 2003). The different concepts in science subject are the fundamentals for getting scientific knowledge and are highly helpful for precise understanding of subject matter, basics, scientific theories and facts behind the subject and it is the successful means of learning among students and at the same time, they are also facing many issues in learning and dealing them in their learning of science subject (Muhammad, 2005). Among different designs for teaching and learning, instructional design is population and dominant in current learning and teaching atmosphere.

Instructional design is the method of generating experiences that help the easy understanding and getting skills and knowledge which are highly effective and most efficient and also attractive (Culatta,

2016). It comprises generally of deciding the requirements and position of the students or learners, describing the ultimate objectives of instruction and generating few interventions to help in the changes and it is a highly systematic method through which the instructional stuffs are generated and given to learners(Gardner et al 2018). It is also the means of planning of instruction with due importance given to learners' needs and necessities(Rozitis, 2017). Multi media tools mainly audio, video and animation are used in construing instructional design for improving engagement and interest of students or learners in learning. Hence, an attempt is made to assess effectiveness of instructional design on botany among XI standard boys students.

2. REVIEW OF RELATED LITERATURE

Grampil (2022) found that significant difference existed in academic performance of second year aviation electronics technology students in flexible learning as compared to traditional learning and flexible learning had positive effect on their academic performance.

Al-Bawi et al (2021) concluded that instructional learning design had positive and large effect on the acquisition of physical concepts among high school students and there existed significant difference in the acquisition of physical concepts among experimental and control group high school students.

Siagian et al (2020) revealed that first year college students had very good attitude on electronic learning through instructional design. Electronic learning through instructional design was significantly different from learning through lecture methods and it had positive effect on electronic learning among first year college students.

Ismail and Alkhazali (2019) indicated that instructional design had positive impact on learning competencies of distance education students and significant difference prevailed among pre and post test group of students in learning competencies and it was higher in post test group students than pre-test group students.

Batoon et al (2018) showed that instructional design for using electronic books had positive effect on grades of high school students and the effect was high because of visual and audio content of electronic books and they were largely motivated to learn through electronic books by interactive design of learning.

Costley et al (2017) found that students attended OCU classes in the second semester had highly engaged with video lectures and instructional design had positively related with engagement of students in learning and also their academic performance.

Khalil and Elkhider (2016) concluded that instructional design of learning had positive effect on learning outcomes of college students and significant difference prevailed among gender of college students and their learning outcomes through instructional design.

Andrade et al (2015) revealed that instructional design had positive and significant effect on cognitive load of undergraduate students and students with less intrinsic cognitive load were having higher score in post-test in group-I and students with less extraneous cognitive load were having higher score in post test group in-II.

3. OBJECTIVES OF THE STUDY

1. To find out the significant difference between experimental group (Instructional Design through Virtual Reality Video for Root and Shoot System in Botany) boys and control group (Conventional Design for Root and Shoot System in Botany)

boys in XI Standard students learning Botany.

