Alternative assessment (Teacher/Peer) in MOOCs and its effect on enhancing collaborative leadership skills

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Abstract

This study sought to enhance university students' collaborative leadership skills through the use of an alternative assessment method (teacher/peer) within a massive open online course (MOOC) on the Canvas platform. It examines how university students taking a massive open online course (MOOC) on the Canvas platform might improve their collaborative leadership abilities by using two alternative assessment methods: teacher assessment and peer assessment. A sample of 100 students studying educational technology was divided equally between two groups using a quasi-experimental method. The instructor evaluated one group, and peers evaluated the other. T-tests were used to assess the results of the pre-test and post-test, which were obtained using a newly created Collaborative Leadership Skills Scale. The findings show that collaborative leadership abilities significantly improved as a result of both evaluation methodologies. Peer assessment was more successful in promoting social contact and constructive peer interdependence, while teacher assessment was more successful in developing cognitive negotiation, appraisal, and team management skills. These results show that, through different pathways, teacher and peer assessments both significantly contribute to the development of collaborative leadership qualities. The study emphasizes how crucial it is to incorporate these cutting-edge evaluation techniques into MOOC designs since they can improve collaborative and self-directed learning and better prepare students for the changing demands of the contemporary workforce. In a quasi-experimental study, 100 students studying educational technology who were enrolled in a MOOC through Canvas were split evenly into two groups and given assessments that were either peer- or teacher-based. T-tests based on a developed Collaborative Leadership Skills Scale were used to examine the results of the pre-test and post-test. The results show that both assessment models considerably improve collaborative leadership abilities. Peer assessments more effectively foster social interaction and constructive interdependence, while teacher assessments are more successful in fostering cognitive negotiation, evaluation, and team management abilities. These findings provide credence to the inclusion of different evaluation techniques in MOOCs, emphasizing how they might promote more successful independent and group learning and better equip students for the changing needs of the contemporary workforce.

Keywords: Alternative assessment, Collaborative leadership skills, e-learning environment, Massive open online courses, MOOCs.

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1. Introduction

The current job market is highly competitive, requiring a reevaluation of how learners develop skills and adapt to new trends to improve job prospects. Collaborative leadership skills are crucial as technology reshapes leadership concepts, emphasizing the need to adapt to advancements in artificial intelligence.

Effective leadership boosts team performance through motivation, guidance, and trust, enhancing educational efficiency and achieving goals. Developing social relationships and engaging in critical thinking significantly improve comprehension.

Collaborative leadership aligns perspectives among learners, leading to effective methods for achieving educational goals. Sidran [1] views it as an ideal model for educational success, allowing learners to develop social, analytical, and continuous learning skills through modern technology.

Kazmi and Naaranoja [2] noted that collaborative leadership fosters a cooperative spirit, enhancing task completion. Al-Sha'ar [3] highlighted that technological advancements and MOOCs enhance teaching and learning, offering flexible, self-directed study opportunities.

Ding, et al. [4] affirmed MOOCs' role in peer communication and fostering belonging, while Al-Turki [5] recommended them for sustainable, lifelong learning, addressing learners' needs and job market demands. Studies by Lu [6]; Ingolfsdottir [7] and Grossman [8] explored factors affecting MOOCs' use, including assessment strategies.

Technological advancements have influenced all facets of education, necessitating updates to learning management systems to tackle challenges such as increased learner numbers and limited teacher supervision. This progression necessitates enhanced electronic learning activities, with more adaptable and consistent alternative assessment methods (Lawrie, et al. [9]).

Alternative electronic assessments encompass teacher, peer, and self-assessment. Teacher assessment involves evaluating learners' activities to ensure they meet learning goals. Peer assessment requires learners to evaluate each other based on established criteria, while self-assessment involves learners assessing their own activities against standards to achieve objectives [10]. This study concentrates on teacher and peer assessments due to their relevance to self-assessment. Research on assessment methods reveals varied effectiveness. Hasbullah [11] advocated for training learners in alternative assessments and encouraging open discussion. Khidr, et al. [12]; Saleh, et al. [13] and Mousa [10] emphasized the role of peer assessment in developing critical thinking and skills in e-learning environments. Martin, et al. [14] found online assessment tools effective for collaboration, and Elson [15] discussed synchronous tools for adjusting educational activities based on learner performance.

This study aims to identify effective assessment practices in e-learning environments, focusing on content understanding, learning resources, objectives, and feedback. It investigates the impact of alternative assessments (teacher and peer) in MOOCs, enhancing learner interaction, knowledge building, and continuous learning. The study addresses the following questions:
1. How can alternative assessment strategies (teacher/peer) be designed for MOOCs?
2. What is the effectiveness of alternative assessment strategies (teacher/peer) in MOOCs for developing learners' collaborative leadership skills?

1.1. Theoretical Background of the Research
1.1.1. Widespread Courses and Collaborative Leadership Skills

Widespread learning courses began in 2008 with Downes and Siemens' course on connectivity, which used Siemens' connectivity theory to explain digital-age learning. This course, offered at the University of Manitoba, introduced cognitive networks for educational innovation.

These courses enhance collaborative leadership by using collaborative and competitive strategies, standardizing educational content, and leveraging web technologies. They integrate Content Management Systems (CMS), Learning Management Systems (LMS), and social networks to foster team collaboration, motivation, and educational democracy.

By 2012, widespread learning courses had gained popularity with platforms like Coursera and edX, collaborating with leading universities to create effective online learning environments. These courses are recognized as significant technological advancements in higher education, offering a digital learning environment that fosters educational experiences through interactive knowledge sources.

Educational literature underscores that widespread learning courses are documented electronic courses that facilitate

content co-creation through social networks and digital video. Authors such as Al-Halafawi [16]; Shaltout [17]; Abdel-Wahab [18] and El-Sayyed [19] highlight their emphasis on interactive learning and skill development. Baker, et al. [20] and others note that these courses offer interactive, web-based learning environments with free expert-led education and multimedia communication tools.

