

Enhancing Teacher Learning for Student Development: The Case of Collaborative Leadership Skills

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Abstract

This research aimed to investigate by utilizing the Research and Development (R&D) methodology, to yield innovative educational outcomes. The focus was on efficiently deriving educational innovations from experimental research that had been conducted in field settings. The intended applicability of the research findings was directed towards benefiting schools that serve as the target population, and thereby, facilitating the widespread dissemination of the research outcomes. This educational innovation took the form of an online self-training program, which was comprised of two distinct projects. Firstly, there was the Teacher Development Project, which encompassed seven modules designed for the professional growth and learning of educators. Secondly, the Teacher-Led Learning Enhancement Project consisted of modules that were intended to be practically applied by teachers in facilitating the translation of the acquired knowledge into student development, with a single module dedicated to this aspect. The experimental research results from the first project revealed that those teachers belonging to the experimental group (consisting of 13 individuals) had attained post-test scores by the 90/90 standard. Furthermore, the scores exhibited statistical significance, given that these scores had been higher than the scores obtained from the pre-test. In addition, the experimental research findings from the second project revealed that the target group of students, who benefited from the developmental intervention (210 individuals), had exhibited post-test scores that had been significantly higher than their respective pre-test scores. This factor demonstrated that the utilization of the Research and Development (R&D) methodology in this study had resulted in the development of an educational innovation termed "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills." The effectiveness of this innovation aligned with the research hypotheses, and thereby demonstrated that the program could be beneficially applied to teachers and students in those schools that serve as the target population. Consequently, the research outcomes can be disseminated for future use and implementation.

Keywords: online self-training program, teachers' learning, collaborative leadership skills

1. Introduction

Collaborative leadership is a management strategy in which leaders and team members collaborate on project initiatives and ideas that ensure the firm's continued success. Cooperation may take many forms, from the desire to help a coworker to an enterprise-wide system for exchanging information, exploring possibilities, and increasing productivity. The notion that cooperative efforts are more effective than individual efforts is the driving force of collaboration. Co-creating solutions and open, constructive criticism are a few examples of the practice. (He, 2022)

The benefits of collaborative leadership include increased productivity and better-quality work from team members, as well as improved employee satisfaction. Collaborative leaders are more likely to be successful than authoritarian leaders because they have higher levels of engagement among their team members. (RingCentral Team, 2023)

Primeast (2020) suggested that there are 7 ways to build collaborative leadership: 1) Building bridges of trust; 2) Encouraging the adoption of a shared purpose; 3) Developing diversity; 4) Accepting and encouraging initiative; 5) Being sharers of information, not hoarders of information; 6) Creating transparency in decision-making; and 7)

Understanding that conflict can be constructive. Meanwhile, Dunne (n.d.) suggested another 8 ways to develop collaborative leadership: 1) Realizing that silos can kill your business; 2) Building your collaboration strategy around the human element; 3) Using collaboration as an organizational strategy for change; 4) Making visioning a team sport; 5) Utilizing diversity in problem-solving; 6) Helping people to develop relationships; 7) Focusing on building trust; and 8) Watching your body language.

The foregoing information highlights the significance of collaborative leadership and illustrates the diverse perspectives on the approaches that can be utilized to enhance collaborative leadership skills, as expressed by various stakeholders. When conducting the internet research, it was observed that there are diverse perspectives on collaborative leadership skills from various regions worldwide. These perspectives address multiple aspects, such as definitions, significance, characteristics, development approaches, developmental processes, challenges, and obstacles to development, as well as methods of assessment. Multiple viewpoints on collaborative leadership skills, covering a spectrum of topics, emerge from different global regions. The research team considered the gathered knowledge to be valuable and applicable as a guideline for fostering collaborative leadership skills among students. In this research endeavor, the team employed the Research and Development (R&D) methodology to yield an educational innovation entitled "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills." This educational innovation was developed based on the concept of "knowledge and action are power," and incorporated diverse perspectives on collaborative leadership skills across various issues. It aimed to serve as a developmental framework for educators by prioritizing their learning as the initial step. Subsequently, it can stimulate and encourage educators to translate their acquired knowledge into student development, and thereby foster collaborative leadership skills that are in alignment with pre-defined indicators. The research team is confident that the Research and Development (R&D) methodology, which will be elaborated upon in the research methodology section later, can result in the production of an effective educational innovation. Hence, to expand educational opportunities, this innovation can be disseminated to provide benefits for teachers and students in schools. In this instance, the target population for the dissemination of the research findings is the nationwide educational community under the jurisdiction of the Basic Education Commission of Thailand. Following the principles of R&D methodology, any developed educational innovation can be experimentally applied in representative test areas. After the experimental results have determined the effectiveness of the innovation according to pre-defined criteria, it can then be disseminated for the benefit of the target population in the research.

