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Effect of ICT-Based Peer Teaching on the Achievement and Retention of Preservice Teachers.

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Abstract
The main aim of the study was to find out the Effect of ICT-Based Peer Teaching on the Achievement and retention of knowledge, among Preservice Teachers while learning a paper on 'Educational Evaluation'. This study was experimental in nature, and a post-test-only control group design was used. A self-made "Achievement test of Educational Evaluation" was used to collect the data from the sample, which consisted of 80 preservice teachers. The experimental and control groups had a strength of 40 students each; both the groups were matched on pre-achievement scores. The objectives and related hypotheses were analyzed by applying the t-test. The findings of the study indicated that: i) ICT-Based Peer Teaching is more effective than the Conventional Strategy in improving Achievement of preservice teachers in Educational Evaluation. ii) The preservice teachers have retained their achievement in educational Evaluation, which is improved through an ICT-Based Peer Teaching.

Keywords: *ICT-Based Peer Teaching, Achievement, Retention, preservice teachers, Educational Evaluation.*

INTRODUCTION

Peer teaching involves one or more students teaching other students in a particular subject area and builds on the belief that "to teach is to learn twice" (Whitman, 1998). Peer teaching is a popular pedagogical method developed by Eric Mazur in the 1990s. This concept of learning through peer teaching is based on Vygotsky's (1978) social constructive theory of learning, which emphasizes the role of students in generating learning by having them teach peers through social interaction within their zones of proximal development. Vygotsky and Piaget developed two widely accepted theories of learning (Piaget, 1985; Vygotsky, 1978) that have made enduring contributions and developed a foundation for peer teaching. The objectives of peer-learning are the transfer of knowledge, skills, and experience from one municipality to others. A review of related literature revealed that very few studies on ICT-based peer teaching strategies in various subjects have been conducted. Thus, the investigator felt it was necessary to investigate the effect of ICT-based peer teaching on the achievement of preservice teachers in educational evaluation.

In the present study, "ICT-Based Peer Teaching" involves preservice teachers teaching each other in a particular group on a particular subject, using ICT to enhance their achievement and retention of knowledge in educational evaluation. "Achievement in educational evaluation" refers to the acquired learning outcomes in terms of instructional objectives, namely knowledge, understanding, application, and skill objectives, as a result of instruction provided to preservice teachers through the ICT-Based Peer Teaching strategy. In the present study, it refers to the score obtained by a student in the "Achievement Test in Educational Evaluation" constructed by the investigator.

REVIEW OF RELATED LITERATURE

Peer Teaching has been extensively used in different disciplines.

Moliner, L., and Alegre, F. (2020), conducted a study on "Peer Tutoring Effects on Students' Mathematics Anxiety: A Middle School Experience." In this study, the effects of reciprocal peer tutoring on students' mathematics anxiety levels were examined. A pretest-posttest control group design was used. A total of 420 students from the 7th, 8th, and 9th grades from a public middle school in Spain were selected for the study, out

of which 215 were female and 205 were male. These students were randomly assigned and equally distributed on the basis of course grade between the experimental group and control group, 210 in each. Data was gathered by using the "Mathematics Anxiety Scale" developed by Chiu and Henry (1990) and by eight focus group sessions that were held with students. Two main factors, mathematics learning anxiety and mathematics evaluation anxiety, were analyzed using quantitative and qualitative data. The findings revealed statistically significant improvements in both male and female students in the experimental group. The main conclusion is that peer tutoring is very beneficial for reducing middle school students' anxiety about mathematics.

Liu, C. Y., and Chen, H. L. (2020) conducted a study on the "Effects of Peer Learning on Learning Performance, Motivation, and Attitude." This study aims to propose a peer-learning teaching approach in a financial management course to facilitate students in discussing and learning in small groups as well as in engaging in games and tournaments to achieve their learning objectives. The results concluded that the peer-learning group performed better than the lecture-based group in both final exam scores and semester grades. These findings also reveal that the peer-learning group reports a marginally higher score for learning motivation and a more positive attitude towards peer-learning than the lecture-based group. Participants' feedback highlights that peer learning is most helpful in enhancing students' overall learning.