Luo, et al. [21] and Grossman [8] describe these courses as adhering to specific quality standards, featuring modern educational elements such as objectives, lectures, videos, teaching materials, activities, and assessments. Their goal is to enhance accessibility, adapt to labor market changes, and improve quality while reducing costs.

Misra [22] views these courses as web-based models accessible to many learners, providing building activities, quizzes, and assignments. Baker, et al. [20] sees them as democratizing education by making resources from prestigious universities more accessible and overcoming traditional academic constraints.

Widespread learning courses offer a rich environment with minimal effort required to receive information, enabling interactive dialogue and teacher support. According to Hamdani [23] and Al-Muaydhir [24] they provide:

- Flexibility in learning times.
- Access to diverse information sources.
- Effective communication and collaboration options.
- Development of collaborative skills.
- Free access without licensing fees.
- No geographical or temporal limitations.
- Alignment with national development plans.
- Self-assessment tests with automatic grading.
- Progress tracking from entry to exit.

These courses enable equal access to information and fulfill educational needs, fostering interaction and collaboration among learners.Evans and Myrick [25]; Hegat [26]; Hood, et al. [27] and Gillani and Eynon [28] emphasize their significance in achieving learning objectives. Mehmet and Hakan [29] highlight their continuous information exchange, which enhances engagement and provides diverse viewpoints. Al-Juhani [30] notes their role in knowledge management, skill development, and promoting innovation.

Despite sharing common features, widespread learning courses vary in their theoretical foundations, structure, and the use of educational media, as demonstrated by Downes [31].

Rooted in connectionist theory, these courses emphasize peer-to-peer and self-directed learning. Teachers set general frameworks while learners create final products based on their knowledge. They focus on knowledge creation and innovation through learner interaction.

Content-Based MOOCs (xMOOCs): Based on social theory, these courses present content sequentially with a structured curriculum, tasks, and assessments.

The study finds both types address learners' needs based on their strengths and preferences. It primarily uses content-based MOOCs (xMOOCs) for their structured content, activities, and tasks aimed at developing collaborative leadership skills (see Figure 1). These MOOCs use educational videos and manageable topics, incorporating personal learning experiences, assessments, and data collection. They offer increasingly challenging levels and utilize advanced interactive software for collaborative and competitive learning. Canvas was chosen for delivering educational content.

Figure 1.
Constructivist MOOCs (cMOOCs).

Martinez-Lopez, et al. [32] describe these courses as modern tools for managing academic activities and achieving educational goals, while Black and Wiliam [33] notes their role in designing interactive learning scenarios and facilitating discussion, debate, and knowledge construction through peer and expert interactions.

1.1.2. Collaborative Leadership

Collaborative leadership enhances educational outcomes by developing problem-solving skills, collective judgment, and awareness. It involves engaging team members in addressing issues and making decisions through discussions, fostering trust and teamwork that are essential for task completion.

This leadership approach encompasses various styles, focusing on values, ethics, and long-term goals. It includes evaluating learner motivations, addressing needs, and showing respect [34, 35].

Key aspects of collaborative leadership are:

- Team cooperation and joint effort.
- Partnership and mutual learning.
- Collaborative problem-solving and decision-making.
- Building trust through consensus.
- Encouraging teamwork and skill sharing.
- Equality in decision-making and task distribution [36-38].

Studies show that collaborative leadership evolves with new tasks and life events, promoting teamwork, efficiency, and adaptability [39-41]. It includes behaviors like listening, empathy, and commitment, positively influencing team effectiveness, trust, and long-term relationships [42-50].

Collaborative leadership requires leaders and team members to master several key skills. Based on various studies and references, including Khorakian, et al. [51]; Nouman [52] and Khuwaildat [53], and others, the research identifies four essential skills for effective collaborative leadership. These skills enhance team performance and contribute to successful collaborative leadership.

Alternative Assessment

Alternative assessment offers a fresh approach to evaluation, moving beyond traditional memory-based tests. It includes methods like performance assessments, portfolios, presentations, peer assessments, and electronic evaluations. This shift focuses on developing all aspects of a student's personality through diverse, integrated methods rather than merely comparing performance with standardized tests.

Key aspects of alternative assessment include:

- Evaluating how students handle real-world tasks.
- Revealing cognitive, performance, and practical skills through authentic products.
- Encouraging problem-solving and exploration through open-ended tasks.
- Engaging in high-level thinking activities and reflecting real-life achievements.
- Systematic collection of objective data from various sources for informed decisions.

Cauley and McMillan [54] emphasize that ongoing assessment helps teachers monitor and enhance student performance, providing timely feedback, tracking progress, and boosting motivation. This approach improves educational practices, making the system more effective and responsive.

Types and Strategies of Alternative Assessment. Many sources classify assessment into three types: teacher assessment, peer assessment, and self-assessment. This study focuses on two types: teacher assessment and peer assessment, given the similarities between self-assessment and peer assessment. Below is an overview of these sources:

Teacher Assessment. Teacher assessment is a crucial element of the educational process, offering a thorough evaluation of a learner's skills, knowledge, and practical application of learning. It employs various tools to gauge actual performance, not just achievements, and draws on diverse sources for evidence of progress.

Studies bySaleh, et al. [13] and Mousa [10] highlight the advantages of teacher assessment, advocating for its use in both formative and summative forms. Al-Shdeifat [55] discovered that teacher assessment enhances performance and emphasizes the need for guidance tailored to learners' strengths and weaknesses. Gareis [56] stressed the importance of integrating assessment into teaching due to teachers' expertise in evaluation.

However, time constraints occasionally restrict its use, leading to a growing interest in peer and self-assessment as alternatives [57]. E-learning systems provide electronic assessment methods based on teacher assessment, offering benefits in measuring cognitive aspects [13].