1.1 The Purpose of Research

This research aimed to conduct an investigation using the Research and Development (R&D) methodology to produce an educational innovation that would be effective by the pre-defined criteria. The objective was to disseminate this innovation for the benefit of teachers and students in schools and to thereby expand their educational opportunities. In this instance, the targeted population for the dissemination of the research findings was the nationwide educational community under the jurisdiction of the Basic Education Commission of Thailand. This educational innovation took the form of an online self-training program, which was comprised of two projects. Firstly, there was the Teacher Development Project, which was made up of 7 modules designed for teacher learning. Secondly, the Teacher-Led Learning Enhancement Project consisted of a single module for teachers. Its intention was for the teachers to practically apply the contents to facilitate the translation of the acquired knowledge to enhance student development. (Refer to the program structure and other details in Figure 1.)

1.2 Research Hypothesis

Based on the examination of other research works to develop educational innovations through the teacher development approach, the goal was to empower teachers to subsequently foster the continuous development of their students. Some examples of this approach in the literature were as follows: "Empowering Teachers' Learning to Enhance Students' Change Leadership Skills" by Praneetpolkrung and Supakicco (2023), "Enhancing Teachers' Learning to Develop Students to Become Successful Students" by Thammabut and Thacha (2023), and "Developing Teachers to Enhance Project Management Skills for Students" by Nukoonkan and Dhammapissamai (2023). Therefore, it was believed that this research endeavor would yield an "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills," which could be similarly effective. Hence, the following research hypotheses were formulated:

- Teacher Development Project: The hypothesis posits that those teachers in the experimental group will attain post-test scores that will meet the standard of 90/90 and will be significantly higher than their pre-test scores.

- **Teacher-Led Learning Enhancement Project:** The hypothesis asserts that students in the target group, who have received the developmental intervention, will achieve post-test scores that will be significantly higher than their pre-test scores.

1.3 Literature Review

At the outset, it was mentioned that there were experts, who had provided diverse recommendations on the development of collaborative leadership skills. In particular, upon conducting internet research, the research team found a plethora of perspectives that they deemed to be valuable knowledge. This informed their decision to undertake the research by using the Research and Development (R&D) methodology, the aim of which was to produce an educational innovation termed "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills." In this research endeavor, the team delved deeper into the literature that is related to collaborative leadership skills across various issues and then built upon the preliminary findings. The objective was to accumulate knowledge for the development of self-training modules for teacher learning, covering seven key areas as follows: 1. The definition from the perspectives of DiFranza (2019), Moseley (2019), Murley (2011), Rabinowitz (n.d.), and Samur (2019). 2. The importance from the perspectives of DiFranza (2019), Miller (n.d.), Taparia (2021), Torchio (2019), and Yvanovich (2021). 3. The characteristic from the perspectives of Christiansen (2021), Goman (2017), McCombs (2021), Schaub (2011), Williams (n.d.). 4. The obstacles and ways to overcome obstacles from the perspectives of Reimer (2019), Gabriel-Petit (2017), Thuen, (2016). 5. The development guidelines from the perspectives of Crosby (2017), Dunne (n.d.), Lau (n.d.), Linders (2017), Pewsey (2019), Rayis (2020), Tolson (2019), Viki (2017), Wilson (2019), Witte (2012). 6. The development stage from the perspectives of Dyer and Dyer (n.d.), Elorus Team. (2018), Joseph (2019), Kashyap (n.d.). 7. The evaluation from the perspectives of Chase (2016), Chrislip and Larson (n.d.), and Turning Point Collaborating for a New Century in Public Health (n.d.).

In the context of the aforementioned seven key areas, those perspectives related to "Development guidelines" were deemed crucial. These guidelines represent recommendations that elucidate the principles, concepts, techniques, methodologies, and activities, which aim at initiating the learning process for teachers as the primary step. This is integral for teachers, who can subsequently apply the acquired knowledge in developing their students, and who can foster the emergence of collaborative leadership skills in the subsequent steps. The research team synthesized these "Development guidelines" from the perspectives of various references that were mentioned earlier; this synthesis resulted in a total of 60 development strategies. (Each developmental approach is further detailed in the self-training modules that have been compiled.)

