



## The Learning Outcome Improvement of Quadratic Function with NHT-Type Cooperative Learning Assisted by Geogebra and Flipbook

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**Abstract:** This Collaborative Classroom Action Research (PTKK) aims to improve learning outcomes of quadratic functions through the NHT (Number Head Together) cooperative learning model assisted by geogebra and flipbooks for class X-5 students of SMA N 3 Salatiga. The subjects of this study were students of class X-5 with a total of 34 students consisting of 11 male students and 23 female students. PTKK consists of two cycles, namely Cycle I and Cycle II, each consisting of four stages: planning, action, observation, and reflection. Data collection techniques in this study used student learning outcomes tests and observations during the learning process in cycles I and II. The research instrument used was a description test consisting of 3 questions for each cycle and learning observations, which consisted of the learning process and students' responses to learning. The data analysis techniques used consisted of two types, namely descriptive qualitative methods and descriptive statistics. The study's results showed that using the NHT learning model with the help of GeoGebra and flipbooks can improve student learning outcomes. This is indicated by the percentage of classical completeness, which also increased from the pre-cycle of 67.65%. In the first cycle, it increased to 73.53%; in the second, it increased to 91.18%. This shows that the use of media can make a big contribution to the world of education.

**Abstrak:** Penelitian Tindakan Kelas Kolaboratif (PTKK) ini bertujuan untuk meningkatkan hasil belajar fungsi kuadrat melalui model pembelajaran kooperatif tipe NHT (Number Head Together) berbantuan geogebra dan flipbook bagi siswa kelas X-5 SMA N 3 Salatiga. Subjek penelitian ini adalah siswa kelas X-5 dengan jumlah siswa 34 siswa yang terdiri dari 11 siswa laki-laki dan 23 siswa perempuan. PTKK ini terdiri dari dua siklus yaitu Siklus I dan siklus II yang setiap siklusnya terdiri dari empat tahapan diantaranya perencanaan, tindakan, observasi, dan refleksi. Teknik pengumpulan data dalam penelitian ini menggunakan tes hasil belajar siswa dan observasi selama proses pembelajaran berlangsung pada siklus I dan siklus II. Instrumen penelitian yang digunakan yaitu berupa tes soal uraian dan observasi pembelajaran yang terdiri dari proses pembelajaran dan respon siswa terhadap pembelajaran. Teknik analisis data yang digunakan terdiri dari dua jenis yaitu metode deskriptif kualitatif dan statistika deskriptif. Berdasarkan hasil penelitian menunjukkan bahwa penggunaan model pembelajaran NHT berbantuan geogebra dan flipbook dapat meningkatkan hasil belajar peserta didik. Hal ini ditunjukkan dengan persentase ketuntasan klasikal juga mengalami kenaikan dari pra-siklus 67,65%, siklus I meningkat 73,53% dan pada siklus II meningkat 91,18%. Hal ini menunjukkan bahwa penggunaan media dapat memberikan sumbangsih yang besar bagi dunia pendidikan.

## A. Introduction

The twenty-first-century experiences globalization. This indicates that human life has various and unique fundamental changes within the life order compared to the previous century. Some important skills for the 21<sup>st</sup> century are familiar with 6C, based on the [Montessori et al \(2023\)](#) and [Anugerahwati \(2019\)](#). The skills are character, citizenship, critical thinking, creativity, collaboration, and communication. In this century, mathematics becomes a lesson to develop critical, analytic, logical, creative, and systematical thinking skills based on the 6C skills ([Yusuf, 2023](#)).

Mathematics is an important lesson for daily routine. The implication of mathematics skills deals with calculation and logical and critical reasoning to solve real-life non-routine questions or problems ([Fathani, 2016](#)). The successful indications of learning mathematics for learners are the personal improvements based on cognitive outcomes ([Nugraha et al., 2020](#)). Learning outcomes rely on the learning success of the learners. Learning outcomes are valuable references to learners' cognitive levels after joining mathematics learning and learning success.