In summary, teacher assessment is essential for evaluating and enhancing all facets of the educational process, contributing to the development of well-rounded learners.

Peer Assessment. Peer assessment involves learners evaluating each other's work based on teacher-defined criteria, aiming to save teacher time and enhance understanding and problem-solving skills.

Martinez-Lopez, et al. [32] highlighted that peer assessment is grounded in relational theory, which suggests that learning is more effective when aligned with learners' interests, similar to constructivism but with a focus on applying knowledge contextually.

Tighe-Mooney, et al. [58] noted the increasing use of peer assessment in higher education. It helps learners understand academic standards, develop judgment and feedback skills, and promotes a collaborative learning environment. Hunt and Hutchings [59] found that peer assessment improves collaborative work, communication, and self-assessment skills. Meusen-Beekman, et al. [60] observed benefits in self-organization, motivation, and self-efficacy.

Peer assessment can address gaps left by traditional methods and is often more effective due to differing age and experience levels [13].

In peer assessment, learners evaluate each other's work based on specific criteria, focusing on quality and accuracy [61]. Effective peer assessment requires clear criteria for evaluating peers' performance, including feedback on strengths,

weaknesses, and suggestions for improvement. Research shows that it enhances critical thinking, self-confidence, and learning through peer interactions and discussions. However, learners may experience anxiety, which can hinder the process, making training on objective assessment practices essential [60].

Peer assessment supports theories like intentional learning and project-based learning, emphasizing individual and group responsibilities under teacher guidance [62]. Studies by Saleh, et al. [13] and Mousa [10] indicate that peer assessment often exceeds other methods in effectiveness. Madkour [63] found that while teacher assessment was best for academic achievement, peer assessment excelled in skill development and innovative thinking, with self-assessment falling short of expectations.

Al-Shdeifat [55] found that self-assessment and peer assessment significantly improved Arabic writing performance, supporting Ozogul and Sullivan [57] claim that teacher assessments lead to better final lesson plans than peer or self-assessments. This highlights the need for student training in assessment methods.

El-Sayyed [19] and Dabbagh and Reo [64] showed that peer assessments can match teacher assessments, particularly in oral presentations and writing skills.

In summary, assessment practices have evolved with new methods and tools that improve learner performance by engaging them in activities that boost cognitive and practical skills, increase motivation, and reduce cognitive load.

Theoretical Foundations of Alternative Assessment in Widespread Courses. Assessment design in e-learning is based on theories such as constructivist and sociocultural theories, which view learning as an active, constructive process involving problem-solving and experience acquisition. These theories highlight the importance of feedback in guiding learners and improving their performance.

Key theories supporting electronic assessment include:

- Goal-Oriented Theory: Focuses on providing feedback during task execution, breaking tasks into manageable parts, and supporting skills development through clear instructions and distributed practice [7].
- Learning Path Maintenance Theory: Emphasizes learning through interaction, feedback, and self-assessment, helping learners develop internal standards and take responsibility for their learning [41].
- Goal-Based Scenario Theory: Highlights the use of various assessment mechanisms to guide learners, correct errors, and achieve optimal performance [51].
- Intervention Theory: Supports using assessment to maintain learning progress and improve practices through specific strategies and teacher decisions [33].
- Capability Theory: Suggests that task performance in e-learning enhances learning through interaction and engagement, improving cognitive processes and achieving learning goals [64].

These theories demonstrate that web-based assessment and feedback during interactive tasks foster higher-order thinking, self-regulation, and motivation, leading to improved learning outcomes and creativity [65]. This study uses these principles to explore alternative assessment in e-learning, including teacher and peer assessments.

2. Methodology

This study sought to enhance learners' collaborative leadership skills through the use of a widely adopted course with an alternative assessment model (teacher/peer). A quasi-experimental design was implemented to evaluate these skills. Table 1 details the experimental design, illustrating the use of the Canvas e-learning platform and the alternative assessment model. The study examined the effect of this model on participants' collaborative leadership skills and compared the results between the two experimental groups.

Table 1.
Experimental design of the study.

	Pre-application of Tools	Group	Treatment	Post-application of Tools
Collaborative Leadership Skills Scale	Experimental Group 1	Widely used course via Canvas e-learning platform with teacher assessment model	Collaborative Leadership Skills Scale	Collaborative Leadership Skills Scale
	Experimental Group 2	Widely used course via Canvas e-learning platform with peer assessment model		

Table 1 shows the use of the Collaborative Leadership Skills Scale. Participants were divided into two groups: one received teacher assessment via Canvas, and the other received peer assessment. Skills were measured before and after the course to evaluate the impact on development.