- Lead by example
- Celebrate successes
- Open up communication
- Establish a shared vision
- Watch body language
- Reward collaboration
- Make time for team building
- Get to know the team
- Discourage internal competition
- Agree on team goals
- Create space for innovation
- Make time & space for fun
- Help-seeking
- Help to give
- Lead from the top down
- Encourage mentoring
- Offer positivity and rewards

- Have the right technology in place
- Focus on building trust.
- Help people develop relationships.
- Emphasize mission statement
- Invite constructive input
- Pay attention to team efforts
- Cultivate a community spirit
- Recognize the power of relationships
- Communicate clearly and often
- Use a smooth and warm tone of voice
- Promote a sense of inclusion
- Learn to step back from a project
- Support collaboration practice
- Encourage collaboration across departments
- Utilise diversity in problem-solving
- Cultivate openness and transparency
- Establish a judgment-free idea-sharing culture
- Set the example
- Build a collaboration strategy around the human element
- Accommodate different collaboration styles
- Highlight team members' strengths
- Clarify goals, roles, and responsibilities
- Use collaboration as an organizational
- Identify and implement collaborative
- Facilitate cross-functional brainstorming
- Encourage and reward people who get input from several sources
- Reward people for sharing information
- Use incentives to encourage innovation
- Promote those who are skilled in collaboration
- Establish clearly defined roles and responsibilities
- Encourage communication between departments
- Walk a mile in a department's shoes
- Listen to ideas on all levels of the organization
- Set up regular town hall meetings
- Explain the reasons why certain tasks are important
- Establish clear roles and specialties within a team environment
- Create collaboration corners in the office
- Realise that silos can kill business
- Explore collaboration bottlenecks

- Set communication boundaries and norms
- Foster a culture that supports and promotes collaboration
- Managers and stakeholders are role models and true examples of collaborators
- Encourage equal participation across collaboration channels

2. The Research Methods

2.1 Concepts and Process

This research employed the Research and Development (R&D) methodology by the perspective outlined by Sanrattana (2023), which posits that educational innovations, which have been developed by employing this research methodology, aim at cultivating knowledge with the expectation that individuals will translate this knowledge into actions, which will, in turn, generate effective outcomes that align with the philosophy of "knowledge and action are power." This guiding principle led to the conceptual framework of this research: "commencing with the development of teacher learning, followed by enabling teachers to continuously apply this acquired knowledge in developing students." The research was structured around four sequential phases as follows:

Step 1 involved reviewing the literature related to collaborative leadership skills in the seven key areas. The objective was to compile content for the online self-training modules for the Teacher Development Project, which consisted of seven modules: Definition, Importance, Characteristics, Obstacles and Ways to Overcome Obstacles, Development Guidelines, Development Stage, and Evaluation. Additionally, a practical implementation module for teachers was developed.

Step 2 involved assessing the quality of the online self-training modules through two phases. The first phase consisted of the *Preliminary Field Testing and Revision*, which involved five teachers from a school that was not included in the experimental research area. The second phase, the *Main Field Testing and Revision*, involved ten teachers from another school that was also not included in the experimental research area. Both phases utilized the method of conducting focus group discussions.

Step 3 involved the creation of research tools for the experimental research, which were made up of two sets: 1) a test to assess the teachers' learning outcomes, and 2) an evaluation form for the students' collaborative leadership skills. Detailed information about these tools is discussed in the section on research tools.

Step 4 involved testing the effectiveness of the online self-training program based on the research hypotheses. The research was conducted using a one-group Pre-test – Post-test experimental design in a school that had been selected as the designated research area by using purposive sampling. The program under investigation was the "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills." The experimental group consisted of 13 teachers and 210 students, and the study was conducted during the second semester of the Academic Year of 2023. The research was divided into two phases: 1) A one-month experimental research period focusing on the Teacher Learning Development Project, and 2) A two-month experimental research period focusing on the Teacher-Led Learning Enhancement Project.

2.2 The Research Tools

2.2.1 The Teacher Learning Outcome Test was a multiple-choice questionnaire with four options. It aimed to assess the learning outcomes of teachers both before and after the experimental research in the Teacher Learning Development Project.

The research team developed assessments for six aspects: Definition, Importance, Characteristics, Development Guidelines, Development Stage, and Evaluation. Each aspect was designed by the cognitive domain and was specifically ordered from lower-order thinking skills to higher-order thinking skills (remembering, understanding, applying, analyzing, evaluating, and creating), following Benjamin S. Bloom's Revised Taxonomy 2001 (Armstrong, 2010). This test quality validation underwent two phases, which were as follows. **In the initial phase**, the content validity was assessed using the Indexes of Item-Objective Congruence (IOC) method proposed by Rovinelli and Hambleton (1977). This involved consulting five experts in the fields of Curriculum and Instruction and Educational Measurement and Evaluation. They were qualified professionals, who had expertise in these areas and who evaluated the relevance and alignment of the test items with the specified objectives. The results of the data analysis revealed that all the questions had yielded IOC values higher than the criterion of 0.50. (Chaichanawirote & Vantum, 2017) **In the second phase**, the quality was assessed by administering the test to a sample group of 30 teachers from a school

that was not involved in the experimental phase. The data analysis revealed the following: 1) each question on the test had shown an index of difficulty within the range of 0.20 to 0.80, and a power of discrimination that ranged from 0.20 to 1.00; 2) the KR-20 coefficient, indicating the internal consistency reliability, was 0.89, which exceeded the criterion of 0.70; and 3) the test's level of difficulty was measured at 64.81