Ullah, I., Tabassum, R., and Kaleem, M. (2018) conducted a study on the "Effects of Peer Tutoring on the Academic Achievement of Students in the Subject of Biology at the Secondary Level." The present study was aimed at analyzing the effects of peer tutoring on the academic achievement of students in the subject of biology at the secondary level. The objectives of the study were: (1) to study the effect of peer tutoring on the academic achievement of students; and (2) to determine the effect of peer tutoring with respect to different levels in the cognitive domain of Bloom's taxonomy. All 433,405 male students at the secondary level (10th grade) in Khyber Pakhtunkhwa were the population of the study. Forty students were taken as the sample for the study from the Allied National Software Institute in Maryland. The post-test-only equivalent group design was used. The data collected from the pretest and post-test were analyzed through an independent sample t-test. It was found that the mean score of the experimental group was significantly better than that of the control group. The results revealed that peer tutoring improved the academic achievement of students in the experimental group significantly as compared to the control group; hence, it was an effective method for teaching biology at the secondary level. It was suggested that peer tutoring may be incorporated along with other teaching methodologies for the subject of biology and may be given due consideration in all teacher education practices in the country.

Raheem, Y. A., Yusuf, H.T., and Odutayo, A.O. (2017) conducted a study on the "Effect of Peer Tutoring on Students' Academic Performance in Economics in Ilorin South, Nigeria." The main goal of the study was to determine the effect of peer tutoring and the moderating effect of gender on economics academic performance. The experimental (peer tutoring) group had 40 students, while the control group had 38 selected from two intact classes in two different secondary schools. A "Economics Performance Test" (EPT) was used to measure academic performance. Students in the peer tutoring group obtained higher scores than those of conventional instruction group. This effect was not moderated by gender. Hence, it is concluded that teachers adopt peer tutoring instructional strategies in the classroom so as to develop students' generic skills.

Stigmar, M. (2016), conducted a study on "Peer-to-Peer Teaching in Higher Education: A Critical Literature Review." The aim of the critical literature review was to identify studies where students are engaged as partners in teaching in higher education and analyse how tutors and tutees benefit from peer teaching. Thirty studies were included for review. Thirteen countries are represented, and two thirds of the studies were conducted in the United States of America or the United Kingdom. There is a significant representation of studies from science. Social constructivism is the dominant pedagogical belief and theory. The use of quasi-experimental pre- and post-testing is the most common study design. University teachers do not share the view that peer teaching necessarily results in greater academic achievement gains or deeper learning. University teachers identify and value other pedagogical benefits such as improving students' critical thinking, autonomy, motivation, and collaborative and communicative skills. The finding of this review is that the training of generic skills benefits from peer-to-peer teaching.

Aghaee, N., and Keller, C. (2016) conducted a study on "ICT-supported peer interaction among learners in Bachelor's and Master's thesis courses." The aim of the study was to investigate learners' perceptions of the use of an ICT-based support system for peer interaction and its influencing factors on the quality of the peer interaction. The ICT-based Support System was developed at the Department of Computer and Systems Sciences,

at Stockholm University. The peer interaction has taken three forms: peer reviews, active participation, and final opposition. This study monitors how an ICT-based support system facilitates peer interaction in the Bachelor's and Master's thesis processes. Interaction and collaborative learning through the use of information and communication technology are used to an increasing level in higher education. A mixed-method approach was used to collect the data, including an online survey followed by in-depth interviews. The learners of Bachelor's and Master's level computer science and information systems were the target groups of the study. The findings showed that an ICT-based support system was more effective in enhancing the quality of the learning outcomes.

