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Effect of Cooperative and Individualized Learning Strategies on Critical Thinking in Elementary Students

Shamiala Rasheed[1], Dr. Tanveer Kouser[2], Dr. Khalid Rashid[3]

1. Ph.D. Scholar, Department of Education, The University of Lahore, Lahore, Punjab, Pakistan. Email: shumailarasheed676@gmail.com
2. Assistant Professor, Department of Education, The University of Lahore, Lahore, Punjab, Pakistan. Email: tanveer.iqbal@ed.uol.edu.pk
3. Assistant Professor, Department of Education, The University of Lahore, Lahore, Punjab, Pakistan. Email: khalid.rashid@ed.uol.edu.pk

ABSTRACT

Successful teaching and learning of History depend significantly on the use of effective instruction. Utilizing proper teaching methods and techniques is essential in ensuring a productive educational experience in the field of history. The research sought to examine the effect of cooperative and individualized learning strategies on critical thinking in elementary students. This study adopted a quantitative research method with a pre-test and post-test design. The target population was all female students in grade VIII at a public high school in Kasur district. 90 class VIII students were selected through a simple random selection method. The participants were divided into three groups experimental group 1 (cooperative learning using the jigsaw method), experimental group 2 (individualized learning using mathetic programming), and Group 3 (control group taught by using conventional methods). The intervention period spanned twenty-four sessions, utilizing the History textbook for grade VIII as the teaching material. A self-constructed questionnaire was utilized to evaluate critical thinking before and after the intervention. Collected data were analyzed using paired-sample t-test and independent-sample t-test. The findings indicated that individualized learning had a significant impact on critical thinking as compared to cooperative learning and the traditional teaching.

Consequently, the study suggests that teachers should implement individualized learning strategies to improve students' critical thinking in the subject of History.
Keywords: Cooperative learning, jigsaw, individualized learning, mathetic programming, Critical thinking.

INTRODUCTION

The procurement of capabilities for critical thinking are key objectives of education systems worldwide. Critical thinking is exceedingly valued 21st-century skill that is considered a crucial learning outcome in education. Individuals who possess strong critical thinking abilities are expected to excel both in their professional and personal lives (Akbar & Akhtar, 2021). To prepare individuals for success in a globalized world, it is essential for the system of learning to cultivate persons with advanced critical thinking skills. As educators and researchers continue to explore effective strategies to enhance these outcomes (Loes et al., 2017). Education is crucial for the progress of individuals and society as a whole. It provides people with the awareness and skills to become responsible members of society and tackle the challenges they face in their lives. The structure of learning goals plays a vital role in shaping learning environments, including daily routines, the social and emotional climate, and interactions between teachers, students, and peers. These learning goals can be structured in two distinct ways: cooperatively and individually (Johnson & Johnson, 1999). Cooperative learning (CL) involves students working collaboratively towards shared goals, while individualized learning (IL) focuses on students working independently towards their own learning objectives. Both strategies have been found to impact students' critical thinking (CT) abilities and academic achievement positively.

CL as a teaching method, emphasizes collaboration and mutual support among students. It encourages active participation, engagement, and interaction among peers and teachers. According to Erdogan (2019) CL promotes higher-order thinking skills, such as critical thinking (CT), by offering students the chance to participate in meaningful discussions, solve problems collectively, and share perspectives. This approach not only enhances academic performance but also fosters social and emotional skills like communication, teamwork, and empathy (Slavin, 2014). Numerous studies have consistently shown the positive impact of collaborative learning on critical thinking (Johnson et al., 2014; Kagan, 1989).

On the other hand, Individualized Learning (IL) focuses on customizing instructional methods and learning experiences to address the particular needs and interests of specific students. It enables students to work independently, set their particular goals, and progress at their own pace. Proponents argue that IL promotes self-directed learning, autonomy, and metacognitive skills, which are essential components of CT (Dabbagh & Bannan-Ritland, 2007). However, the effect of IL on critical thinking is a topic of ongoing debate, with conflicting findings in the literature (Kulik & Kulik, 1991; Bloom, 1984). IL involves students working independently towards their own learning goals, without considering the goals of others. In this approach, individuals focus solely on their own outcomes, disregarding the efforts and progress of their peers. In both CL and IL, teachers assess student performance based on specific criteria (Johnson & Johnson, 2000).

CT is recognized as a fundamental skill essential for individuals to navigate the complex challenges of the modern world. It enables students to analyze information critically, make well-informed decisions, and tackle problems effectively (Ennis, 2011). Pakistan and other countries are reforming education to transition from a teacher-centered to a student-centered classroom to expand critical thinking skills and formulate students for 21st-century challenges. (Lotz-Sisitka, 2017). In many Pakistani schools, traditional teacher-centered methods are still prevalent, hindering students' attitude to acquire critical thinking (CT) and problem-solving skills. Effective education necessitates the adoption of appropriate strategies and techniques by teachers to impart knowledge. In today's complex and modern society, it is important to develop CT skills so that learners can apply new knowledge to solve problems (Facione, 1990). Given the current situation, fostering the advance of CT is an effective approach to support the attainment of learning objectives. Educators can create regular opportunities for students to recognize and analyze the materials they are engaging with, encouraging them to evaluate their attributes and discern similarities and differences. Through brainstorming sessions and filling students with the essential skills and necessary strategies required for thinking critically, teachers can empower students to effectively solve problems.

