Effectiveness of Computer-based Instructional Package in Educational Psychology with Respect to Various Determinants

Sarita Chaudhary* and S.K. Tyagi**

Abstract

This study was related to two broad areas namely— Information and Communication Technology, and Educational Psychology. In the present study, the investigator has attempted to find out the effectiveness of computer-based instructional package on the pupil teachers' achievement in educational psychology, with respect to various psycho-social determinants. This study was an attempt to explore the possibilities of applying computer-based instruction for teachers' training programme. In the present research, the investigator has developed Computer-Based Instructional Package in Educational Psychology and assessed the effectiveness of the package, in terms of achievement in the educational psychology of the pupil teachers. The pre-test-post-test control group design has been used for the experiment.

Introduction

It is crucial to understand the role of ICT in promoting educational changes and creating a new culture of learning. A basic assumption of using ICT in education, is that it changes the distribution, and uses the information and resources in the zone of teaching and learning, resulting in changing the association among educational participants. The core idea of ICT integration in teaching and learning is to always apply pedagogy which is based on technology. Moreover, it refers not only to develop mastery in ICT

* *Former Research Scholar*, School of Education, Devi Ahilya Vishwavidyalaya, Indore.
** *Former Head* and *Dean*, School of Education, Devi Ahilya Vishwavidyalaya, Indore.

skills, but also improve teaching and learning with the use of ICT.

The efficient integration of Information and Communication Technology (ICT), in the teaching-learning process and pedagogy, is becoming a fundamental competency for stakeholders. However, generally they do not allow linear instructional design models for integrating ICT, which is the reason the experts suggest a generic model, which consists of three basic elements—pedagogy, social interaction, and technology. It develops a learner-centred culture with an independent and autonomous learning atmosphere that promotes initiation, creativity, and critical thinking (Wang, 2008). There should be much emphasis on integrating ICT as a tool in pedagogy, and on learning that tends to improve basic cognitive skills, motivate and engage students, as well as foster their enquiry and inquisitive skills.

The teachers are expected to create a new flexible and interactive learning environment with flexible, experiential, and multimedia-based delivery system (Pelgrum and Law, 2003). ICT helps learners and teachers to interact and collaborate beyond the boundaries of classrooms, and enable the learners to collect, select, analyse, organise, extend, transform, and present knowledge in an authentic way, besides permitting the teachers and instructors to bring the whole world into the classrooms.

ICT Based Learning Environment

Authenticity is an important concern which should be undertaken in the planning and development of learning environment. According to Bransford and researchers (1990), learning environments need to reflect the potential uses of knowledge that students are expected to master it. In order to prevent the acquired knowledge from becoming static, ICT provides opportunities to access an affluence of information through multiple information resources, viewing information from multiple perspectives, and also makes complex concepts easier to understand through simulation, to create an authentic learning environment. The use of ICT may foster co-operative learning and promote reflections about the content; it may act as a facilitator of active learning and higher order thinking (Vaezinia and Dehghani, 2016). The ICT environment extends experience in developing web-based and multimedia materials. It has been developed by using different software, in order to maximise the opportunities for open and active learning.

ICT has the capacity to increase the flexibility in the delivery of content that enhances the learners' access to knowledge, anytime and anywhere. It has a huge potential to transform the teaching methodology by creating a learner-driven environment instead of teacher-centred practices (Somekh, 2008). It provides a ground to prepare the learners for lifelong learning, as well as enhances the quality of learning.

ICT Benefitting Teaching-Learning Process

The learners have now initiated to acknowledge the capability of ICT to make education available anywhere and anytime, due to its potential to heighten the availability of just-in-time learning and distance learning. Best content and best practices, which are the shared means of ICT, can foster quality teaching-learning and allow the educational institutions to grasp the disadvantaged groups of the society. The teachers and learners both recognise the capabilities of ICT within the sphere of communication technologies and mobile technologies in a 24×7 envelop. What and how much time will be used within the 24×7 envelop are the challenges that will be encountered by the future educators for the purposeful use of ICT (Young, 2002). Teachers tend to use ICT for making radical changes in their teaching practices (Fabry and Higgs, 1997).