2.1. Participants

The study sample included 100 learners from Minia University's Educational Technology program, divided into two groups of 50 each. The study took place in the second semester of the 2023-2024 academic year, with participants selected randomly.
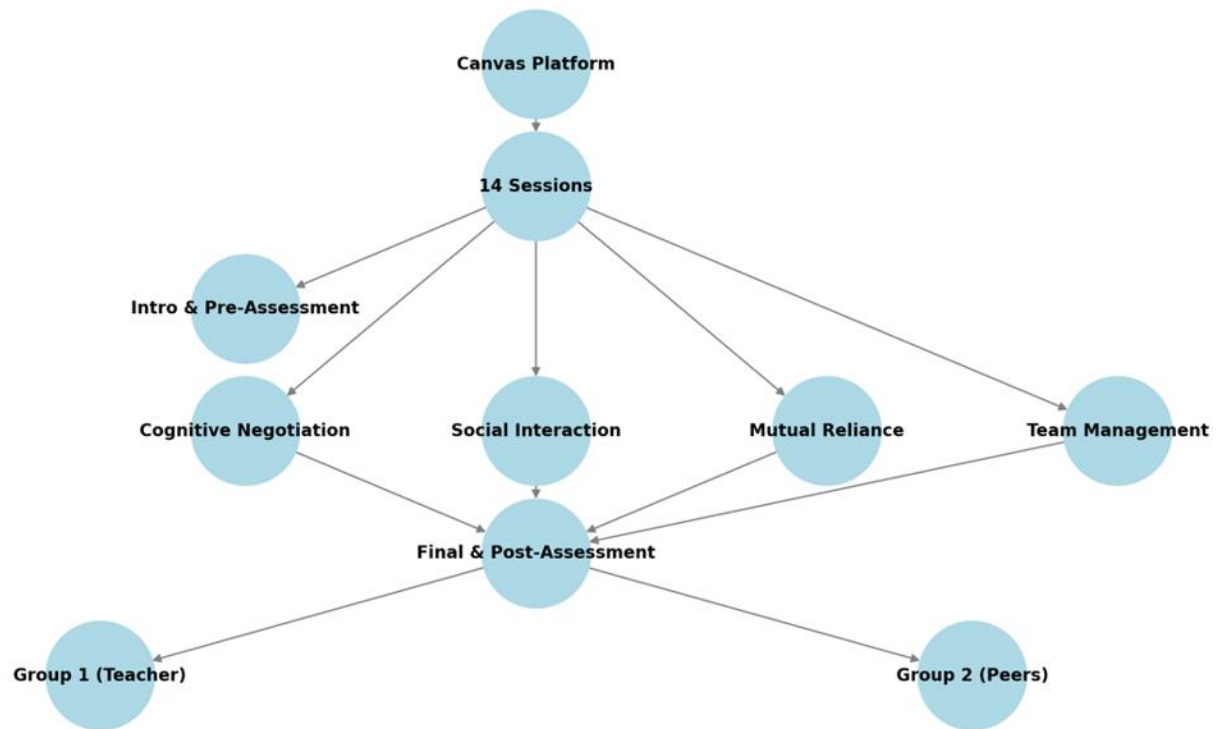
Participants

Figure 2.
Alternative assessment for activities and tasks.

The course, delivered via the Canvas e-learning platform, aimed to develop learners' collaborative leadership skills through 14 sessions. It included an introductory session, pre-assessment, and skill-focused sessions covering cognitive negotiation, social interaction, mutual reliance, and team management. Each skill was taught over three sessions with various learning activities (see Figure 2). Assessment varied by group: teacher assessment for Group 1 and peer assessment for Group 2. The course concluded with a final session and post-assessment.

2.2. Research Tools

Two tools were used to achieve the research objectives and answer its questions, as follows:

A 27-item scale was developed to assess collaborative leadership skills across four dimensions: cognitive negotiation (11 items), social interaction (7 items), positive mutual reliance (4 items), and team management (5 items), using a five-point Likert scale. The scale demonstrated high internal consistency (correlation coefficients ranging from 0.64 to 0.93) and a Cronbach's alpha of 0.88. With an average response time of 30 minutes, it proved to be a valid and reliable measurement tool.

Widely Used Course on the Canvas E-Learning Platform. The Canvas-based course aimed to develop collaborative leadership skills through four stages. In the preparation stage, goals, learner characteristics, and required skills were identified. The design stage involved selecting the alternative assessment model and designing learning screens. During implementation, the course was executed, multimedia elements were gathered, and interaction patterns were established. Finally, the course was delivered to the research sample and evaluated based on the assessment model.

2.3. Results
2.3.1. Quantitative Results

The Collaborative Leadership Skills Scale was administered to both research groups before the experiment to ensure group equivalence and establish baseline scores for comparison with post-experiment scores. SPSS was used for statistical analysis to derive results and test hypotheses.

- Equivalence Calculation between the Experimental Groups:

Group equivalence was verified using pre-experiment scores on the Collaborative Leadership Skills Scale. A T-Test assessed differences between the teacher and peer assessment models. Results are shown in the table below.

Table 2 shows T-values for the Collaborative Leadership Scale and its dimensions (2.02, 1.99, 0.98, 1.01, 1.84), all below the critical T-value, indicating no significant difference between the experimental groups before the experiment. Any post-experiment differences are attributed to the experimental treatments, not pre-existing group differences. Figure 3 compares the average pre-test scores of the groups.

Table 2.
Means, standard deviations, and t-values for the first and second experimental groups in the pre-test of the collaborative leadership skills scale.