2.2.2 The Assessment Form for Collaborative Leadership Skills among students was structured as a 5-point rating scale. The scale consisted of the following levels: "Very High," "High," "Moderate," "Low," and "Very Low."

This assessment form was created by the research team based on the results of the study of characteristics that show collaborative leadership skills from the perspectives of Christiansen (2021), Goman (2017), McCombs (2021), Schaub (2011), and Williams (n.d.). Additionally, insights into the concepts of assessing collaborative leadership skills were drawn from the perspectives of Chase (2016), Chrislip and Larson (n.d.), and Turning Point Collaborating for a New Century in Public Health (n.d.). This assessment tool underwent two phases of quality assessment. **In the initial phase**, the content validity was examined using the method proposed by Rovinelli and Hambleton. The qualified individuals, with expertise in the fields of Educational Administration and Educational Measurement and Evaluation, totaled five. The results of the data analysis revealed that the indexes of Item-Objective Congruence (IOC) for all questions had exceeded the threshold of 0.50. This indicated that the questions in the assessment tool could be effectively utilized for the intended purposes of measurement (Chaichanawirote & Vantum, 2017). **In the second phase**, the reliability or internal consistency of the assessment tool was examined by administering it to a sample group of 30 students in a non-experimental school. The analysis aimed at determining the alpha coefficient of reliability using Cronbach's method. The results of the data analysis revealed that this assessment tool had met the established criterion for reliability, with an alpha coefficient equal to or exceeding 0.70 (UCLA: Statistical Consulting Group, 2016). The alpha coefficient of reliability for the entire assessment tool was 0.86. When examined by specific dimensions, the coefficients for teamwork skills, dedication to Work Collaboration Skills, Commitment to Collaborative Work, Personal Development and Team Building, Team Spirit and Communication Skills, Commitment and Trust in the Team, Monitoring, Tracking, and Creative Improvement, and Values and Personal Ethics in Collaborative Work were 0.80, 0.75, 0.99, 0.89, 0.73, 0.99 and 0.90, respectively.

2.3 Data Analysis

The data analysis was conducted in two scenarios: 1) The Analysis of scores from the post-test was compared to the standard criterion of 90/90. Here, the first 90 refers to the percentage of the average scores of the teachers in the group obtained from the knowledge test, while the second 90 refers to the percentage of the number of teachers, who passed the test by the criteria for all objectives (Yamkasikorn, 2008). 2) The results of the analyses of the pre-test and post-test were compared by using dependent t-test statistics.

3. The Results

3.1 The Educational Innovation Results

The outcomes of this research led to the development of an educational innovation named "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills." This innovation consists of two consecutive projects: 1) The Development Project for Teachers' Learning, which consists of 7 self-training modules as follows: Definition, Importance, Characteristics, Obstacles and ways to overcome obstacles, Development guidelines, Development stage, and Evaluation, and 2) The Teacher Implementation Project, which involves a self-training module for teachers to use as a practical guide, with 1 module, with the following topics: Instructions, Summary of the expected characteristics, Summary of development guidelines, Summary of the development process, Students' collaborative leadership skills assessment form, Self-assessment form for teachers on the level of implementation of development guidelines (Google form), Teachers' self-assessment on the selection of a development process model for implementation (Google form), and Teacher's self-reflection form on practice (Google form). For further details, please refer to the illustration presented in Figure 1.