Many of the studies, conducted through the ICT, suggest that an appropriate use of digital technologies in education could have a remarkable positive effect on the students' attitude and their performance in their scholastic subjects, which is the need of the 21st century classrooms. Further, the students who integrate ICT as a means of learning, scored higher than the students not using ICT, despite having an average intelligence level. The learners learned quicker and showed more interest in the classroom interactions (Kulik, 2003). However, creating a positive effect on the learners' performance is based on how effectively the teachers use ICT, and how efficiently they use such technologies (Hammond et al., 2009).

Rationale of the Study

The programme such as B.Ed. is an important course in teachers' training; it prepares future teachers for teaching in secondary and senior secondary classes. In this programme, 'Educational Psychology' is a part of the course structure which prepares pupil teachers to apply psychological principles to make teaching-learning process effective and interesting.

The studies related to ICT are extravagantly conducted on relative effectiveness of computer-based instructions and comparative analysis with traditional and other methods or strategies of teaching. In this area, researchers such as, Amareshwaran and Singh (2011), Singh and Chaudhary (2016), Kant (2016), Vaezinia and Dehghani (2016), conducted research and explored this area of study. But not much research has been conducted on— How ICT and Computer-Based Instructional Package improve our teachers' effectiveness and students' achievement in specific subjects like Educational Psychology and no attempt has been made to develop Computer-Based Instructional Package on Educational Psychology. Further to the best of researcher's

knowledge, no Computer-Based Instructional Package on Educational Psychology has been developed at B.Ed. level, which may help pupil teachers in enhancing the comprehension of the contents. This Computer-Based Instructional (CBI) Package has been developed especially for pupil teachers or future teachers to provide insight into Educational Psychology. It will hopefully be helpful for future teachers to identify, understand and nurture their abilities with the help of study of Educational Psychology.

Objectives of the Study

The present problem endeavours for the realisation of the following objectives:

1. To study the effect of treatment, academic discipline, and their interaction on the achievement in Educational Psychology of B.Ed. students, by considering pre-achievement in Educational Psychology as covariate.
2. To study the effect of treatment, computer proficiency, and their interaction on the achievement in Educational Psychology of B.Ed. students, by considering pre-achievement in Educational Psychology as covariate.
3. To study the effect of treatment, personality, and their interaction on the achievement in Educational Psychology of B.Ed. students, by considering pre-achievement in Educational Psychology as covariate.

Hypotheses

The hypotheses of the present study were as follows:

1. There is no significant effect of treatment, academic discipline, and their interaction on the achievement in Educational Psychology of B.Ed. students, by considering pre-achievement in Educational Psychology as covariate.
2. There is no significant effect of treatment, computer proficiency, and their interaction on the achievement in Educational Psychology of B.Ed. students, by considering pre-achievement in Educational Psychology as covariate.
3. There is no significant effect of treatment, personality and their interaction on the achievement in Educational Psychology of B.Ed. students, by considering pre-achievement in Educational Psychology as covariate.

Methodological Orientation

Sample

The purpose of this study was to find out the relative effect of the CBI Package in enhancing the understanding of student-teachers in Educational Psychology. For this, the researcher selected 75 students as experimental group and 52 students of B.Ed. for control group, in which the traditional method of teaching has been applied.

Table 1
Variable-wise Distribution of Sample

S.No.	Variable	Groups	N
1.	Treatment	Experimental Group	75
		Control Group	52
2.	Personality	Introvert	50
		Extrovert	47
		Ambivert	30
3.	Computer Proficiency	Proficient	60
		Not Proficient	67
4.	Academic Discipline	Humanities/Social Science	97
		Science	30

Tools

To assess the performance of the pupil teachers before and after the experiment, an achievement test in Educational Psychology was constructed by the researchers on the topics— learning, intelligence, personality and creativity. The items included in the test were of objective type consisting of only objective type questions (04 options— multiple choice). The test was designed to assess the achievement in the knowledge, understanding and application domains; the same achievement test was used for pre-test and post-test.