Objectives of the study

The main primary goals of the study are:

1. To assess the effect of cooperative learning strategy on the development of critical thinking in elementary students.

2. To analyze the effectiveness of individualized learning strategy in enhancing critical thinking among elementary students.
3. To compare the outcomes of cooperative and individualized learning strategies on the critical thinking of elementary students.

Hypotheses of the Study

The research developed the following null hypotheses to investigate:

H_{01}: There is no significant effect of cooperative learning on critical thinking observed in eexperimental group 1 before and after the intervention.

H_{02}: There is no significant effect of individualized learning on critical thinking observed in experimental group 2 before and after the intervention.

H_{03}: There is no significant effect of traditional method on critical thinking observed in control group during pre-test and post-test.

H_{04}: There is no significant difference in critical thinking of experimental group 1 and 2 before and after the intervention.

H_{05}: There is no significant difference of critical thinking between experimental group 1 and control group during pre-test and post-test.

H_{06}: There is no significant difference of critical thinking between experimental group 2 and control group during pre-test and post-test.

Significance of the Study

The research is meaningful for educators as it emphasizes the importance of utilizing creative teaching techniques to elevate the level of critical thinking among students. Trainers may be motivated to embrace both cooperative learning and individualized teaching strategies at the elementary level. This study primarily benefits Grade VIII students by fostering their critical thinking abilities through the implementation of innovative teaching methods, particularly cooperative and individualized learning approaches. Furthermore, the research provides valuable insights for curriculum developers, emphasizing the importance of prioritizing creative pedagogies, particularly cooperative and individualized learning, in the curriculum to advance students' critical thinking abilities. The study is also significant for teacher training institutes, as it highlights the need to train prospective instructors with the skills to effectively implement both cooperative and individualized pedagogical approaches in their classroom practices.

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REVIEW OF RELATED LITERATURE

Cooperative learning

Cooperative learning is a teaching technique where students work in small groups to achieve a common goal. Each group member is responsible for his own learning and also contributes to the learning of each other. This strategy aims to improve participants' positive interdependence, individual responsibility, collaborative skills and group handling skill (Roseth & Johnson 2008). Cooperative learning is an instructional approach that fosters collaborative efforts among students to achieve common educational goals (Slavin, 2022). Learning occurs within three types of groups: informal orientation learning groups, formal co-operational learning groups, and cooperative associations groups (Johnson, 2009). Informal orientation learning groups are characterized by them in short, ad-hoc nature, typically spanning after a brief period, the duration of a single class time. In contrast, cooperative associations groups are long-term and heterogeneous, often extending for a semester or longer. Formal co-operational learning groups have a medium time frame, lasting anywhere from one class period to several weeks. The main goal of all types of cooperative learning groups is to foster collaboration among participants to achieve shared educational objectives (Ballantine & Larres, 2007). While groups are essential in cooperative learning, it is not just a matter of students sitting together and working on the assignments they were given (Gillies, 2003). Effective cooperative learning requires five components: positive interdependence, face-to-face interaction with others and students, individual responsibility for knowledge and instruction from peers in a collaborative manner, as well as interpersonal and social skills and group work. (Johnson & Johnson, 2008).

Positive interdependence: Positive interdependence is a cornerstone of cooperative learning, wherein students work collectively to reach common educational goals. This principle requires students to be responsible not only for their own learning but also for the success of their peers (Slavin, 2011; Johnson & Johnson, 2008). Research by Hwong, Caswell, Johnson & Johnson (1993) and further studies by Johnson & Johnson (2008) have shown that positive interdependence results in enhanced achievement and productivity. Harkins and Petty (1982) noted that when individuals view their contributions as vital to the group's success, they tend to exert more effort. Conversely, Kerr and Bruun (1983) found that if individuals do not perceive their input as significant, their level of effort tends to diminish.

Face-to-face interaction: It occurs when students have the prospect to communicate face-to-face, positive outcomes can occur. Learners can effectively communicate, provide assistance and guidance to their fellow group members, debate one another's views, provide suggestions for improvement, and investigate various viewpoints (Ballantine & Larres, 2007; Johnson & Johnson, 2009). Creating a comfortable setting for students is crucial to facilitate easy connection and interaction with one another (Slavin, 2014).

Individual and group accountability: In cooperative learning, individual accountability is a critical component, with each group member bearing responsibility for their personal educational growth (Johnson & Johnson, 2000; Slavin, 2011). This principle is reinforced when members acknowledge and prioritize their own learning efforts (Tran & Lewis, 2012). Each participant is expected to significantly contribute to the collective endeavor while assuming responsibility for both their individual progress and that of the team (Johnson & Johnson, 2000). To cultivate this aspect of cooperative learning, three strategies may be implemented: administering individual assessments, randomly selecting group members to answer questions on behalf of the entire group during oral examinations, and offering students opportunities to present and share their acquired knowledge (Johnson & Holubec, 1998).