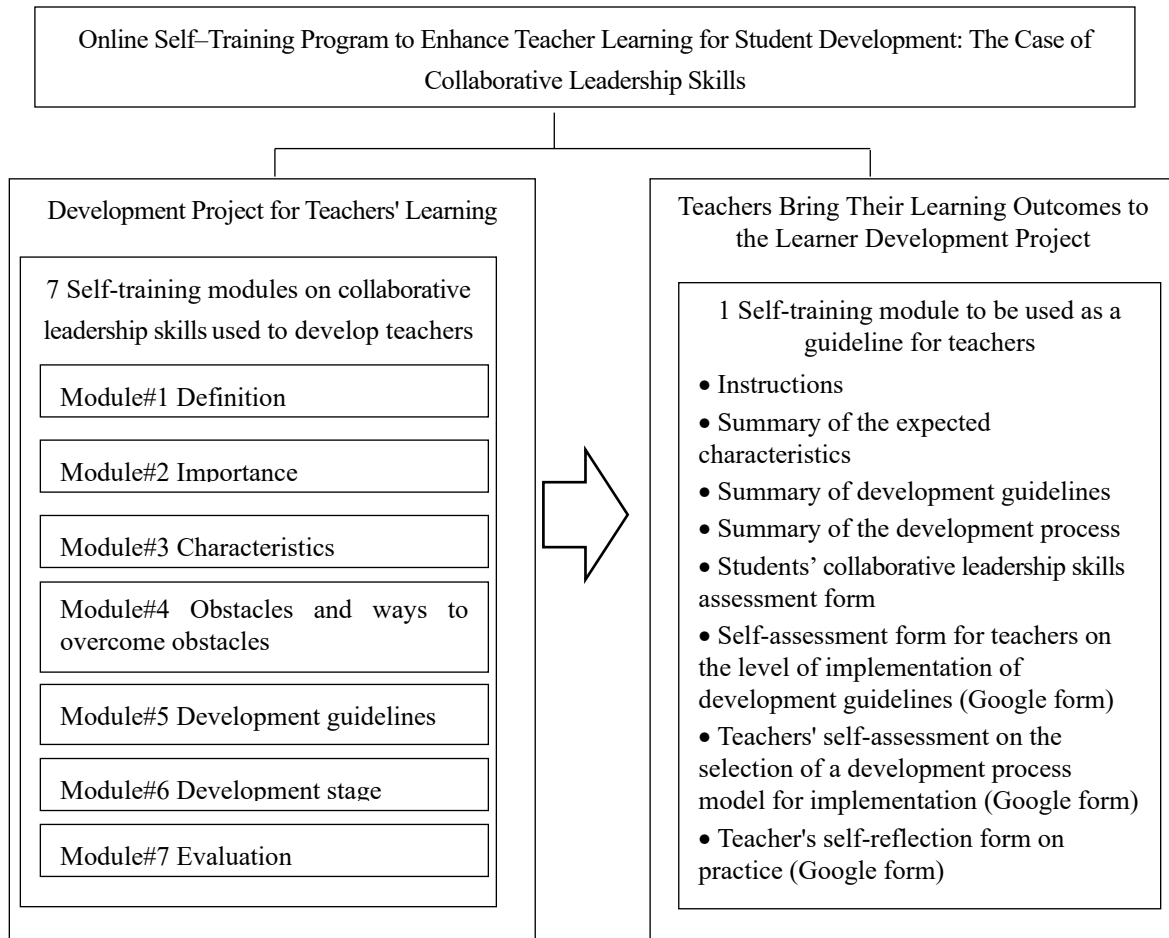


Figure 1. Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills (See the characteristics of Modules in the original Thai language from <https://shorturl.at/gpyEJ>)

3.2 The Results of the Online Self-Training Program Evaluation

3.2.1 Results from the Teacher Development Project

The experimental research conducted in the Teacher Development Project yielded findings consistent with the pre-defined research hypotheses. Teachers in the experimental group achieved an average score of 34.08 on the post-test, which was equivalent to 36 of the maximum score. Additionally, they demonstrated successful learning outcomes across all the specified objectives, reaching a rate of 94.66 %. These results align with the 90/90 standard criteria.

The average post-test scores were found to be statistically significantly higher than the pre-test scores at a level of significance of 0.05, as indicated by the data analysis in Table 1.

Table 1. The Means of Teachers' Pre-test and Post-test Scores Using the Dependent t-test

Testing	Sample sizes	Means	Standard Deviations	t
Pre-test	13	20.62	4.33	
Post-test	13	34.08	1.32	14.15*

* $p < 0.05$

3.2.2 Results from the Teacher-Led Student Development Project

The experimental research conducted in the Teacher-Led Student Development Project revealed findings that were consistent with the pre-defined research hypotheses. This was evident from the analysis of the average scores and standard deviations that had been obtained from the assessment of collaborative leadership skills among students before and after the experiment, as presented in Table 2. Additionally, the results from the comparative analysis using the dependent t-test are provided in Table 3.