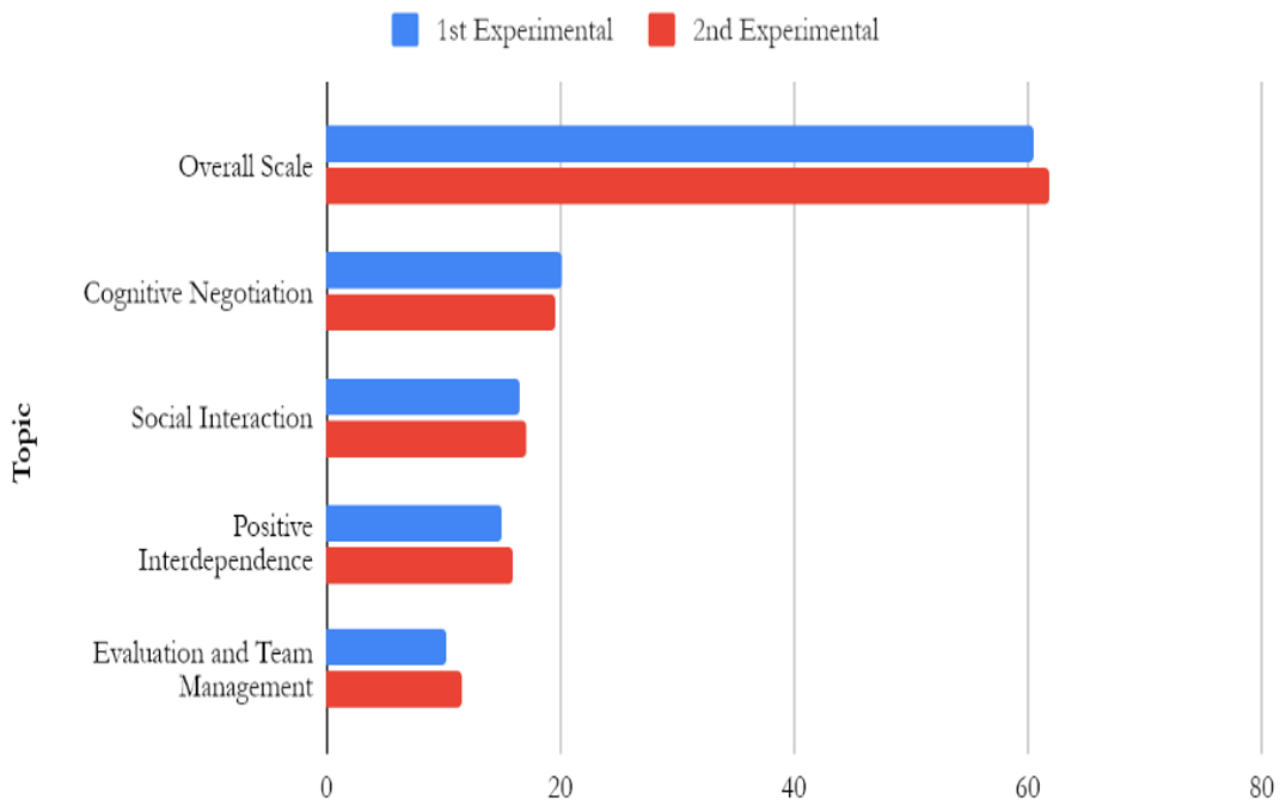| Group	Topic	Score	Mean	Deviation	Calculated Value (t)	Significance Level	Significance
1st experimental group	Overall Scale	135	60.42	0.042	2.02		Not Significant
2nd experimental group			61.9	1.9			
1st experimental group	Cognitive Negotiation	55	20.24	1.25	1.99		Not Significant
2nd experimental group			19.54	1.01			
1st experimental group	Social Interaction	35	16.48	1.14	0.98	0.01	Not Significant
2nd experimental group			17.18	1.92			
1st experimental group	Positive Interdependence	20	14.94	1.51	1.01		Not Significant
2nd experimental group			15.88	1.66			
1st experimental group	Evaluation and Team Management	25	10.24	1.82	1.84		Not Significant
2nd experimental group			11.62	1.64			

Figure 3.
Average scores of the research groups' students on the Collaborative Leadership Skills Scale, both overall and for each dimension.

2.4. Qualitative Results and Discussion
The research results are presented and interpreted through the hypotheses as follows:

Testing the First Hypothesis. The first hypothesis posits a significant difference (≤ 0.05) between the pre-test and post-test scores of the first experimental group (teacher assessment model) on the Collaborative Leadership Skills Scale, favoring the post-test. A T-Test was used to compare these scores, as detailed below:

Table 3.
Means, standard deviations, and t-test results for the difference between mean scores of the first experimental group in the pre-test and post-test of the collaborative leadership skills scale overall, and for each dimension.

| Component	Application	Mean	Standard deviation	T-Value	Significance level	Type of significance
Overall Scale	Pre-Test	60.42	0.042	23.37	0.01	Significant
	Post-Test	121.52	2.80			
Dimension 1	Pre-Test	20.24	1.25	28.25	0.01	Significant
	Post-Test	48.98	1.87			
Dimension 2	Pre-Test	16.48	1.14	23.88	0.01	Significant
	Post-Test	29.44	1.22			
Dimension 3	Pre-Test	14.94	1.51	19.89	0.01	Significant
	Post-Test	24.88	1.91			
Dimension 4	Pre-Test	10.24	1.82	21.44	0.01	Significant
	Post-Test	20.10	1.49			

Note: Table Value of T at 0.01 Level = 1.
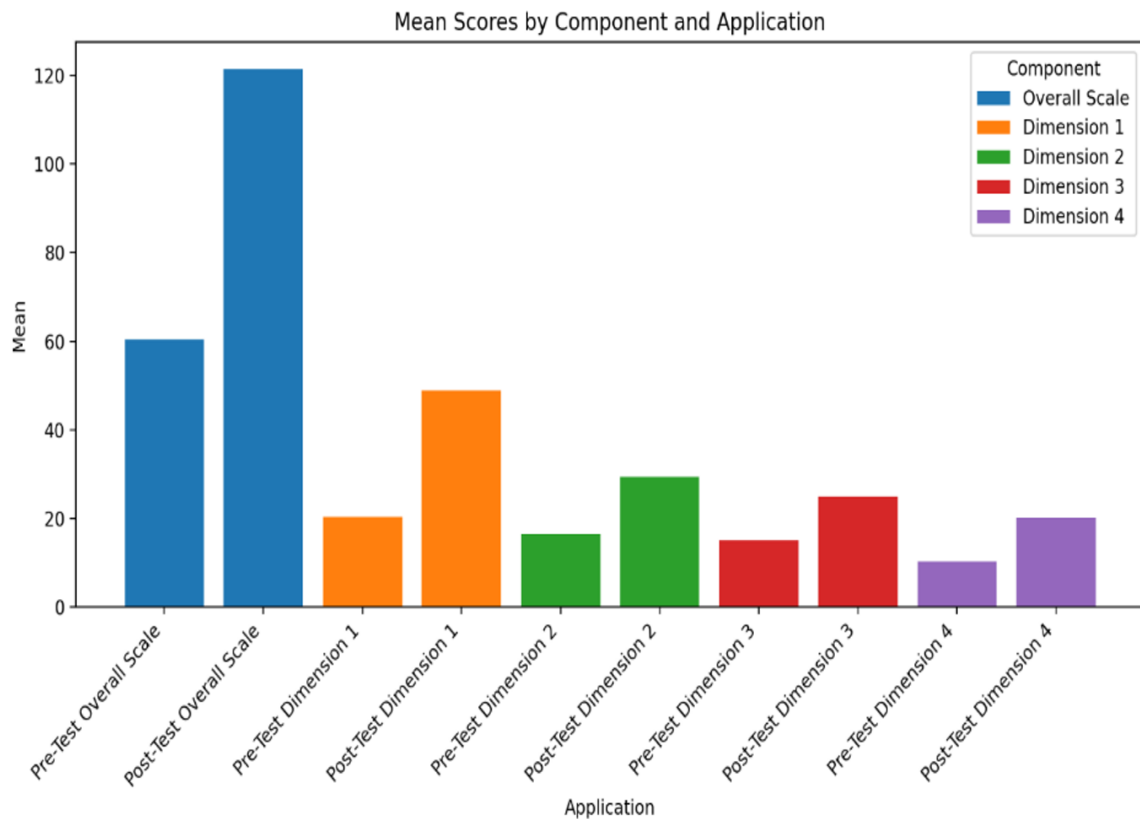
Figure 4.
Mean scores of the first experimental group in the pre-test and post-test of the Collaborative Leadership Skills Scale overall, and for each dimension.