Interpersonal and social skills: The diversity in knowledge and learning styles is pivotal for optimizing group performance within cooperative learning environments (Johnson & Johnson, 2011). Proficiency in social skills is imperative for both interpersonal and task-related interactions. Interpersonal skills encompass the ability to engage effectively with others, value their perspectives, mediate conflicts, and offer commendation. Task-related social competencies involve collaborative engagement to achieve collective goals, necessitating capabilities such as inquiry, explanation, and content summation. Effective learners should be adept in various areas including managing decisions, developing leadership skills, creating trust mechanisms, and resolving conflicts. (Johnson, 2009; Sadeghi, 2012). To enhance these capacities communication prowess, leadership aptitude, conflict management strategies and team-building faculties must be explicitly taught (Wyk, 2012). Instructional methodologies like role-playing exercises and modeling can serve as effective vehicles for imparting these essential group skills (Slavin et al., 2011).

Group processing: Batch-based processing involves the systematic group evaluation and contemplation activities by its members. This process includes discussions about which actions are necessary, what changes need to be made, and which practices should

continue. The primary objective is to improve both individual member effectiveness and overall group performance (Johnson & Johnson, 2009). In an educational setting, group processing is frequently employed in cooperative learning environments to enhance academic outcomes and foster positive interpersonal relationships among students (Slavin, 2011). According to Johnson and Johnson (2009), some notable cooperative learning techniques are Jigsaw Methodology, Think-Pair-Share, Learning Together, Numbered Heads Together, Team-Assisted Individualization (TAI), Student Teams-Achievement Divisions (STAD), and Scripted Cooperation.

Individualized learning

Individualized learning (IL) is an instructional approach that emphasizes personalized pacing and content to deal with the specific desires of each student. It has evolved from various learning methods, including self-paced and programmed instructions (Trentin, 2009). The National Educational Technology Plan (2010) highlights IL's focus on adapting instruction to individual learning requirements, allowing for personalized pacing. Petty and Brewer (2011) define IL as individual work toward academic goals at one's own pace, while Pane et al. (2017) describe IL as practices tailored to light the desires of respectively student. Additionally, Dream Box Learning (2018) characterizes IL as a teaching method that tailors content, technology, and pace to individual abilities and interests, supporting diverse learning preferences and permitting Students move at their own pace and explore zones of interest or challenge. IL aligns with democratic principles, caters to diverse learning styles, develops critical thinking, fosters intrinsic motivation, and teaches effective decision-making, providing a personalized experience to help students reach their academic goals. Individualized learning fosters independence, allowing students move at their own pace, accommodating their learning style, cognitive approach, and schedule. This approach enables authentic learning based on individual needs. It encompasses diverse methods such as Linear Programming, Branching Programming, Mathetics Programming, and Computer Assisted Instruction (CAI). According to Hertz, (2018) IL is an educational approach that supports students in developing 21st-century skills and knowledge. It focuses on adjusting instruction to meet individual student demand, strengths, and goal line. The four key elements of individualized learning are student ownership, assessment data, routes and student profiles, as well as adaptable learning settings are essential to engage students to learn.

Student Ownership of Learning: In individualized learning, students and teachers share responsibility for learning and create a collaborative classroom community. Students feel empowered, learn to communicate respectfully, and reflect on their interactions. Teachers use one-on-one conferences to help students apply their learning to their own work, creating a student-centered environment (Barbara, 2010).

Formal and Informal Assessment Data: In IL, teachers use diverse assessments, including pre- and post-assessments as well as frequent formative assessments, to build unique learner profiles for each student. Summative assessments gauge learning growth, while formative assessments like observations and individual conference notes help teachers track students' progress. This data aids in identifying students' strengths and needs, enabling teachers to customize instruction based on each student's developmental level.

Developing Learner Profiles and Learning Pathways: Developing learner profiles and learning pathways is a key aspect of individualized learning. Teachers use various assessments to capture each student's strengths, areas for growth, and learning goals, allowing for a individualized approach to instruction (Guskey, 2000). Collaborating with students, teachers create individualized learning pathways based on these profiles, supporting students in achieving academic outcomes (Tomlinson, 2017). These pathways are continuously adjusted to meet and exceed standards, ensuring that each student's unique needs are addressed (Thompson & Zeuli, 1999). In an individualized classroom, instruction pace is based on individual student needs, enabling students to spend more time on certain topics or accelerate through others based on their personal learning pathway (Hattie, 2009).