Mathematics is a complex lesson to understand. The preliminary observation of the teachers, from March to April 2023, found that the tenth graders of X-5 at Public SHS 3 Saratoga needed help understanding the material of equations and quadratic functions. The learners had these difficulties because they lacked the creativity and imagination to visualize the forms of the parabolic curve based on the quadratic functions, such as determining the cut-off point of the X-axis and Y-axis, determining the symmetrical axis, determining the optimum value, and determining the turning point coordinate. The interview results with the learners found that they had difficulties finding the cut-off coordinate and drawing the quadratic function. The pre-cycle test also found that 34 tenth-grade learners obtained an average test score of 62.79, with a maximum score of 100 and a minimum score of 60. Learners that could achieve the minimum standard mastery score were 13, 38.24%. The other 21 learners, 61.76%, needed help to meet the accomplishment criteria. The preliminary observation also found that the learners were passive. They rarely asked, responded, or answered the given questions. Therefore, the effort to involve the learners' participation and to improve the learning outcomes was with NHT-type cooperative learning.

The NHT, Number-Head-Together cooperative learning is useful to influence the interaction pattern of the learners. Thus, the NHT-type cooperative learning model provided opportunities for the learners to share arguments and determine accurate answers ([Nursiah & Kristanti, 2020](#)). [Muliandari \(2019\)](#) explains that the primary feature of the NHT-type cooperative learning model is - the number labeling for all learners to understand the given materials and to take responsibility for the member numbers. NHT type cooperative learning model applies six phases: a) phase 1: labeling the number, b) phase 2: giving the question; c) phase 3: Thinking together; d) phase 4: answering the question; e) phase 5: drawing conclusion; and f) phase 6: appreciating. This learning model could improve the learners' activities and learning outcomes ([Puspahita, 2019](#)). [Fahreza et al \(2020\)](#) also found

that NHT could improve the confidence, understanding, cooperation, and learning outcomes of learners with low learning outcomes.

The combination of the NHT cooperative learning model applies to technology-based learning media. Examples of the applicable learning media are Geogebra and Flipbook. These learning media are practical, efficient, flexible, and interesting to motivate the learners' learning intention. Geogebra could facilitate the learners to visualize the quadratic function, while Flipbook facilitates learners to learn autonomously with an e-module. Besides that, Geogebra could facilitate learners to understand the quadratic function. On the other hand, Flipbook could make the learners more motivated and interested while reading the materials and questions than paper-based media. NHT-type cooperative learning, assisted by Geogebra and Flipbook, could be the alternative to manage the learning problems of the tenth graders at X-5 of Public Senior High School 3 Salatiga.

Geogebra is a learning application to learn geometry and to create dynamic mathematics objects. This application could connect the mathematics concept with visualization or figure. Thus, learners could understand the complex materials and explain the given materials (Asngari, 2015). The implementation of Geogebra also influenced and effectively improved the learners' mathematics skills and learning outcomes. Therefore, Geogebra is practical for learning quadratic functions and equations.

Flipbook is another medium to attract learners, create a conducive learning environment, and improve learning outcomes. Flipbook is software to convert a PDF file into an electronic book with audio, figures, animation, and video (Hasanah et al., 2020). Flipbook is a solution to create a joyful, communicative, and supportive atmosphere for better learners' understanding. Implementing Flipbook for learning could attract the learners' attention and improve the creative thinking skills of the learners (Selvia et al., 2016). Flipbook media could facilitate learning while reading the ebook (Haryanti & Saputro, 2016).

Based on the explanations, the research objectives are 1) describing the mathematics learning process about quadratic function with NHT type cooperative learning model assisted with Geogebra and Flipbook and 2) describing the learning outcomes of the learners on the material of quadratic function with NHT type cooperative learning assisted with Geogebra and Flipbook for the tenth graders.

## B. Method

The applied research design was collaborative classroom action research. Castro Garcés & Martínez Granada (2016) explain that collaborative classroom action research involves teachers cooperating and evaluating their pedagogical practices. This collaborative classroom action research facilitates the further development of teachers in the future. Paizaluddin & Ermalinda (2016) assert that collaborative action research could manage classroom problems and improve learning effectiveness.