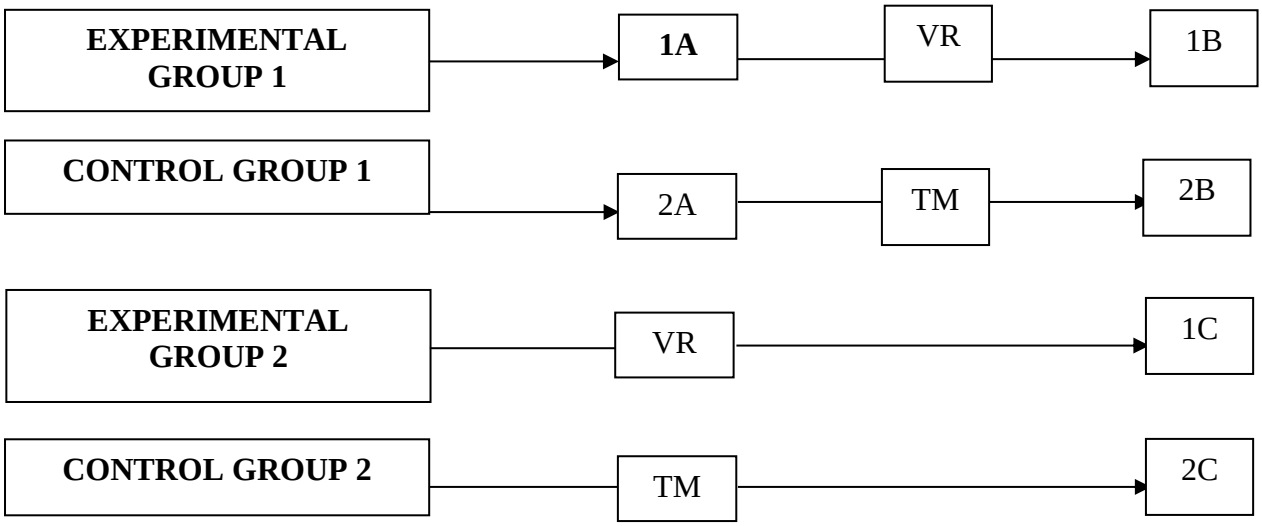
4. HYPOTHESES OF THE STUDY

1. There is no significant difference between the pre test and post test scores of experimental group boys in PPT design.
2. There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PPT design.
3.There is no significant difference between the pre test scores of experimental group boys in PPT design and pre test scores of control group boys in PPT design.
4. There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of control group boys in PPT design.
5. There is no significant difference between the post test scores of experimental group boys in PT design and post test scores of control group boys in PT design.
6. There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PT design.
7. There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of experimental group boys in PT design.
8. There is no significant difference between the post test scores of control group boys in PPT design and post test scores of control group boys in PT design.

5. METHODOLOGY

The current research is made in Erode district. The sample of the study consists of 64 XI standard boys students and they are drawn from Government higher secondary school, Olagadam, Bhavani Taluk, and Government higher secondary school, Guruvarettiyur, Anthiyur Taluk, Erode District of Tamil Nadu. In order to study the objectives, Solomon four group experimental design has employed and it is shown in Figure-1 and it is a mixture of the pre test-post test control group design and the post test only control group design. The XI standard boys students in control group were taught Root and Shoot System in Botany by using Conventional Design. The XI standard boys students in experimental group were taught Root and Shoot System in Botany by using Instructional Design through Virtual Reality Video and the measures were taken to minimize or control the threats to internal and external validity at a rational level.

FIGURE-1 SOLOMON FOUR GROUP EXPERIMENTAL DESIGN



1. 1A - EG1 - Pre test
2. 2A - CG1 - Pre test
3. 1B - EG1 - Post test
4. 2B - CG1 - Post test
5. 1C - EG2 - Post test
6. 2C - CG2 - Post test

The tools namely Criterion test on Root and Shoot System in Botany for XI Standard Students and Stimulus Materials Used- Virtual Reality Video for Root and Shoot System in Botany for XI Standard Students are used in the current study. The Pre and Post- tests are conducted among Group I and Group II. The post test only design (PT design) is conducted for Group III and Group IV. The investigator has developed the Virtual Reality Video for Root and Shoot System in Botany. The two Experimental groups' with sample of 32 XI standard boys students and each of them are subjected to treatment and these students are taught Virtual Reality Video through Instructional Design. The two Control groups' with sample of 32 XI standard boys students and each of them are subjected to Conventional Design.

6. RESULTS –HYPOTHESES TESTING

Hypothesis-1: There is no significant difference between the pre test and post test scores of experimental group boys in PPT design.

Table-1. Pre Test and Post Test Scores of Experimental Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Pre Test	16	19.00	4.89	14.970	.000
PPT(Experimental Boys) - Post Test	16	39.13	1.78		

From the above table, it is seen that the calculated 't' value of 14.970 is higher than the critical value of 2.95 in 1% level of significance. Hence, it is concluded that there exists significant difference between the pre test and post test scores of experimental group boys in PPT design. The mean value of the post test (39.13) scores of experimental group boys in PPT design is higher than the mean value of pre test (19.00) scores of experimental group boys in PPT design. Thus, the hypothesis is rejected. The experimental group boys in PPT design has performed very well after the experiment. It is interpreted that the Instructional Design through Virtual Reality Video is having better impact on XI Standard Boys' students in learning of Root and Shoot System in Botany in PPT design

Hypothesis-2: There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PPT design.