Ali, N., Anwer, M., and Abbas, J. (2015) conducted a study on the "Impact of Peer Tutoring on the Learning of Students." The study attempts to investigate the concept of peer tutoring and its impact on learning. The students learn from each other in an organized way through the process. It is a well-organized and beneficial learning experience in which one student acts as the tutor and the other one serves as the tutee. Peer tutoring creates an opportunity for the students to utilize their knowledge and experience in a meaningful way. In this process, the tutors reinforce their own learning by reviewing and reformulating their knowledge. The tutee gets one-on-one attention. Peer tutoring helps both the tutor and the tutee gain self-confidence: the tutor gains confidence by observing self-competence in his or her ability to help someone, and the tutee gains confidence by receiving positive reinforcement from peers. Therefore, peer tutoring has a positive impact on learning.

Assinder, W. (1991) conducted a study on "Peer Teaching and Peer Learning: One Model." This study describes a practical experiment in which students developed video materials to present to each other, aimed at developing this content in the classroom. Increased responsibility, participation, accuracy, and sustained motivation were observed among students, and it was concluded that student feedback confirms that this was an extremely successful approach.
From the synthesis of the reviewed studies it is observed that, majority of studies made use of experimental. Peer Teaching is undoubtedly an effective strategy for Achievement.

OBJECTIVES

1. To study the Effect of ICT-Based Peer Teaching and Conventional Strategy on the Achievement of preservice teachers in Educational Evaluation.
2. To study whether the preservice teachers retained the Achievement in Educational Evaluation improved through ICT-Based Peer Teaching.

HYPOTHESIS

$H0_1$: There is no significant difference between the ICT-Based Peer Teaching and the conventional strategy in improving the achievement of preservice teachers in educational Evaluation.

$H0_2$: Immediate and delayed post-test scores of the preservice teachers taught through the ICT-Based Peer Teaching do not differ significantly with reference to achievement.

RESEARCH DESIGN

Post test-only control group design was used. It is diagrammatically represented below.
Table 1: Schematic Representation of Treatments

Groups	Treatment	Post test	Delayed Post test
Experimental Group	ICT-Based Peer Teaching. (X1)	O1E	O2E
Control Group	Conventional Strategy. (X2)	O1C	

In the above table, O1E refers to the post test conducted for the experimental group, O2E refers to the post-test conducted for the control group, and O1C refers to the delayed post test conducted for the experimental group.

SAMPLE

The sample included 80 preservice teachers from the K. B. College of Education in Kumta, Karnataka, during the academic year 2022. Based on their pre-achievement scores, matched pairs were identified and distributed into Experimental and control groups, with 40 cases in each group.

TOOLS USED

A self-made Achievement Test in Educational Evaluation was used to collect the data from the sample, consisting of 80 preservice teachers . The validity of the content was established by expert judgment. The coefficient of consistency by the split-half method was found to be 0.95.

PROCEDURE OF THE STUDY

This research was experimental in nature, and a post-test-only control group design was used. The 80 preservice teachers were randomly selected from a Bed College, which is randomly selected among eight colleges in the Uttara Kannada district of Karnataka, in the year 2022. Based on their pre-achievement scores, matched pairs were identified and divided into two groups with a strength of 40 in each. The preservice teachers of the experimental group were randomly divided into subgroups during ICT-based peer teaching. The main concept was divided into subtopics, and assigned to each group in accordance with the lesson objectives. Students then worked to become subtopic experts with the help of ICT. Working side-by-side, they discussed and presented new knowledge to their team together by using ICT. The experimental treatment involved in the teaching of educational evaluation paper. Each lesson lasted for thirty minutes. The experimental group received sixteen lessons using ICT-Based Peer Teaching. Meanwhile, students in the control group were taught the same lessons using the traditional strategy. The treatment was done for five weeks. Instantly after the completion of the treatment, both groups were post-tested on their achievements in educational evaluation. After four weeks, a delayed post test was conducted for the experimental group to test whether they retained their knowledge of educational evaluation. The objectives and related hypotheses were analyzed by applying the t-test.