Personality traits were assessed by using *The Personality Inventory* (PI-SS). PI-SS is a standard and easy method to administer and provides a scored inventory which is designed for assessing the degree of *Introversion – Extraversion* dimensions of personality. The computer proficiency of B.Ed. students was assessed with the help of a computer proficiency test which was developed and standardised by the researchers. The test comprised of 30 questions which are objective in nature. The students were given 40 minutes to complete the test. The total weightage of the test was of 30 marks. The grouping was done on the basis of academic discipline, i.e., graduation subject.

Research Design

The present research was quasi-experimental in nature. In this study, the researchers followed non-equivalent pre-test post-test control group design. This quasi-experimental method was designed by Campbell and Stanley. The layout of the design is as follows:

O X O
.....
O O

Where X denotes the treatment, O before X denotes the pre-test, and O after X denotes the post-test. The dotted line means that the groups

were not made the equivalent before the experiment. There were two groups— one group was designated as the experimental group and the other as the control group. The experimental group was taught by Computer-Based Instructional Package in Educational Psychology and the control group was taught by the traditional method. In traditional method, only lectures and discussion method were used to explain the content. ANCOVA is used to eliminate the effect of pre-achievement in Educational Psychology.

Computer-based Instructional Package

The computer-based instructional package was developed by researchers which contains graphics, text pictures, animations and e-assessment. It consists more material than an ordinary class room lecture or notes. In this mode of instruction, computers are used as primary means of knowledge exposition. Thus, computer-based instructional packages may present any topic in a lively and interactive mode. This CBI Package has followed behaviouristic approach of learning. It is based on Skinner's Operant Conditioning Principles stating that learning is best accomplished in small incremental steps with immediate reinforcement, or reward for the learners.

Analysis of Data

The data was analysed objective wise with the help of statistical techniques as listed hereby.

1. For studying the effect of treatment, academic discipline and their interaction on achievement in Educational Psychology of B.Ed. students by considering pre-achievement in educational psychology as covariate, 2×2 factorial design ANCOVA was used.
2. For studying the effect of treatment, computer proficiency and their interaction on achievement in Educational Psychology of B.Ed. students by considering pre-achievement in educational psychology as covariate, 2×2 factorial design ANCOVA was used.
3. For studying the effect of treatment, personality and their interaction on achievement in Educational Psychology of B.Ed. students by considering pre-achievement in educational psychology as covariate, 3×2 factorial design ANCOVA was used.

Results and Interpretation

The analysis and interpretation of results has been done according to the objectives of the study, which are given as follows.

1. Effect of treatment, academic discipline, and their interaction on the achievement in Educational Psychology of B.Ed. Students: The first objective of

this investigation was to study the effect of treatment, academic discipline, and their interaction on the achievement in Educational Psychology of B.Ed. students by considering pre-achievement in Educational Psychology as covariate. There were two levels of each— the treatment and academic discipline. Thus, the data, with respect to this objective, was analysed with the help of 2×2 factorial design ANCOVA. The results are given in Table 2.

Table 2 shows that the adjusted F-value for Treatment is 14.474, whose probability of significance with df = (1,122) is 0.000, which is less than 0.01. Hence, it is significant at 0.01 level of significance. It indicates that the adjusted mean scores of achievements in Educational Psychology of experimental group and control group, by considering pre-achievement in Educational psychology as covariate, differ significantly. Hence, the null hypothesis, 'There is no significant difference in the adjusted means score of achievement in educational psychology of experimental group and control group, by considering pre-achievement in educational psychology as covariate', is rejected.