Table-2. Pre Test Scores of Control Group Boys in PPT Design and Post Test Scores of Control Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Control Boys) - Pre Test	16	21.13	2.36	7.557	.000
PPT(Control Boys) - Post Test	16	31.13	4.30		

From the above table, it is observed that the calculated 't' value of 7.557 is higher than the critical value of 2.95 in 1% level of significance. Hence, it is concluded that there exists significant difference between the pre test and post test scores of experimental group boys in PPT design. The mean value of the post test scores of control group boys (31.13) in PPT design is higher than the mean value of pre test scores of control group boys (21.13) in PPT design. Thus, the hypothesis is rejected. The pre test scores of control group boys in PPT design is smaller than the post test scores of control group boys in PPT design.

Hypothesis-3: There is no significant difference between the pre test scores of experimental group boys in PPT design and pre test scores of control group boys in PPT design.

Table-3. Pre Test Scores of Experimental Group Boys in PPT Design and Pre Test Scores of Control Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Pre Test	16	19.00	4.89	1.488	.158
PPT(Control Boys) - Pre Test	16	21.13	2.36		

From the above table, it is clear that the calculated 't' value of 1.488 is smaller than the critical value of 2.13 in 5% level of significance. Hence, it is concluded that there exists no significant difference between the pre test scores of experimental group boys in PPT design and pre test scores of control group boys in PPT design. Thus, the hypothesis is accepted. It is interpreted that the experimental group boys and control group boys are equated accurately in PPT design.

Hypothesis-4: There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of control group boys in PPT design.

Table-4. Post Test Scores of Experimental Group Boys in PPT Design and Post Test Scores of Control Group Boys in PPT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Post Test	16	39.13	1.78	7.108	.000
PPT(Control Boys) - Post Test	16	31.13	4.30		

From the above table, it is evident that the calculated 't' value of 7.108 is higher than the critical value of 2.95 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of experimental group boys in PPT design and post test scores of control group boys in PPT design. The mean value of the post test scores of experimental group boys (39.13) in PPT design is higher than the mean value of post test scores of control group boys (31.13) in PPT design. Thus, the hypothesis is rejected. The post test scores of control group boys in PPT design is lesser than the post test scores of experimental group boys in PPT design. It is interpreted that the Instructional Design

through Virtual Reality Video is having better impact on XI Standard Boys' students in learning of Root and Shoot System in Botany than Conventional Design in PPT design.

Hypothesis-5: There is no significant difference between the post test scores of experimental group boys in PT design and post test scores of control group boys in PT design.

Table-5. Post Test Scores of Experimental Group Boys in PT Design and Post Test Scores of Control Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PT(Experimental Boys) - Post Test	16	52.19	1.94	5.872	.000
PT(Control Boys) - Post Test	16	42.75	5.17		

From the above table, it is apparent that the calculated 't' value of 5.872 is higher than the critical value of 2.95 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of experimental group boys in PT design and post test scores of control group boys in PT design. The mean value of the post test scores of experimental group boys (52.19) in PT design is higher than the mean value of post test scores of control group boys (42.75) in PT design. Thus, the hypothesis is rejected. The post test scores of control group boys in PT design is lesser than the post test scores of experimental group boys in PT design. It is interpreted that the Instructional Design through Virtual Reality Video is having better impact on XI Standard Boys' students in learning of Root and Shoot System in Botany than Conventional Design in PT design.

Hypothesis-6: There is no significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PT design.

Table-6. Pre Test Scores of Control Group Boys in PPT Design and Post Test Scores of Control Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Control Boys) - Pre Test	16	21.13	2.36	13.457	.000
PT(Control Boys) - Post Test	16	42.75	5.17		

From the above table, it is observed that the calculated 't' value of 13.457 is higher than the critical value of 2.95 in 1% level of significance. Hence, it is concluded that there exists significant difference between the pre test scores of control group boys in PPT design and post test scores of control group boys in PT design. The mean value of the post test scores of control group boys (42.75) in PT design is higher than the mean value of pre test scores of control group boys (21.13) in PPT design. Thus, the hypothesis is rejected. The pre test scores of control group boys in PPT design is lesser than the post test scores of control group boys in PT design. It is interpreted that the normal difference is there between

the scores of XI Standard boys students before and after the subject has taught.