DELIMITATION'S

- ICT-Based Peer Teaching can be used in any discipline and at any level of education. In the present study, the researcher has enabled its application to educational evaluation paper of B.Ed Curriculum.
- Different types of instruction can benefit from ICT-Based Peer Teaching. In the present study, it is applied to group instruction as it is appropriate to the Indian context.

RESULTS

$H0_1$: There is no significant difference between the ICT-Based Peer Teaching. and the conventional strategy in improving the achievement of preservice teachers in educational evaluation.
To test this hypotheses t-test was applied and the results are presented in the following table.

Table-2: Shows the post test scores of preservice teachers (Experimental and Control group) achievement in educational evaluation.

Treatments	N	Mean	S.D	t- value	Result
ICT-Based Peer Teaching.	40	36.5	5.38	8.62061	Significant at 0.05
Conventional Strategy	40	25.5	59.74		

The calculated t-value 8.62061 is greater than the table value at 0.05 Significant level. The result is significant. hence, the null hypothesis ($H0_1$) is rejected. Thus, the alternative hypothesis $H_1$is accepted.

H_1: There is a significant difference between the achievement scores of the experimental group and the control group of preservice teachers in educational evaluation improved through ICT-Based Peer Teaching and conventional strategy.

From the above Table 2, it is revealed that "there is strong evidence at the 0.05 level that the experimental group and the control group of preservice teachers achievement scores in educational evaluation differed in how effective they were." The t-value indicates a statistically significant difference, but it did not indicate which group of students (the experimental group or the control group) led to better test scores. Observing the overall means, the achievement scores of the experimental group of preservice teachers have a grand mean score difference of (36.5-25.5=11.0) 11.0 units higher in comparison with the achievement scores of the control group of preservice teachers in educational evaluation. This indicates that the experimental group of preservice teachers achieved better test scores than the control group of preservice teachers in educational evaluation, which was taught through the ICT-Based Peer Teaching.

$H0_2$: Immediate post-test and delayed post-test scores of the preservice teachers taught through the ICT-Based Peer Teaching do not differ significantly with reference to achievement.

To test this hypothesis, a t-test was applied, and the results are presented in the following table.

Table-3: shows the t-test results of the immediate post-test and delayed post-test scores of the achievement of preservice teachers in educational evaluation improved through ICT-Based Peer Teaching.

Experimental group	N	M	SD	t-value	Result
Immediate post-test	40	36.5	5.38	3.44469	Significant at 0.05
delayed post-test	40	37.98	2.69		

The calculated t-value 3.44469 is greater than the table value at 0.05 Significant level. The result is significant. hence, the null hypothesis ($H0_2$) is rejected. Thus, the alternative hypothesis H_2 is accepted.

H_2: There is a significant difference between the immediate post-test scores and the delayed post-test scores of preservice teachers' achievement in educational evaluation taught through ICT-Based Peer Teaching.

From the above Table 3, it is revealed that "there is strong evidence at the 0.05 level that the immediate post-test scores and the delayed post-test scores of preservice teachers' achievement in educational evaluation differed in how effective they were." The t-value indicates a statistically significant difference, but it did not indicate which test scores (immediate post-test scores or delayed post-test scores) led to better test scores. In educational evaluation, the achievement scores of the delayed post test of preservice teachers have a grand mean score difference of (37.98 - 36.5 = 1.48), 1.48 units higher than the achievement scores of the immediate post test of preservice teachers. This indicates that the delayed post-test scores are better than the immediate post-test scores of preservice teachers in educational evaluation, which was taught through ICT-Based Peer Teaching.

MAJOR FINDINGS

1. ICT-Based Peer Teaching is more effective than the Conventional Strategy in improving Achievement of preservice teachers in educational evaluation.
2. The preservice teachers have retained their achievement in educational evaluation which improved through ICT-Based Peer Teaching.