The current research subjects comprised 34 learners from X-5 of Public SHS 3 Salatiga. There were 11 males and 23 females. The researchers carried out the research during the even semester in the academic year of 2022/2023. This collaborative classroom

action research lasted within two cycles based on the Kemmis & McTaggart model, starting from planning, acting, observing, and reflecting (Asrori & Rusman, 2020). Each research cycle lasted two meetings. Here are the steps:

**Table 1.** The Cycle Division of the Research Method

CYCLE I	Planning	The researchers identified the learning problems during the pre-cycle and created a learning plan to improve the learning promotion and to create teaching modules, questions, and assessment criteria (March 29 - 30, 2023).
	Action	The plan's action was based on the syntax of NHT assisted with Geogebra and Flipbook. The teacher grouped the learners into some groups and labelled every member with a number. Then, the teacher shared a worksheet and link to the question card via Flipbook. Then, the learners had to solve the questions collaboratively. After that, the learners had to present the answers in front of the classroom. The teacher and the learner confirmed the answers by demonstrating the question solution with Geogebra and asked the learners to practice independently.
	Observing	The teacher processed the learners' test results and created statistical data, starting from the maximum score, minimum score, mean, and accomplishment (April 6, 2023).
	Reflecting	The researcher and teacher reflected on the oktest results of the learners and the observation results of the learning (April 7, 2023). Then, the researcher and teacher adjusted the observation and reflection results based on the indicators of success.
CYCLE II	Planning	The researcher determined the occurring problems based on cycle I. Then, the researcher revised the learning step and created a teaching module, worksheet, question, and assessment criteria (April 9-11, 2023).
	Acting	The teacher carried out the learning based on the NHT syntax and assisted with Geogebra and Flipbook. The teacher grouped the learners into some groups and labelled every member with a number. The learners received question cards in the form of Flipbook via link. Then, they had to solve the questions collaboratively. The learners might solve the questions with the Geogebra application. After that, the learners had to present the answers in front of the classroom. The teacher, along with the learners, confirmed the answers and concluded.
	Observing	The teacher processed the learners' test results and created statistical data, starting from the maximum score, minimum score, mean, and accomplishment (Saturday, April 15, 2023).
	Reflecting	The researcher and the teacher reflected on the test and observation results (April 16, 2023). Then, the researcher and teacher adjusted the observation and reflection results based on the indicators of success.

The researchers collected the data with a learning test and observed the process during the applied cycles, cycles I and II. The applied instrument was an essay question with three items as the test. In cycle I, the researcher provided the question about quadratic

function, and the learners had to determine the cut-off point between the X-axis and Y-axis, the symmetrical axis of the curve, the optimum value of the curve, and the peak point coordinate of the curve. In cycle II, the questions dealt with quadratic functions based on daily life. The learners had to determine the optimum height of a vertically shot bullet, the required period of the thrown object to return to the ground, and the maximum production cost of the product. The observation sheet consisted of how teachers promoted the learning process and the learners' responses toward the promoted learning. The observers filled out the observation sheet based on the real situation in the classroom. Then, the researchers analyzed the data descriptive-qualitatively to explain the reflection result of the learning cycle. The researchers also described statistically the research data results, maximum score, minimum score, mean, and accomplishment. The proposed indicators of success in this research, for cycle I and cycle II, were a minimum mean score of 80.00 with an accomplishment percentage of 80% based on the applied minimum mastery standard of mathematics lessons at Public SHS 3 Salatiga, 75.

## C. Result and Discussion

### Result

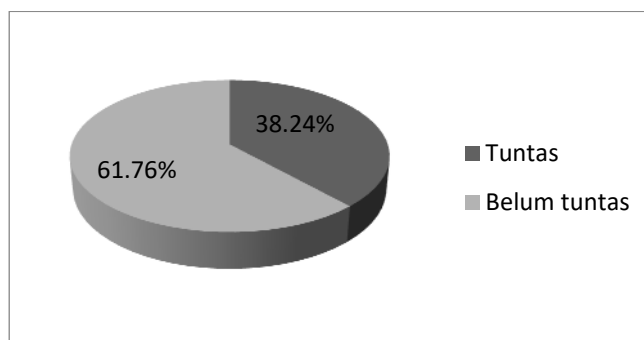
This collaborative classroom action research consisted of three cycles.