Utilizing Flexible Learning Environments: The learning environment in a collaborative classroom is planned to cater to the diverse demand of each student, fostering independent learning and extending learning beyond the classroom (Tomlinson, 2017). This IL approach involves adjusting the space to support learners, providing constant support through IL (Boushey & Moser, 2023), and organizing classroom libraries to accommodate students' reading levels (Gambrell, 2011). By understanding students' strengths, skills, and needs, teachers can transform traditional settings into individualized classrooms (Hattie, 2009).

Critical thinking's

The interpretation of critical thinking differs among scholars. Ennis (2011) characterizes critical thinking as reasonable and reflective thought directed toward decision-making processes. It is defined as the capacity to recognize, evaluate, and make efficient use of information by Ryan and Tatum (2013). As stated by Reichenbach (2001), it encompasses the thoughtful judgment necessary to accept or reject information. Despite these varying definitions, a consensus exists regarding the core components of critical thinking (Pithers & Soden, 2000). Critical thinking transcends mere information acquisition and retention; it demands continuous self-reflection (Facione, 1998). The Delphi research report provides an exhaustive definition of critical thinking by identifying six essential skills: Including interpretation, analysis, evaluation, reasoning, explanation, and self-regulation. The process of interpretation involves comprehending and elucidating ideas, analysis is concerned with examining arguments; evaluation assesses arguments and assertions; inferences challenge the facts and draw conclusions. Furthermore, description pertains to articulating reasoning clearly while self-regulation entails monitoring one's cognitive processes to understand what one knows (Zhang, 2003).

Cooperative learning and critical thinking

The notion of critical thinking presents significant challenges in both measurement and instruction. However, intentional educational strategies can enhance this vital skill (Esmaeil Nejad et al., 2022). Carefully structured learning experiences can promote the development of critical thinking abilities (Loving & Wilson, 2000; Seymour et al., 2003). Educators play a pivotal role in fostering these skills by cultivating environments that stimulate inquiry, analysis, and evaluation (Facione, 2011; Fisher, 2014; Tsui, 2002). Willingham (2007) highlighted that one core objective of the study is to give students the opportunity to think critically an aim often unmet within current systems. In today's information rich society, the necessity for critical thinking becomes even more pronounced to effectively assess and verify the reliability of information sources (Grabau, 2007).

Cooperative learning has been a longstanding method for fostering students' critical thinking competencies (Shachar & Sharan, 1994). Cooperative learning has been found to have a significant impact on social skills, language learning, academic achievement, and critical thinking in studies (Sadeghi, 2012). Cooperative learning can enhance students' analytical abilities through participation (Booysen & Grosser, 2014). The importance of

face-to-face communication is highlighted by Fahim and Eslamdoost (2014). Moreover, group discussions have proven effective at stimulating and cultivating ideas an essential component of critical thinking (Devi et al., 2015). As noted by Devi (2015), Cooperative learning not only enhances students' communication skills but also fosters their critical thinking.

Individualized learning and critical thinking

Individualized learning, often tailored to students' unique needs, has consequences for the growth of critical thinking skills (Shemshack & Spector, 2020). Personalized learning environments consent students to progress at their own hop, explore diverse learning styles, and interact in a way with the content that encourages independent thought and analysis (Chen et al., 2021).

Research suggests that individualized learning experiences can donate to the building of critical thinking skills (Yuan et al., 2022). The possibility exists for students to take charge of their own education path and delve into topics of interest, they are more likely to develop the capacity for critical thinking and make connections between concepts (Shpeizer, 2018). Furthermore, the flexibility inherent in individualized learning settings allows for the incorporation of problem-solving and decision-making components, essential elements of CT (Bernacki et al., 2021).

RESEARCH METHODOLOGY

Nature and Design of the Study

The investigation was designed to examine the effect of Cooperative and Individualized Learning Strategies on Critical Thinking in Elementary Student's. It utilized a true-experimental research design and quantitative research method within a post-positivist paradigm. The chosen design for the experimental study was the pre-test and post-test framework, which is considered rigorous and controls out any potential threats to internal or external validity. This research assumed three groups: EG1 (experimental group 1), EG2 (experimental group 2) and control group, which were formed through random assignment. The study had two independent variables (cooperative and individualized learning) and one dependent variables (critical thinking skills). EG1 and EG2 received an approach of using cooperative and individualized learning strategies to develop students' critical thinking in the classroom. Traditional teaching method was used to instruct the control group. The process of critical thinking involves combining various skills such as critical, convergent analytical, divergent, and creative thinking. Only two types; critical

thinking skills and creative thinking were selected for this study. The specific strategies used were Jigsaw for cooperative learning and mathetic programming for individualized learning. These strategies were implemented to improve students' critical thinking.

Sample of the Study

Research was presented in a female public high school in Kasur district, selecting ninety Grade VIII students through random sampling. The students were systematically allocated into three groups: a control group taught History conventionally, an EG1 taught using cooperative learning (jigsaw method), and another EG2 taught with individualized learning (mathetic programming). The selection of these strategies was based on their alignment with the study's content and objectives. The focus was on a targeted approach, utilizing only the jigsaw method and mathetic programming among the various strategies available in the literature.