CONCLUSION AND IMPLICATIONS OF THE STUDY

ICT-Based Peer Teaching refers to peer teaching that delivers learning material via information and communication technologies. Peer teaching is a strategy where students learn from each other without direct teacher intervention. Integrating information and communication technology into peer teaching is the practise of combining digital learning tools with peer teaching. This is an innovative instructional strategy that is helpful for pre-service teachers and teacher educators. This method allows pre-service teachers to understand the concept deeply. ICT-Based Peer Teaching is also a valuable tool for teacher educators to effectively teach and train.

The present study has proved that the ICT-Based Peer Teaching is more effective when compared to the conventional strategy in improving the achievement of pre-service teachers in educational evaluation. This study has implications for learner-centered learning. It has been found to be an effective strategy to improve classroom instruction in various disciplines, and its inclusion in the teacher education curriculum will be a major step in making its application possible. Teachers at all levels require adequate training in order to use ICT-integrated peer teaching to improve student achievement. Efforts in this direction will definitely improve student achievement.

REFERENCES

Aghaee, N., and Keller, C. (2016). ICT-supported peer interaction among learners in bachelor's and master's thesis courses. *Computers & Education, 94*. Retrieved from: https://www.researchgate.net/publication/ 288994098 ICT-supported peer interaction among learners in bachelor's and master's thesis courses.

Ali, N., Anwer, M., and Abbas, J. (2015). Impact of Peer Tutoring on the Learning of Students. *Journal for Studies in Management and Planning, 1*(2). Retrieved from: http://internationaljournalofresearch.org/ index.php/JSMaP.

Assinder, W. (1991) Peer teaching, peer learning: one model. *ELT Journal, 45*(3). Retrieved from: https://academic.oup.com/eltj/article-abstract/45/3/218/3113715?login=false.

Vygotsky, Lev. (1978). Mind in Society. London: Harvard University Press. Retrieved from: https://gsi.berkeley.edu/gsi-guide-contents/learning-theory-research/social-constructivism/#:~: text=According%20to%20Vygotsky%20(1978%2C%2057,inside%20the%20child%20(intrapsychological).

Liu, C. Y., and Chen, H. L. (2020). Effects of peer learning on learning performance, motivation, and attitude." *International Journal of Education Economics and Development 11*(4). Retrieved from: https://www.researchgate.net/publication/339325727_Effects_of_peer _learning_on_learning_performance_motivation_and_attitude.

Moliner, L., and Alegre, F. (2020). conducted a study on "Peer Tutoring Effects on Students' Mathematics Anxiety: A Middle School Experience. *Frontiers in Psychology, 11*. Retrieved from: https://www.frontiersin.org/articles/10.3389/fpsyg. 2020.01610/full.

Raheem,Y. A., Yusuf, H.T. and Odutayo, A.O., (2017).Effect of Peer Tutoring on Students' Academic Performance in Economics in Ilorin South, Nigeria. *Journal of Peer Learning, 10*. Retrieved from:https://files.eric.ed.gov/fulltext/EJ1147960.pdf.

Stigmar, M. (2016). Peer-to-peer Teaching in Higher Education: A Critical Literature Review. *Taylor and Francis Online, 24*(2). Retrieved from: https://www.tandfonline.com/doi/abs/10.1080/13611267.2016. 1178963.

Ullah, I., Tabassum, R., and Kaleem, M. (2018). Effects of Peer Tutoring on the Academic Achievement of Students in the Subject of Biology at Secondary Level. *Education Sciences, 8*(3). Retrieved from: https://www.mdpi.com/2227-7102/8/3/112

Weiss, V., and Needlman, R. (1998). To teach is to learn twice. Resident teachers learn more. *Arch Pediatr Adolesc Med, 152*(2). Retrieved from: https://pubmed.ncbi.nlm.nih.gov/ 9491047/.