Table 3 shows a significant difference at the 0.01 level between the pre-test and post-test scores for the first experimental group on the Collaborative Leadership Skills Scale (also, see Figure 4). The t-values ranged from 21.44 to 28.25, indicating a notable improvement favoring the post-test, attributed to the teacher assessment model.
This improvement is due to:

- The course design using the teacher evaluation model, with clear stages and logical content presentation, helped define learning objectives and deliver appropriate content, aiding in efficient task completion.
- The teacher's assessment clarified educational practices, aligned with Goal-Setting and Learning Path Preservation Theories. It provided clear objectives, guided learners towards achievements, and detailed task steps, improving performance.

Testing the Second Hypothesis. The second hypothesis posits a significant difference ($p \leq 0.05$) between the pre-test and post-test scores of the second experimental group (using the peer evaluation model), favoring the post-test.

To test the second hypothesis, a T-Test compared the pre-test and post-test mean scores of the second experimental group on the Collaborative Leadership Skills Scale. The results are presented in Table 4.

The results show a statistically significant difference at the 0.01 level between the pre-test and post-test scores for the second experimental group. The t-values ranged from 21.95 to 26.08 overall and from 18.14 to 22.19 for each dimension, all exceeding the critical t-value. This indicates that post-test scores were significantly higher, confirming the effectiveness of

the peer evaluation model. Thus, the second hypothesis is accepted.

Table 4.
Means, standard deviations, and t-values for the difference between mean scores of the second experimental group in the pre-test and post-test of the collaborative leadership skills scale overall and for each dimension maximum scale score (135) N = 50.

Component	Test	Mean	Standard Deviation	Calculated t-Value	Significance Level	Type of Significance
Overall Scale	Pre-Test	61.90	1.90	21.95	0.01	Significant
	Post-Test	119.34	2.01			
Dimension 1	Pre-Test	19.54	1.01	21.40	0.01	Significant
	Post-Test	41.08	1.47			
Dimension 2	Pre-Test	16.48	1.14	26.08	0.01	Significant
	Post-Test	33.84	1.82			
Dimension 3	Pre-Test	15.88	1.66	22.19	0.01	Significant
	Post-Test	28.18	1.91			
Dimension 4	Pre-Test	11.62	1.64	18.14	0.01	Significant
	Post-Test	16.24	1.49			

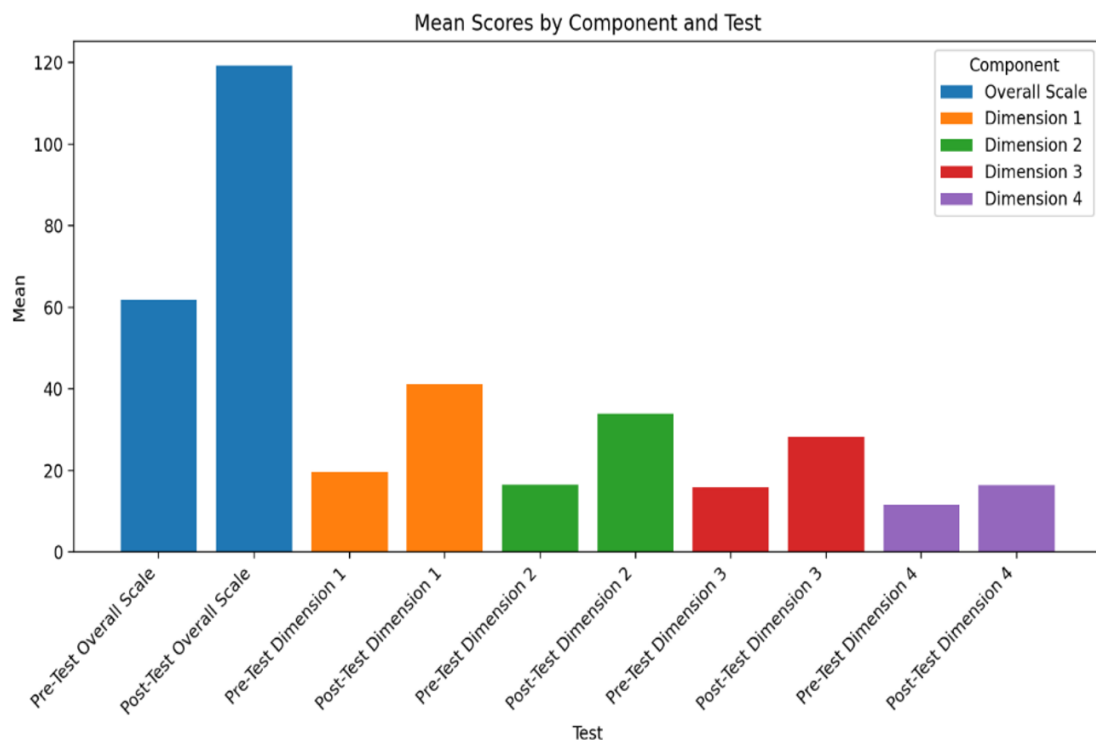**Note:** Table value of t at 0.01 level = 1.98.