Table 1 Design of the Study

Group	Pre-test O	Treatment X	Posttest O
Control	Evaluation of Critical thinking	No	Evaluation of Critical thinking
EG1	Evaluation of Critical thinking	Yes	Evaluation of Critical thinking
EG2	Evaluation of Critical thinking	Yes	Evaluation of Critical thinking

Instrumentation

The researcher constructed the critical thinking scale herself on 5- point Likert scale (ranging from strongly disagree to strongly agree) regarding subtypes of critical thinking which was based on the theory Edward Glaser's (1942). Critical thinking scale were comprised of 30 items. 20 items were measured at two levels such as Critical thinking skills and 10 items from Creative Thinking. Questionnaire of Critical thinking was got an author either by three university teachers to validate the tools. After the content validity by the experts, the pilot test is used to check meant the ambiguity of language in statements and to get response for clarity of concept in statements. Reliability of questionnaires was checked through Cronbach's Alpha. Reliability, specifically the internal consistency was evaluated by applying Cronbach's alpha coefficient which was found to be 0.75 ($n = 30$, $p < 0.05$). Hence the scale can be considered as reliable.

Questionnaire was administered as pre-test and post-test to evaluate the effect of teaching strategies on critical thinking.

Collection of Data

The collection of data occurred through pre-test and post-test. Pre-test was conducted for three groups: EG1, EG2, and a control group. The intervention contained of 24 sessions lasting 40 minutes each, focusing on the History Textbook for grade VIII students. Lessons were developed using cooperative and individualized learning strategies. Each group comprised 30 students, and two different treatment patterns (jigsaw method for cooperative group and mathetic programming for individualized group) were implemented. All groups had identical lesson plans and critical thinking questions. The cooperative learning group engaged in small-group interactions, while the individualized learning group focused on individual student opportunities. The control group surveyed traditional classroom practices. After the 24 sessions experiment, a post-test was executed to evaluate treatment impact. The data analysis involved the use of paired sample t-test and an independent sample t-test was conducted to compare the results of the pre-test and post-test across all groups.

Data Analysis and Interpretation

To investigate the effect of cooperative and individualized learning strategies on students' critical thinking, null hypotheses were developed. A comprehensive data analysis with interpretation is outlined below:

H_{01}: There is no significant effect of cooperative learning on critical thinking detected in EG1 before and after the intervention.

Table 2

Effect of Cooperative Learning on Critical Thinking in Experimental Group 1.

		M	N	SD	t	df	Sig. (2 tailed)	Cohen's d
Pair 1	Pre-test score of EG1	3.13	30	.453	-7.767	29	.000	1.9
	Post-test score of EG1	3.84	30	.255				

In Table 2 researcher presented the analysis for null hypothesis 1. It displays that pre-test score of EG1 is (M = 3.13, SD = .453) was less than post-test score (M = 3.84, SD = .255). This difference is statically significant at t (29) = -7.767, p = .000 (which is less

than .05). The analysis for Cohen's d revealed that intervention' effect magnitude is d = 1.9, which represents a large effect size.

Result: Analysis in Table 2 shows that a significant variation exists in critical thinking of EG1 before and after interlineation. Thus, the data not supported null hypothesis 1.

H_{02}: There is no significant effect of individualized learning on critical thinking observed in EG2 before and after the intervention.

Table 3

Effect of Individualized Learning on Critical Thinking in Experimental Group 2.

		M	N	SD	t	df	Sig. (2 tailed)	Cohen's d
Pair 1	Pre-test score of EG2	3.14	30	.475	-10.329	29	.000	2.3
	Post-test score of EG2	4.02	30	.231				

The analysis in Table 3 indicates that the pre-test score of EG2 was (M = 3.14, SD = .475) was lower than post-test score (M = 4.02, SD = .231). This disparity was deemed statistically relevant. at t (29) = -10.329, p = .000 (which is less than .05). The analysis for Cohen's d revealed that intervention' effect size is d = 2.3, which represents a large effect size.

Result: The analysis in Table 3 demonstrates a significant variation in students' critical thinking of EG2 before and after the intervention. Consequently, the data do not support null hypothesis 2.

H_{03}: There is no significant effect of traditional method on critical thinking observed in control group during pre-test and post-test.

Table 4

Effect of traditional method on Critical Thinking in Control Group.

		M	N	SD	t	df	Sig. (2 tailed)	Cohen's d
Pair 1	Pre-test score of Control group	3.14	30	.502	-1.649	29	.110	0.3
	Post-test score of Control group	3.28	30	.342				

In Table 4 researcher presenter the analysis for hypothesis 3. It shows that the control group's pre-test result was (M = 3.14, SD = .502) less than post-test score (M = 3.28, SD =

.328). The statistical significance of this difference was established at t (29) = -1.649, p =.110, which is higher than .05. Intervention effect size is denoted by Cohen's d = 0.3, which represents a small effect size.

Result: The analysis in Table 4 indicates that there is no significant difference in critical thinking of the control group before and after interlining. Thus, the data supported the null hypothesis.