Table 2. The Means and Standard Deviations from the Assessment of Collaborative Leadership Skills among Students Before and After the Experiment

The Aspects of Collaborative Leadership Skills in Students	Results			
	Pre-test		Post-test	
	\bar{X}	S.D.	\bar{X}	S.D.
Work Collaboration Skills	3.76	0.67	4.58	0.55
• The team and I always share common goals in our work.	3.79	1.03	4.55	0.59
• I consistently engage in collaborative work with others in a cooperative context.	3.81	1.03	4.57	0.58
• I am an effective team member.	3.67	0.99	4.48	0.59
• I give opportunities to others so that they can express their opinions during collaborative work.	3.94	1.16	4.66	0.72
• I build trust when working collaboratively with others.	3.84	0.98	4.60	0.73
• I can establish a strong network for the benefit of our collaborative work.	3.60	1.02	4.65	0.74
• I possess the ability to coordinate between tasks or teams constantly to ensure the team's success.	3.69	1.08	4.54	0.73
Commitment to Collaborative Work	3.60	0.67	4.61	0.57
• I have self-confidence that my approach to work will lead to success.	3.73	0.90	4.79	0.51
• I have methods to promote diversity in team brainstorming to ensure successful outcomes.	3.69	0.94	4.56	0.73
• I perform well in a highly competitive environment and under constant pressure.	3.46	1.00	4.68	0.71
• I have a clear work plan that can be executed.	3.55	1.08	4.51	0.73
• I can define an easily understandable work process that can be practically implemented.	3.60	0.99	4.43	0.76
• I maintain clarity in vision and motivation in the workplace.	3.58	1.01	4.68	0.56
Personal Development and Team Building	3.72	0.73	4.57	0.39
• I encourage creative thinking when collaboratively working with others.	3.79	1.02	4.53	0.59
• I have a process to develop individuals into effective team leaders in collaborative work.	3.67	1.06	4.40	0.58
• I promote the growth of others into effective team leaders during collaborative work.	3.64	1.10	4.53	0.59
• I have efficient ways to share power and influence to help team members work effectively.	3.83	1.03	4.70	0.55
• I can serve as a positive learning model when performing collaborative work.	3.69	1.06	4.78	0.42
• I can be both a follower and a leader, helping others in the team to demonstrate their potential in their work.	3.67	1.10	4.43	0.53
• I emphasize self-improvement, while also promoting and developing individuals on the team.	3.75	1.09	4.59	0.58
Team Spirit and Communication Skills	3.68	0.66	4.58	0.39
• I can influence the minds of others to follow my lead.	3.55	0.98	4.68	0.47
• I always admire the abilities of others that result from their actions.	3.89	0.99	4.52	0.59

The Aspects of Collaborative Leadership Skills in Students	Results			
	Pre-test		Post-test	
	\bar{X}	S.D.	\bar{X}	S.D.
• I don't exaggerate or praise others unnecessarily in different situations.	3.62	1.13	4.59	0.49
• I can adapt my body language (working cheerfully, smiling, and laughing) according to the situation, even under pressure.	3.75	1.12	4.60	0.58
• I understand the diverse motivations of team members, and that communication is required to create a spirit of teamwork.	3.75	0.96	4.52	0.59
• I can appropriately control my emotions in different work or situational settings.	3.52	1.12	4.54	0.59
Commitment and Trust in the Team	3.66	0.67	4.61	0.35
• I have a way to create transparency in decision-making during teamwork.	3.72	0.92	4.51	0.50
• When working with others, I am a sharer of information rather than a hoarder of data.	3.62	1.01	4.71	0.55
• I am capable of working effectively in non-standard situations and am always successful.	3.60	0.92	4.59	0.49
• I have the ability and versatility to create commitment and trust among team members.	3.68	0.96	4.61	0.58
Monitoring, Tracking, and Creative Improvement	3.74	0.65	4.66	0.23
• I accept failures in the tasks that are undertaken, and I collaborate in planning.	3.79	0.97	4.62	0.58
• I can listen to what others have to say about the work I am doing.	3.83	1.07	4.57	0.73
• I can accept praise and constructive criticism about the work I am doing.	3.91	0.92	4.45	0.50
• I always abide by my commitments in whatever I undertake.	3.69	1.00	4.80	0.40
• I work to achieve efficient results by setting goals.	3.69	0.95	4.60	0.57
• I can assess the environment or the situations that arise from the work I perform.	3.60	0.98	4.83	0.37
• I achieve successful results, reflect on myself, and continuously improve my work creatively.	3.76	0.98	4.66	0.48
• I consistently encourage the concept of embracing risks that arise from creative work.	3.75	0.92	4.78	0.41
• I have an understanding that conflict in operations is beneficial for monitoring tasks and work outcomes.	3.67	1.03	4.61	0.49
• I comprehend that conflict is a creative force for examining and tracking tasks, and it can be used as a guideline for improving operations.	3.74	0.94	4.67	0.47
Values and Personal Ethics in Collaborative Work	3.75	0.75	4.52	0.35
• I can create mental security when performing collaborative work with others.	3.67	1.10	4.57	0.58
• I am honest, ethical, and moral when working with others.	3.93	1.06	4.46	0.50
• I have discipline in time management, making the most of it without wasting time during collaborative work with others.	3.69	0.96	4.60	0.49
• I don't pressure employees to do anything wrong; I follow the regulations and laws related to work practices when working with others.	3.73	1.00	4.46	0.58
Totals	3.71	0.58	4.60	0.34

From Table 2, it can be observed that the average scores from the assessment of the Collaborative Leadership Skills of students after the experiment were higher than before the experiment. When analyzed and compared using the Dependent t-test, it was found that there had been a statistically significant difference at the significance level of 0.05, as shown in Table 3.