Table 2 further shows that the adjusted F-value for Academic Discipline is 0.022, whose probability of significance with df = (1,122) is 0.882, which is greater than 0.05. Hence, it is not significant at 0.05 level of significance. It indicates that the adjusted mean scores of achievement in Educational Psychology of Science and Social Science or Humanities groups do not differ significantly by taking pre-achievement in Educational Psychology as covariate. Hence, the null hypothesis is not rejected. It may, therefore, be concluded that the achievement in Educational Psychology of Science and Social Science or Humanities group was found to be equally enhanced, when

Table 2

Summary of 2 × 2 Factorial Design ANCOVA of Treatment, Academic Discipline and their Interaction on Achievement in Educational Psychology by Considering Pre-Achievement in Educational Psychology as Covariate

Source of Variance	Df	SSy.x	MSSy.x	Fy.x	Sig (p)	Remark
Treatment	1	464.661	464.661	14.474	0.000	P < 0.01
Academic Discipline	1	0.704	0.704	0.022	0.882	P > 0.01
Treatment × Academic Discipline	1	5.055	5.055	0.157	0.692	P > 0.05
Error	122	3916.562	32.103			
Total	**125**					

both the groups were matched with respect to pre-achievement in Educational Psychology.

Again from Table 2, it can be seen that the adjusted F-value for interaction between Treatment and Academic Discipline is 0.15, whose probability of significance with df = (1,122) is 0.692, which is greater than 0.05. Hence, it is not significant at 0.05 level of significance. It indicates that there is no significant effect of interaction between Treatment and Academic Discipline on the Achievement in Educational Psychology, by considering Pre-achievement in Educational Psychology as covariate. Hence, the null hypothesis is not rejected. It may, therefore, be concluded that the achievement in Educational Psychology of Science and Social Science/Humanities groups was found to be equally enhanced when taught through Computer-Based Instructional Package, by considering Pre-achievement in Educational Psychology as covariate.

2. Effect of Treatment, Computer Proficiency and Their Interaction on Achievement in Educational Psychology of B.Ed. Students: The second objective of the investigation was to study the effect of Treatment, Computer Proficiency, and their interaction on achievement in Educational Psychology of B.Ed. students, by considering Pre-achievement in Educational Psychology as covariate. There were two levels each of the Treatment and Computer Proficiency. Thus, with respect to this objective, the data was analysed with the help of 2×2 Factorial Design ANCOVA. The results are given in Table 3.

Table 3 further shows that the adjusted F-value for Treatment is 23.858, whose probability of significance with df = (1,120) is 0.000, which is less than 0.01. Hence, it is significant at 0.01 level of significance. It indicates that the adjusted mean scores of the achievement in Educational Psychology of Experimental Group

Table 3

Summary of 2 × 3 Factorial Design ANCOVA of Treatment, Computer Proficiency, and Their Interaction on Achievement in Educational Psychology by Considering Pre-Achievement in Educational Psychology as Covariate

Source of Variance	Df	SSy.x	MSSy.x	Fy.x	Sig (p)	Remark
Treatment	1	733.047	733.047	23.858	0.000	P < 0.01
Computer Proficiency	1	172.197	172.197	5.604	0.019	P < 0.05
Treatment × Computer Proficiency	1	16.103	16.103	0.524	0.524	P > 0.05
Error	122	3748.486	30.725			
Total	**125**					

and Control Group, by considering Pre-achievement in Educational Psychology as covariate, differ significantly. Hence, the null hypothesis is rejected.

Again from Table 3, it can be seen that the adjusted F-value for Computer Proficiency is 5.604, whose probability of significance with df = (1,122) is 0.019, which is less than 0.05. Hence, it is significant at 0.05 level of significance. It indicates that the adjusted mean scores of achievement in Educational Psychology of the two groups namely, Computer Proficient and Computer Non-proficient, by considering Pre-achievement in Educational Psychology as covariate, differ significantly. Hence, the null hypothesis is rejected.

In order to find out which group of students have performed significantly better, the adjusted mean scores of the achievement in Educational Psychology, Computer Proficient and Computer Non-proficient are given in Table 4.

From Table 4, it is evident that the adjusted mean scores of the achievement in Educational Psychology of the Computer Proficient group is 33.25, which is significantly higher than that of Computer Non-proficient group, whose adjusted mean scores of achievement is 30.87. It may, therefore, be concluded that the adjusted mean scores of the achievement of Computer Proficient students are found to be significantly higher than that of Computer Non-proficient, when the groups were matched with respect to Pre-achievement.