Figure 5.
Scores of the second experimental group in the pre-test and post-test of the Collaborative Leadership Skills Scale overall and for each of its dimensions.

Table 4 reveals a statistically significant difference at the 0.01 level between the pre-test and post-test scores for the second experimental group (see Figure 5), with T values ranging from 21.95 to 18.14, all exceeding the critical T value. This significant improvement is attributed to the peer assessment model. Consequently, the second hypothesis is accepted.
The effectiveness of the peer assessment model in developing students' collaborative leadership skills can be attributed to:

- Content Presentation: The peer assessment model provided clear, descriptive information on required skills and performance, building a strong foundation for high-quality outcomes.
- Interactive Design: The course's interactive design encouraged active participation through peer interaction, enhancing performance efficiency.
- User-Friendly Interface: The course's ease of navigation and simple interface allowed learners to focus on content and perform skills effectively.
- Peer Assessment and Feedback: Peer evaluation, combined with continuous monitoring and feedback, developed self-learning, critical thinking, reflection, teamwork, and self-awareness, significantly improving post-test scores.

Testing the Third Hypothesis. The third hypothesis posits that there is no significant difference at the ≤ 0.05 level between the mean post-test scores of the first experimental group (teacher assessment) and the second experimental group (peer assessment) in developing collaborative leadership skills. A T-Test was used to compare these scores overall and by dimension. Results are detailed below.

Table 5.
Means, standard deviations, and t-test significance for differences between mean scores of students in the first and second experimental groups in the post-test of the collaborative leadership skills scale overall and for each dimension maximum scale Score (135) N = (100)

Component	Group	Mean	Standard Deviation	Calculated T	Significance Level	Significance
Overall Scale	First experimental	121.52	2.80	5.29	0.01	Significant
	Second experimental	119.34	2.01			
Dimension 1	First experimental	48.98	1.87	4.98	0.01	Significant
	Second experimental	41.08	1.47			
Dimension 2	First experimental	29.44	1.22	5.12	0.01	Significant
	Second experimental	33.84	1.82			
Dimension 3	First experimental	24.88	1.91	4.48	0.01	Significant
	Second experimental	28.18	1.91			
Dimension 4	First experimental	20.10	1.49	6.58	0.01	Significant
	Second experimental	16.24	1.49			

Note: Table value for T at 0.01 level = 2.63.

Based on Table 5, the observations are:
- A significant difference at the 0.01 level was found between the overall mean post-test scores of the first group (teacher assessment) and the second group (peer assessment), with a t-value of 5.29, favoring the first group.
- Significant differences at the 0.01 level were observed for Dimension 1 (Cognitive Negotiation) and Dimension 4 (Team Management), with t-values of 5.12 and 6.58, respectively, favoring the first group.
- Significant differences were also found for Dimension 2 (Social Interaction) and Dimension 3 (Positive Mutual Dependence), with t-values of 5.12 and 4.48, respectively, favoring the second group.
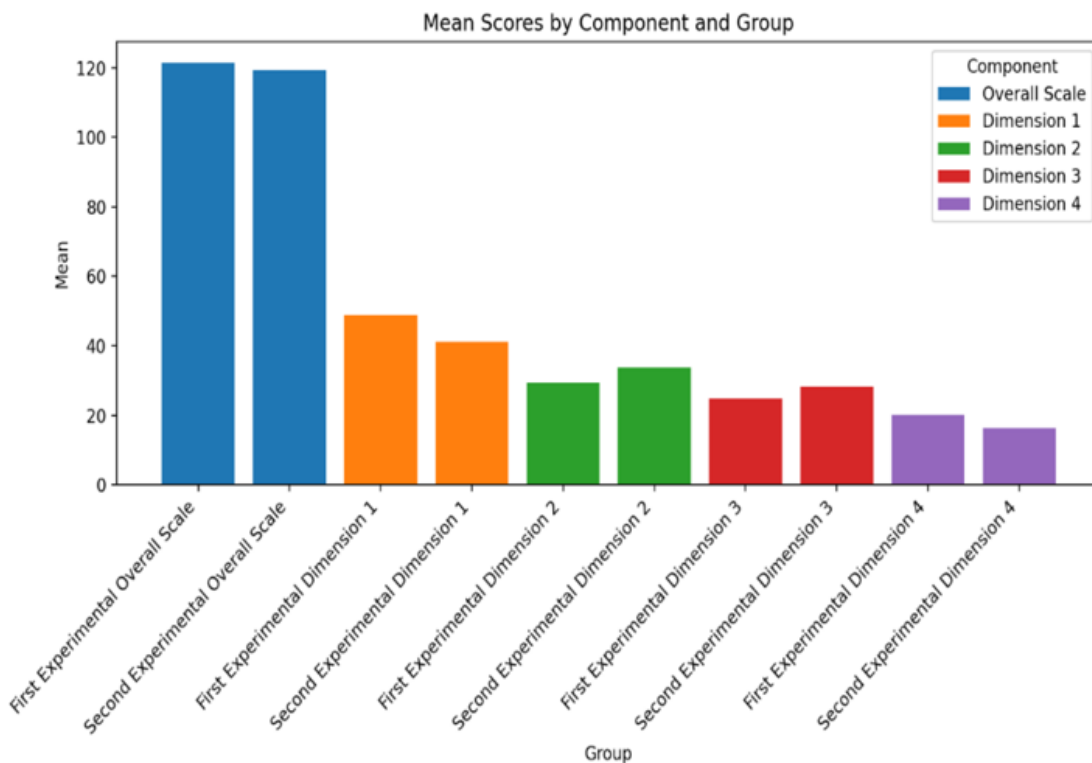

Figure 6.
The difference between the mean scores of students in the first and second experimental groups in the post-test of the Collaborative Leadership Skills Scale overall and for each dimension.