H_{04}: There is no significant difference in critical thinking of experimental group 1 and 2 before and after the intervention.

Table 5

Effect of cooperative and individualized learning on Critical Thinking before and after the intervention.

Critical Thinking		**M**	**N**	**SD**	**t**	**df**	**Sig. (2 tailed)**	**Cohen's d**
Pre-test score	EG1	3.13	30	.453	-.093	58	.926	0.3
	EG2	3.14	30	.475				
Post-test score	EG1	3.84	30	.255	-2.972	58	0.04	0.7
	EG2	4.02	30	.231				

In Table 5 researcher presented the analysis for hypothesis 4. It shows that pre-test score of EG1(Cooperative learning) was (M = 3.13, SD = .453) less than pre-test score of EG2 (Individualized learning) was (M = 3.14, SD = .475). This difference was statically insignificant at t (58) = -.093, p = .926 which is greater than .05. Before intervention effect size is denoted by Cohen's d = 0.3, which represents a small effect size, indicating no significant difference exists between EG1 and EG2 in the pre-test stage. The above table shows that post-test score of EG1 (Cooperative learning) was (M = 3.84, SD = .255) less than post-test score of EG2 (Individualized learning) was (M = 4.02, SD = .231). A statistically significant difference was observed at t (58) = -2.972, p = .0.04 which is less than .05, indicating significant difference in post-test score between EG1 and EG2. Intervention effect size is denoted by Cohen's d = 0.7, which represents a large effect size.

H_{05}: There is no significant difference of critical thinking between EG1 and control group during pre-test and post-test.

Table 6

Effect of cooperative learning and traditional method on Critical Thinking during pre-test and post-test.

Critical Thinking		M	N	SD	t	df	Sig. (2 tailed)	Cohen's d
Pre-test score	EG1	3.13	30	.453	-.072	58	.943	0.0
	Control group	3.14	30	.502				
Post-test score	EG1	3.84	30	.255	7.107	58	0.00	1.8
	Control group	3.28	30	.342				

In Table 6 researcher presented the analysis for hypothesis 5. Its demonstrations that pre-test score of EG1(Cooperative learning) is (M = 3.13, SD = .453) less than pre-test score of Control group (Traditional method) is (M = 3.14, SD = .502). This difference is statically insignificant at t (58) = -.072, p = .943 which is greater than .05. Before intervention effect size is denoted by Cohen's d = 0.0, which represents no effect size, indicating no significant difference between pre-test score of EG1 and control group. The above table displays that post-test score of EG1 (Cooperative learning) is (M = 3.84, SD = .255) greater than post-test score of control group (Traditional method) is (M = 3.28, SD = .342). This difference is statically significant at t (58) = 7.107, p = .0.00 which is less than .05, indicating significant difference between post-test score of EG1 and control group. Intervention effect size is denoted by Cohen's d = 1.8, which represents a large effect size, indicating significant difference between post-test score of EG1 and control group.

H_{06}: There is no significant difference of critical thinking between experimental group 2 and control group during pre-test and post-test.

Table 7

Effect of Individualized learning and traditional method on Critical Thinking during pre-test and post-test.

Critical Thinking		M	N	SD	t	df	Sig. (2 tailed)	Cohen's d
Pre-test score	EG2	3.14	30	.475	.018	58	.986	0.0
	Control group	3.14	30	.502				

Post-test score	EG2	4.02	30	.231	9.812	58	0.00	2.1
	Control group	3.28	30	.342				

In Table 7 researcher presented the analysis for hypothesis 6. It displays that pre-test score of EG2 (Individualized learning) was (*M* = 3.14, *SD* = .475) greater than pre-test score of Control group (Traditional method) was (*M* = 3.14, *SD* = .502). This difference was statically insignificant at *t* (58) = .018, *p* = .986 which is greater than .05. Before intervention effect size is denoted by Cohen's *d* = 0.0, which represents no effect size, indicating the pre-test result was identical without significant deviations. of EG2 and control group. The above table demonstrations that post-test score of EG2 (Individualized learning) was (*M* = 4.02, *SD* = .231) greater than post-test result was obtained by the control group. (Traditional method) was (*M* = 3.28, *SD* = .342). This difference was statically significant at *t* (58) = 9.812, *p* = .0.00 which is less than .05, indicating significant differences were observed between the EG2 and control group post-test results. Intervention effect size is denoted by Cohen's *d* = 1.3, which represents a large effect size.

Findings

This study sought to determine the effect of cooperative and individualized learning strategies on the critical thinking of elementary students. Two different strategies one for cooperative learning; jigsaw and mathetic programming for individualized learning were selected to teach History textbook for grade VIII.