Table 3. The Results of Data Analysis Comparing the Mean Scores of the Pre-test and Post-test of the Students Using a Dependent t-test

Evaluating	Sample size	Mean	Standard Deviation	t
Pre-test	210	3.71	0.58	19.54*
Post-test	210	4.60	0.34	

* p < 0.05

4. Discussion and Conclusion

The outcomes resulting from the research, which was conducted through R&D methodology, with the final phase employing a one-group pre-test and post-test experimental design in a school selected through purposive sampling as the research site, revealed that the experimental group, consisting of 13 teachers, and the target group, which was comprised of 210 students, who benefited from the developmental intervention, had exhibited the intended objectives. The study aimed to assess the effectiveness of the "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills," which was considered to be the educational innovation that was anticipated to derive insights from this investigation. The findings indicated that the aforementioned educational innovation had demonstrated efficacy, which aligned with the research hypotheses established for this study. The research encompassed both experimental cases within the development project that aimed at enhancing teacher learning and experimental cases within the project, in which the teachers applied the acquired knowledge to student learning. Among the experimental group of teachers, the post-test scores aligned with the established standard of 90/90 and were found to be statistically significantly higher than the corresponding pre-test scores. Similarly, the students in the target group, who benefited from the developmental intervention, had exhibited statistically significant increases in their post-test scores compared to their pre-test scores. Consequently, the findings of this research were determined to be consistent with those of other individuals, who had employed R&D methodology and had designed research along similar lines. Examples of such studies include the following: "Empowering Teachers' Learning to Enhance Students' Change Leadership Skills" by Praneetpolkrung and Supakicco (2023); "Enhancing Teachers' Learning to Develop Students to Become Successful Students" by Thammabut and Thacha (2023); "Developing Teachers to Enhance Project Management Skills for Students" by Nukoonkan and Dhammapissamai (2023); "Empowering Teachers' Learning to Develop Students' Inspirational Skills" by Kromthamma and Supakicco (2023); and "Online Program to Empower Teacher Learning to Develop Students' Digital Literacy Skills" by Promrub and Sanrattana (2022). The findings from these studies illustrated that the utilization of the concepts of "Knowledge and Action are Power" and "Developing Teachers' Learning for Student Development" in the methodology of this research had resulted in the attainment of an effective educational innovation as anticipated. It was shown that this innovation had the potential to be disseminated and applied in other schools within the broader target group.

During conducting the research, in addition to the primary objective of evaluating the effectiveness of the developed educational innovation, the research team also sought to discover additional insights from the experimental group of teachers. Specifically, the team investigated knowledge that is considered experiential learning and reflective outcomes, which had been derived from practical implementation in the field. The noteworthy issues that merit discussion are outlined below:

The challenge, which was encountered, revolved around the difficulty in organizing the activities that encourage individuals with diverse needs or motivations to collaborate. This difficulty arose from variations in lifestyles or societal cultures among individuals and was compounded by the deeply ingrained traditional approach to teaching and management that is prevalent in schools, which predominantly emphasizes individuality over group or team dynamics. For instance, there was a pronounced emphasis on passive learning rather than active learning, as highlighted by Gabriel-Petit's (2017) perspective, which identified various organizational, cultural, and interpersonal barriers to collaboration. These barriers encompassed the following issues: a deficiency in respect and trust, divergent mindsets, inadequate listening skills, knowledge gaps, a lack of alignment regarding goals, internal competitiveness, information hoarding, organizational silos, and physical separation.

Hence, it was imperative to employ various approaches to develop Collaborative Leadership, which drew upon a multitude of options, as synthesized from the perspectives offered by Crosby (2017), Dunne (n.d.), Lau (n.d.), Linders (2017), Pewsey (2019), Rayis (2020), Tolson (2019), Viki (2017), Wilson (2019), and Witte (2012), among others. These approaches, which are detailed in the literature review section, encompassed approximately 60

methodologies (please refer to the details provided). Some of them can be executed easily and swiftly, while others may pose challenges and require a significant investment of time. Therefore, to foster sustainable Collaborative Leadership Skills, educators must exhibit dedication in identifying and addressing obstacles and issues, as articulated by Morten T. Hansen, who emphasized the following: "Organizations... often develop barriers that hinder information sharing and collaboration... The job of a leader is to spot these barriers and tear them down..." (Gabriel-Petit, 2017).