Further from Table 3, it can be seen that the adjusted F-value for the interaction between Treatment and Computer Proficiency is 0.524, whose probability of significance with df = (1,122) is 0.470, which is greater than 0.05. Hence, it is not significant at 0.05 level of significance. It indicates that there is no significant effect of interaction between Treatment and Computer Proficiency on achievement in Educational Psychology by considering Pre-achievement in Educational Psychology as covariate. Hence, the null hypothesis, is not rejected. It may, therefore, be concluded that the achievement in Educational Psychology was found to be independent of the interaction between Treatment and Computer Proficiency by considering the Pre-achievement in Educational Psychology as covariate, and it may be concluded that irrespective of the level of Computer Proficiency,

Table 4

Group-wise Adjusted Mean Scores of Achievements in Educational Psychology

Group	Adjusted Means
Computer Proficient	33.25
Computer Non-proficient	30.87

Educational Psychology can be taught equally well through Computer-Based Instructional Package and traditional method of teaching.

3. Effect of Treatment, Personality and Their Interaction on Achievement in Educational Psychology of B.Ed. Students: The third objective of the investigation was to study the effect of Treatment, Personality, and their interaction on the Achievement in Educational Psychology of B.Ed. students, by considering Pre-achievement in Educational Psychology as covariate. There were two levels of treatment and three levels of personality. Thus, the data, with respect to this objective, was analysed with the help of 2 × 3 Factorial Design ANCOVA. The results are given in Table 5.

Table 5 shows that adjusted F-value for Treatment is 23.374, whose probability of significance with df = (1,120) is 0.000, which is less than 0.01. Hence, it is significant at 0.01 level of significance. It indicates that the adjusted mean scores of achievement in Educational Psychology of Experimental Group and Control Group, by considering Pre-achievement in Educational Psychology as covariate, differ significantly. Hence, the null hypothesis is rejected.

Table 5 further shows that the adjusted F-value for Personality is 1.474, whose probability of significance with df = (2,120) is 0.233, which is greater than 0.05. Hence, it is not significant at 0.05 level of significance. It indicates that the adjusted mean scores of achievement in Educational Psychology of extrovert, ambivert, and introvert groups do not differ significantly, by taking Pre-achievement in Educational Psychology as covariate. Hence, the null hypothesis is not rejected. It may, therefore, be concluded that the achievement in Educational Psychology of extrovert, ambivert, and introvert group was found to be equally enhanced, when both the groups were matched with respect

Table 5

Summary of 2 × 3 Factorial Design ANCOVA of Treatment, Personality, and Their Interaction on Achievement in Educational Psychology by Considering Pre-Achievement in Educational Psychology as Covariate

Source of Variance	Df	SSy.x	MSSy.x	Fy.x	Sig (p)	Remark
Treatment	1	737.850	737.850	23.374	0.000	P < 0.01
Personality	2	93.192	46.596	1.474	0.233	P > 0.05
Treatment × Personality	2	49.492	24.746	0.784	0.784	P > 0.05
Error	120	2787.978	31.566			
Total	**125**					

to Pre-achievement in Educational Psychology.

Again from Table 5, it can be seen that the adjusted F-value for interaction between Treatment and Personality is 0.784, whose probability of significance with df = (2,120) is 0.459, which is greater than 0.05. Hence, it is not significant at 0.05 level of significance. It indicates that there is no significant effect of interaction between Treatment and Personality on achievement in Educational Psychology, by considering Pre-achievement in Educational Psychology as covariate. Hence, the null hypothesis is not rejected. It may, therefore, be concluded that achievement in Educational Psychology of extrovert, ambivert, and introvert groups are found to be equally enhanced, when taught through computer-based instructional package, by considering pre-achievement as covariate.