The differences, as is shown in Figure 6, are due to the experimental treatment with teacher and peer assessments affecting the dependent variable. Thus, the third hypothesis is rejected. This indicates that alternative assessment methods significantly impacted students' collaborative leadership skills. The observed differences may be due to:
- Situational Learning, Problem-Based Learning, and Capability for Action Theories: Peer assessment in e-learning highlighted collaboration and reciprocity, enhancing confidence, social interactions, and task engagement, leading to improved social skills and mutual dependence.
- Intervention and Goal-Setting Theories: Peer assessment provided detailed instructions, clarifying tasks and goals, which boosted motivation and task effectiveness, positively impacting social interaction and mutual dependence skills.

- Social Presence and Experiential Learning Theories: Peer assessment fostered competitiveness and knowledge sharing, increasing independent learning and practical experience. This improved performance through competitive interaction and knowledge blending.
- Electronic Learning Environment: The e-learning environment facilitated idea exchange and interactive learning, creating a supportive educational climate. This interaction enhanced cognitive challenge, motivation, and collaborative skills.
- Supporting Studies: Research by Khidr, et al. [12] supports that peer assessment adds value when steps and feedback are clear, empowering learners and aiding teachers in evaluating effectiveness.
- Performer Information Network and Activity Theories: Content-related activities and teacher assessment in e-learning enhanced learner engagement and skill acquisition, promoting exploration and cognitive development in negotiation, evaluation, and team management.
- Modeling Strategy: The teacher assessment framework, using cognitive apprenticeship, guided learners through tasks efficiently, impacting cognitive negotiation, evaluation, and team management skills positively.
- Teacher Assessment Model: Teacher assessment in e-learning improved collaborative leadership skills, with learners appreciating web-based assessments and feedback, enhancing performance and participation.
- Consistent Findings: Studies by Hasbullah [11] and Khidr, et al. [12] and others show that teacher assessment, valued for its objectivity and depth, leads to better cognitive development and collaborative leadership skills compared to peer assessment.

Testing the Validity of Hypothesis Four. Hypothesis four posits that alternative assessments (teacher or peer) are effective in developing collaborative leadership skills in educational technology students. To test this, we calculated the internal effectiveness of these assessment methods using the adjusted gain ratio and η² values for pre-test and post-test scores. Details are in Table 6.

Table 6.
Blake's Adjusted Gain Ratio and η² Value for the Difference Between Mean Scores of Students in the Research Groups in the Pre-Test and Post-Test of the Collaborative Leadership Scale.

Group	Significance level	t value	η² Value	Effect size	Adjusted gain ratio	Effectiveness of proposed alternative assessment methods
Experimental group 1	0.01	23.37	0.92	Large	1.64	Effective
Experimental group 2	0.01	21.95	0.91	Large	1.04	Effective

From Table 6, we observe the following:
For Experimental Group 1:
- The adjusted gain ratio for the collaborative leadership scale was 1.64, surpassing Blake's effectiveness indicator, which suggests the proposed teacher assessment method is highly effective in developing collaborative leadership skills among the research sample.
- The η² value for the collaborative leadership scale was 0.92, indicating a substantial effect size of the independent variable on the dependent variable.

For Experimental Group 2:
- The adjusted gain ratio for the collaborative leadership scale was 1.04, exceeding Blake's effectiveness indicator, which indicates the proposed peer assessment method is effective in developing collaborative leadership skills.
- The η² value for the collaborative leadership scale was 0.91, showing a significant effect size of the independent variable on the dependent variable.

To sum up, the proposed alternative assessment methods (teacher and peer) significantly enhanced collaborative leadership skills overall and in each of the four dimensions among the research sample, as per the reference framework [58]. The effectiveness can be attributed to the following factors:
- The availability of electronic educational content allowed independent review and self-learning, contributing positively to collaborative leadership skills.
- Practical exercises in the course improved skill refinement.
- The research sample's technical readiness and relevant skills for the job market positively influenced the results.
- Multimedia technology and digital infographics in the course helped deliver information effectively, enhancing collaborative leadership skills.
- A variety of educational activities boosted learner motivation and engagement.
- Short video segments in the learning environment-maintained focus and enhanced skill development.
- Content-related activities facilitated recall and linked new experiences, aiding skill development.
- Positive interaction and participation in activities strengthened collaborative leadership skills.
- Educational strategies that addressed individual differences increased attention and skill development.
- Adherence to responsibility in activities enabled learners to complete tasks, further enhancing collaborative leadership skills.

3. Conclusion

The study concludes that alternative assessment methods (teacher and peer) should be integrated into widely used courses to enhance learning and develop collaborative leadership skills. This approach utilizes various content types—texts, images, audio, video—and interactive elements on the Canvas platform, which combines Learning Management Content Systems (LMCs), Learning Management Systems (LMS), and social networks. The platform provides easy access to educational content, tasks, and assignments, enabling a more engaging and accessible learning experience with self-paced learning and analytics. It also supports discussion sessions, multimedia integration, test preparation, and mobile use, contributing to effective learning outcomes.

Educational activities in the course were designed to be diverse and engaging, fostering high focus and immediate feedback to enhance collaborative leadership skills. The research emphasizes the importance of developing these skills, which enhance self-efficacy, confidence, creativity, and critical thinking.

Based on these findings, recommendations include:

- Developing modern skills in educational technology for students to meet job market demands.
- Emphasizing the role of alternative assessment resources and educational activity design in electronic environments to motivate and refine learners' skills.
- Utilizing various alternative assessment tools to sustain learning outcomes.
- Training teachers and students to effectively interact with and manage electronic assessment environments.

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