1. The study showed significant difference in pre-test and post-test results of EG1. It shows that pre-test score of EG1 was (*M* = 3.13, *SD* = .453) was less than post-test score (*M* = 3.84, *SD* = .255). This difference is statically significant at *t* (29) = -7.767, *p* = .000 (which is less than .05). The analysis for Cohen's d revealed that intervention' effect size is *d* = 1.9, which represents a large effect size.
2. The study showed significant difference in pre-test and post-test results of EG2. It shows that the pre-test score of EG2 was (*M* = 3.14, *SD* = .475) was lower than post-test score (*M* = 4.02, *SD* = .231). This disparity was found to be statistically significant at *t* (29) = -10.329, *p* = .000 (which is less than .05). The analysis for Cohen's d revealed that intervention' effect size is *d* = 2.3, which represents a large effect size.

3. The study showed insignificant difference in pre-test and post-test score of Control group. It shows that pre-test score of control group was (*M* = 3.14, *SD* = .502) less than post-test score (*M* = 3.28, *SD* = .328). This difference was statically insignificant at *t* (29) = -1.649, *p* = .110 which is greater than .05. Intervention effect size is denoted by Cohen's *d* = 0.3, which represents a small effect size.
4. The study revealed no significant difference between the results of the pre-test of EG1 and EG2. It shows that pre-test score of EG1(Cooperative learning) was (*M* = 3.13, *SD* = .453) less than pre-test score of EG2 (Individualized learning) was (*M* = 3.14, *SD* = .475). This difference was statically insignificant at *t* (58) = -.093, *p* = .926 which is greater than .05. Before intervention effect size is denoted by Cohen's *d* = 0.3, which represents a small effect size, indicating no significant difference between pre-test score of EG1 and EG2. The post-test score of EG1 (Cooperative learning) was (*M* = 3.84, *SD* = .255) less than post-test score of EG2 (Individualized learning) was (*M* = 4.02, *SD* = .231). This difference was statically significant at *t* (58) = -2.972, *p* = .0.04 which is less than .05, indicating significant difference between post-test score of EG1 and EG2. Intervention effect size is denoted by Cohen's *d* = 0.7, which represents a large effect size, indicating significant difference between post-test score of EG1 and EG2.
5. The study revealed that there was no discernible difference in pre-test scores. of EG1 and control group. It shows that pre-test score of EG1(Cooperative learning) was (*M* = 3.13, *SD* = .453) less than pre-test score of Control group (Traditional method) was (*M* = 3.14, *SD* = .502). This difference was statically insignificant at *t* (58) = -.072, *p* = .943 which is greater than .05. Before intervention effect size is denoted by Cohen's *d* = 0.0, which represents no effect size, indicating no significant difference between pre-test score of EG1 and control group. The above table shows that post-test score of EG1 (Cooperative learning) was (*M* = 3.84, *SD* = .255) greater than post-test score of control group (Traditional method) was (*M* = 3.28, *SD* = .342). This difference was statically significant at *t* (58) = 7.107, *p* = .0.00 which is less than .05, indicating significant difference between post-test score of EG1 and control group. Intervention effect size is denoted by Cohen's *d* = 1.8, which represents a large effect size, indicating significant difference between post-test score of EG1 and control group.

6. The study revealed no substantial variation in pre-test results of EG2 and Control group. It shows that pre-test score of EG2 (Individualized learning) was (*M* = 3.14, *SD* = .475) greater than pre-test score of Control group (Traditional method) was (*M* = 3.14, *SD* = .502). This difference was statically insignificant at *t* (58) = .018, *p* = .986 which is greater than .05. Before intervention effect size is denoted by Cohen's *d* = 0.0, which represents no effect size, indicating the pre-test results were identical without significant deviations EG2 and control group. The above table shows that post-test score of EG2 (Individualized learning) was (*M* = 4.02, *SD* = .231) greater than Post-test result obtained by the control group (Traditional method) was (*M* = 3.28, *SD* = .342). This difference was statically significant at *t* (58) = 9.812, *p* = .0.00 which is less than .05, indicating significant difference between post-test results of EG2 and control group. Intervention effect size is denoted by Cohen's *d* = 1.3, which represents a large effect size.

Conclusion

Based on the analysis, Mathetic programming individualized learning was more effective for History than Jigsaw cooperative learning and traditional lecture methods. The Mathetic group showed higher motivation and better performance. Individualized learning allows students to tailor their experience, fostering critical thinking and analytical skills. In contrast, cooperative learning may prioritize task completion over critical thinking. Within the framework of History, individualized learning is more effective in enhancing critical thinking in comparison to cooperative learning. It permits students to personalize their learning, fostering autonomy and deeper understanding of historical events.

Discussion

The research sought to look at the effect of cooperative and individualized learning strategies regarding critical thinking in elementary students. In the twenty-first century, critical thinking is an essential skill and while most studies have focused on cooperative learning as a means to cultivate critical thinking skills among students (Johnson et al., 2000). Traditional teaching methods in Pakistan discourage critical thinking and limit opportunities for student interaction and collaboration. The literature review highlighted the efficiency of a certain teaching strategy in promoting critical thinking, but in Pakistan, traditional teaching approaches have led to underdeveloped critical thinking skills in students. The research designed to evaluate the result of cooperative and individualized

learning on critical thinking within the Pakistani educational context. In this experimental study, teaching strategies were manipulated for the experimental groups, focusing on cooperative and individualized learning to encourage critical thinking among grade VIII students.