Hypothesis-7: There is no significant difference between the post test scores of experimental group boys in PPT design and post test scores of experimental group boys in PT design.

Table-7. Post Test Scores of Experimental Group Boys in PPT Design and Post Test Scores of Experimental Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Experimental Boys) - Post Test	16	39.13	1.78	19.946	.000
PT(Experimental Boys) - Post Test	16	52.19	1.94		

From the above table, it is clear that the calculated 't' value of 19.946 is higher than the critical value of 2.95 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of experimental group boys in PPT design and post test scores of experimental group boys in PT design. The mean value of the post test scores of experimental group boys (52.19) in PT design is higher than the mean value of post test scores of experimental group boys (39.13) in PPT design. Thus, hypothesis is rejected. It is interpreted that both experimental group boys are having good impact in learning of Root and Shoot System in Botany through Instructional Design. The pre test and post test effect in PT design has influenced the XI Standard boys students scores more than the scores of XI Standard boys students in PPT design.

Hypothesis-8: There is no significant difference between the post test scores of control group boys in PPT design and post test scores of control group boys in PT design.

Table-8. Post Test Scores of Control Group Boys in PPT Design and Post Test Scores of Control Group Boys in PT Design

Variable	N	Mean	SD	t-Value	Significance
PPT(Control Boys) - Post Test	16	31.13	4.30	9.685	.000
PT(Control Boys) - Post Test	16	42.75	5.17		

From the above table, it is evident that the calculated 't' value of 9.685 is higher than the critical value of 2.95 in 1% level of significance. Hence, it is concluded that there exists significant difference between the post test scores of control group boys in PPT design and post test scores of control group boys in PT design.The mean value of the post test scores of control group boys (42.75) in PT design is higher than the mean value of post test scores of control group boys (31.13) in PPT design. Thus, the hypothesis is rejected. The post test scores of control group boys in PT design is higher than the post test scores of control group boys in PPT design. It is interpreted that both control group boys are having good impact in learning of Root and Shoot System in Botany through Conventiional Design. The pre test and post test effect in PT design has influenced the XI Standard boys students scores more

than the scores of XI Standard boys students in PPT design. The criterion test for learning root and shoot system in botany through instructional design by xi standard boys students is shown in the following Table-9.

Table-9. Criterion Test for Learning Root and Shoot System in Botany through Instructional Design by XI Standard Boys Students

Variables	Significance	Remarks
PPT(Experimental) - Pre Test PPT(Experimental) -Post Test	Significant	PPT(Experimental) - Post Test > PPT(Experimental) - Pre Test
PPT(Control) -Pre Test PPT(Control) - Post Test	Significant	PPT(Control) - Post Test > PPT(Control) - Pre Test
PPT(Experimental) - Pre Test PPT(Control) - Pre Test	Not Significant	PPT(Experimental) - Pre Test < PPT(Control) - Pre Test
PPT(Experimental) - Post Test PPT(Control) - Post Test	Significant	PPT(Experimental) - Post Test > PPT(Control) - Post Test
PT(Experimental) - Post Test PT(Control) - Post Test	Significant	PT(Experimental) - Post Test > PT(Control) - Post Test
PPT(Control) - Pre Test PT(Control) - Post Test	Significant	PT(Control) - Post Test > PPT(Control) - Pre Test
PPT(Experimental) - Post Test PT(Experimental) - Post Test	Significant	PPT(Experimental) - Post Test < PT(Experimental) - Post Test
PPT(Control) - Post Test PT(Control) - Post Test	Significant	PPT(Control) - Post Test < PT(Control) - Post Test

7. CONCLUSION

The XI Standard boys in experimental groups of both PPT design and PT design have excelled in learning of Root and Shoot System in Botany by means of Instructional Design through Virtual Reality Video than control groups have gone through in learning of Root and Shoot System in Botany in Conventional Design in both PPT design and PT design. It is concluded that Instructional Design is highly effective for learning Root and

Shoot System in Botany among XI standard boys students.

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