Nevertheless, despite the inherent difficulties and challenges associated with the natural course of developing any skills, the research findings indicated that the "Online Self-Training Program to Enhance Teacher Learning for Student Development: The Case of Collaborative Leadership Skills," which was developed through the R&D methodology, had demonstrated efficacy by the outlined research hypotheses. This holds for both the development of teachers' learning and the enhancement of skills. The results of the educational intervention, which aimed at applying the acquired knowledge to student development, demonstrated that the effectiveness of this educational innovation, derived from this research, had been affirmed. Therefore, it can be utilized to benefit both teachers and students in schools within the targeted population, with the potential for future dissemination of the research findings.

5. Recommendations

Regarding the practical application of these findings, the research team proposed that teachers should be aware of the main principles of Collaborative Leadership Skills, both in terms of using them to develop students and in terms of using them to remind yourself in your work, as Morten T. Hansen said: "Organizations...often develop barriers that hinder information sharing and collaboration. ... The job of a leader is to spot these barriers and tear them down...", with a particular focus on addressing issues related to a culture of individualism in the workplace that has been ingrained in a social context of authoritarianism for a long time. This involves actively enhancing a collaborative culture, as emphasized by Thuen (2016), who noted: "Perhaps the slowest and most challenging part of the process is adapting the culture over time. But, day by day, and task by task, positive reinforcement and dedicated practice of collaborative problem-solving techniques can yield long-term culture changes. At the onset, positive reinforcement may be required more regularly to help transition employee behavior. Once the 'knack' for collaboration is recognized though, achievement recognition thresholds can be raised." Furthermore, the endeavor includes seeking avenues to address those issues that are related to organizational silos, such as strengthening unity, building teams, creating multi-way communication systems, creating diverse teams, and building relationships with other departments, etc., as seen in the views of Gabriel-Petit (2017) who gave the following opinion: 1. Collaboration itself breaks down organizational silos because it helps people form bonds with people on other teams or in other functional groups or business units. 2. Collaborate across teams, functional groups, and business units. 3. Communicate across the entire organization. 4. Encourage the development of networks of people who can help one another and their teams, functional groups, and business units to bridge silos. 5. Ensure that people can talk directly to others at any level in the organization rather than having to go through a chain of command. 6. Provide centrally located places where people working in different functions can meet serendipitously—for example, in breakrooms with free food and beverages or areas with comfortable seating. 7. Establish multidisciplinary teams with members from various business units to collaborate on common practices, processes, and systems. 8. Involve people working in different disciplines in user research and usability testing. 9. Reward people for gathering information and feedback from multiple functions and business units and, thus, gaining broader perspectives.

In addition, teachers must cultivate the motivation to effectively and efficiently implement alternative suggestions, which can be utilized to develop Collaborative Leadership Skills. This motivation, which is particularly derived from an awareness of the benefits and significance of fostering Collaborative Leadership Skills within individuals as the research team has synthesized recommendations from the views of DiFranza (2019), Miller (n.d.), Taparia (2021), Torchio (2019), and Yvanovich (2021) as follows: 1. Cultivating a sense of cohesion, in which everyone feels like an integral part of the team. 2. Facilitating increased productivity, as individuals feel supported by their leaders and collaborate with them, as well as with people in other departments. 3. Enhancing commitment to work, which results in increased productivity and the generation of innovations. 4. Providing members with the opportunity to engage in new and diverse work, which fosters openness to new ideas. 5. Reinforcing positive relationships and increasing the motivation to work. 6. Shortening work durations by providing opportunities for collaborative problem-solving and by highlighting the capabilities of individual members. 7. Supporting the emergence of new ideas by encouraging creative and daring contributions and fostering a commitment to excellence. 8. Cultivating a cross-functional work culture, as well as fostering trust, mutual respect, and a shared dedication among team members to reach a common

goal.

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Authors contributions

Duangjai Thawilphrai was responsible for conducting every step of the research. Starting with studying research problems, designing research methods, creating innovations for use in research, conducting field research,

summarizing results and reporting research results. Associate Professor Dr. Wirot Sanrattana and Assistant Professor Dr. Phrasrivajiravati provided advice and consultation. in the research process. Duangjai Thawilphrai drafted the manuscript and revised it. Associate Professor Dr. Wirot Sanrattana and Assistant Professor Dr. Phrasrivajiravati approved the final manuscript.

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