The consequences revealed that the individualized learning strategy significantly contributed to the expansion of critical thinking among grade VIII students. This result aligns with a previous research conducted by Abd-Elmoghith, (2018), where the application of mathetic programming to prospective teachers demonstrated the efficiency of individualized learning in promoting critical thinking, particularly in the subject of History. Cooperative learning strategies encourage student interaction, which is essential for developing critical thinking skills. Devi et al., (2015) undertook a study within an Indonesian vocational school aimed at evaluating the effectiveness of three distinct cooperative learning strategies: jigsaw, think-pair-share, and structured controversy. The findings demonstrated that these methodologies significantly enhanced student interaction and fostered the improvement of critical thinking skills.

The present investigation results indicated a substantial enhancement in students' critical thinking levels when taught through individualized learning. Xing, Zhu, and Shim (2023) similarly advocated for individualized learning techniques to encourage critical thinking in students. Furthermore, these findings align with the conclusions of Sharma et al., (2016) who also affirmed individualized learning as an effective approach for fostering critical thinking.

Elementary education holds significant importance in Pakistan, serving as the cornerstone for students to make informed choices regarding their advanced studies and future career paths. Achievement in subject selection and higher education is dependent on the cultivation of critical thinking and academic excellence, both of which are essential prerequisites. As such, the national curriculum underscores critical thinking as a principal learning objective at the elementary stage. The newly implemented single national curriculum for grade VIII (2022) advocates CL as an efficacious instructional plan for nurturing critical thinking among students (Government of Pakistan, 2022). Moreover, recent research lends additional support to the efficiency of individualized learning in bolstering critical thinking at the elementary level.

Recommendations

The recommendations in this research report are derived from the results of this investigation,

which examined the effect of cooperative and individualized learning strategies on students critical thinking in the subject of History. While the study explored the relationship between these two variables, there is still a need for further exploration of the study's findings.

1. The current research reveals a significant association between cooperative and individualized learning strategies within the discipline of History. Furthermore, an association between critical thinking skills and creative thinking has been identified. Nevertheless, additional studies are necessary to pinpoint the precise factors that foster the growth of analytical and creative thinking in the field of History studies.
2. Future research could adopt qualitative and mixed methods approaches to explore factors influencing students' History-related critical thinking skills. Qualitative methods like interviews and observations provide insights, while mixed methods offer a comprehensive understanding. Additionally, researchers can Examine the efficacy of interventions in attractive critical thinking skills in History through experimental studies or teaching strategies.
3. The current investigation was carried out in a public high school in the Kasur District. It is advised that more study be done in the future in both private schools and secondary level institutions to further investigate the correlation between critical thinking skills, convergent and divergent thinking. Additionally, exploring this relationship in other subject areas could provide valuable insights.
4. Teachers at all levels can incorporate cooperative and individualized learning strategies as effective instructional methods in their classrooms.
5. The research also assessed the efficacy of individualized learning strategies. Results displayed that students in the individualized learning group performed better in critical thinking test compared to those in the cooperative learning group. However, it is important for teachers to address any issues that arise in the cooperative learning group and consider incorporating other cooperative learning methods to promote critical thinking skills among all students.

6. Providing training sessions for teachers can be beneficial in enhancing their ability to effectively implement Cooperative education techniques in the classroom.
7. On the way to ensure the quality and effectiveness of cooperative learning during the intervention, it is essential to implement proper check and balance measures. These measures can include regular monitoring of group dynamics, assessing individual and group progress, providing timely feedback, and addressing any issues or challenges that may arise. By maintaining a systematic approach to monitoring and evaluating cooperative learning, educators can ensure that this teaching method is being implemented successfully.
8. To develop or adapt assessment tools created specially to assess critical thinking skills in the framework of History. Ensure that these tools align with learning objectives and are sensitive to changes resulting from the chosen strategies.
9. The autocratic style of teaching has been identified as one of the elements influencing student drop-out rates, as it can create an environment of fear and anxiety among children. However, implementing cooperative learning strategies has the potential to reduce drop-out rates. By promoting collaboration, active participation, and a supportive learning environment, cooperative learning can foster a sense of belonging and engagement among students. This can lead to increased motivation, improved academic performance, and ultimately a decrease in drop-out rates.
10. To encourage metacognition and enhance students' critical thinking processes and academic progress, it is advisable to institute feedback mechanisms that enable students to engage in self-reflection about their own learning. The incorporation of these self-assessment strategies serves to cultivate metacognitive skills and foster ongoing improvement. Through these approaches, students can assess their critical thinking capabilities becoming more cognizant of their strengths and areas requiring development. This process of self-reflection aids students in gaining a deeper insight into their learning methodologies and empowers them to make the necessary adaptations to boost their critical thinking skills.

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