Findings and Discussion of Study

The following were the findings and discussion of the present research:

- Achievement in Educational Psychology of Science and Social Science/Humanities group do not differ significantly by taking Pre-achievement in Educational Psychology as covariate. There was no significant influence of Academic Discipline on the achievement in Educational Psychology. There was no significant effect of interaction between Treatment and Academic Discipline on the achievement in Educational Psychology. Achievement of Science and Social Science/Humanities groups was found to be equally enhanced when taught through Computer-based Instructional Package.
- This finding was supported by Sultan (2013), who found that Academic Discipline has no significant effect on Achievement. However, this finding was not supported by Shinde (2002), who, in turn, found that students from the science discipline were significantly superior to those from other disciplines, in terms of the Achievement, when taught through Video Instructional Material. The reason for the present finding might be that the subject of Educational Psychology is new for students of all the disciplines, and previous knowledge of all the students was almost same in this subject. Further, Educational Psychology is an interesting subject, and it is also liked by students of all the disciplines. There is no significant effect of interaction between Treatment and Academic Discipline on Achievement in Educational Psychology by considering Pre-achievement as covariate. Thus, computer-based instructional package can be used to teach educational psychology, irrespective of the Academic Discipline of students when Pre-achievement in Educational Psychology was taken as covariate.

The reason for the present finding might be that proper care was taken by the investigator in developing computer-based instructional package, based on the academic disciplines of the students to maximise their learning through this medium. The subject matter was easily grasped by students from all the academic disciplines, and it can be said that it would not be relatively easier or more difficult for students of any particular academic discipline.

- Achievement in Educational Psychology of two groups namely, Computer Proficient and Computer Non-proficient, by considering Pre-achievement as covariate, differ significantly. There was a significant effect of Computer Proficiency on Achievement. The Achievement of Computer Proficient group was found to be significantly higher than that of Non-proficient group, by considering Pre-achievement as covariate. There was no significant effect of interaction of Treatment and Computer Proficiency on the Achievement in Educational Psychology of B.Ed. students, by considering Pre-achievement in Educational Psychology as covariate. The Achievement in Educational Psychology was found to be independent of the interaction between Treatment and Computer Proficiency, by considering Pre-achievement in Educational Psychology, and it may be concluded that irrespective of the level of computer proficiency, the computer-based instructional package in Educational Psychology was found to be equally effective in terms of the achievement for both the groups namely— computer proficient and computer non-proficient.
- This finding is in support to the study done by Sultan (2013), who found that more computer proficient students significantly enhanced their achievement as compared to less computer proficient students. The reason for the present finding might be that computer proficient students might be more actively engaged in studying through computer-based instructional package. They might have shown more interest and attentiveness, as compared to less proficient students.
- Achievement in Educational Psychology of extrovert, ambivert, and introvert groups do not differ significantly by taking Pre-achievement as covariate. The achievement of extrovert, ambivert, and introvert groups was found to be equally enhanced when taught through computer-based instructional package. There was no significant effect of interaction of Treatment and Personality on the Achievement in Educational Psychology of B.Ed. students, by considering pre-achievement as covariate.

- This finding is supported by Patel (2011) and Shinde (2002), who reported no significant difference between the achievement of extrovert and introvert students. The reason for this finding might be that personality has a little contribution in understanding the subject matter, as it belongs to the affective domain, while understanding comes under cognitive domain abilities. Thus, the three groups of extrovert, ambivert, and introvert students could be fully indulged in the studying process through CBI package.
- Further, the achievement of extrovert, ambivert, and introvert group were found to be equally enhanced when taught through CBI package by considering Pre-achievement as covariate. It indicates that personality may not be taken into consideration, while developing CBI Package in educational psychology. This finding is supported by Shinde (2003), Patel (2011), Sharma and Sharma (2013), Sharma (2017) and Shinde, (2003), who found that extrovert, ambivert, and introvert students can be benefitted equally, when taught through video instructional material and other ICT-based teaching. The reason for the present finding might be that there was no extra activity to be done in the class while studying through CBI package in Educational Psychology, which might have been helpful for a specific kind of personality. Thus, irrespective of having different kind of personalities, the students paid equal attention while studying through the CBI package.

Conclusion

On the basis of the above discussion, we can conclude that computer-based instructional package is effective in terms of achievement in Educational Psychology, this achievement does not differ significantly on the ground on academic discipline and personality, though computer proficiency affect achievement significantly. Achievement of Computer Proficient group was found to be significantly higher than that of Non-proficient group.

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