#### 1. Pre-cycle

The initial situation of the research is based on the observation and test results promoted by the researchers and the teacher. The learners received materials about determining the root of a quadratic function and drew the quadratic function graphic. Then, they worked on the questions. This matter was useful in identifying the learners' weaknesses and problems while learning the materials. The pre-cycle data showed that 61.76% of learners needed to meet the accomplishment criteria. Thus, improving the learning outcome required different learning models and media.

The reflection results found that the promoted learning went smoothly. The learners were also happy to join the lesson. Unfortunately, the learners did not know how to determine the root of the quadratic function and correctly draw the graphic of a quadratic function. The researchers found that most learners had difficulties determining the cut-off point of the quadratic function and the coordinate on the Cartesian coordinate. They could not draw the curve based on the questions and read it correctly. However, the learners were feeling joyful because they learned with the assistance of worksheets. They found the worksheet slightly facilitated the learners to answer the questions, although the answers needed more accurate.

From the test at the end of the class, the researchers found that 23 learners, 67.65%, could reach the accomplishment criteria. On the other hand, 11 learners, 32.35%, could not reach the accomplishment criteria. The obtained mean score was 78.24. Here is the percentage of the learners' accomplishments during the pre-cycle.



**Figure 1.** The Accomplishment Percentage on Pre-Cycle

Tuntas: accomplished
Tidak tuntas: unaccomplished

The pre-cycle test on 34 learners of the X-5 class showed a mean score of 62.79, with a minimum score of 60 and a maximum score of 100. Learners that could achieve the minimum standard mastery score were 23, 38.24%. The other 11 learners, 61.76%, needed help to meet the accomplishment criteria. The results showed that the accomplishment percentage was low and required further revision to improve the learning outcomes.

Based on the reflection and the learning outcome results, the researchers took an alternative to improve the learning outcomes with NHT-type cooperative learning. The researchers also used Geogebra to facilitate the learners in understanding the questions about quadratic functions and equations. The researchers also used Flipbook as the mode for the learners to learn the material joyfully because Flipbook was interesting, innovative, and creative. The steps to use the selected model and media could improve the learning outcomes.

## 2. Cycle 1

Based on the pre-cycle test result, the researcher revised the learning step for cycle I. In this cycle, the applied learning model was NHT assisted with Geogebra and Flipbook. The applied material in the pre-cycle was associated with the quadratic function figure assisted with the table. Then, the follow-up material was with a common formula to draw the quadratic function.

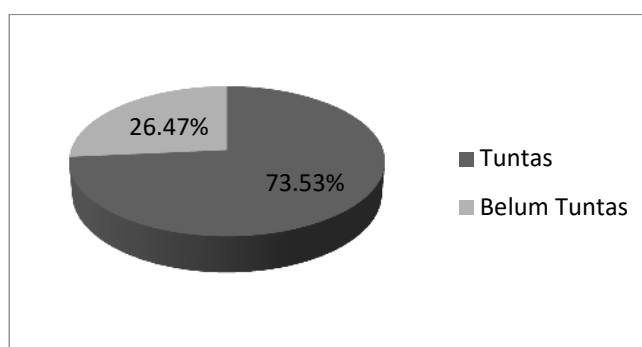
The initial learning process began with phase 1) labelling the number. The researchers grouped the learners into a group of 4 to 5 members and labelled them based on the question numbers; 2) sharing the questions, the learners received questions based on the numbers of the groups. The questions were presented via Flipbook; 3) Thinking together, the learners had to work on the questions based on the grouping in the number labelling phase. Each group had to ensure all members understood and knew the question solutions. The teacher-guided each group and ensured all group members worked on the questions in each group. In this phase, the meeting only ran once until the phase of thinking together. Then, the researchers continued the activity the next day due to limited learning time.

The researchers continued the entailing phases of cycle I in the second meeting. In phase 4) answering questions, the teacher asked the representatives of the numbers from each group to go in front of the class and present the works while the other groups responded. 5) conclusion, all members presented the answers from their groups while the teachers concluded the most accurate answer; 6) acknowledging the teachers acknowledged the best group that answered the questions correctly and got the highest score. The teacher motivated the learners to learn and train in solving questions related to quadratic function graphics.

Before ending the lesson, the teacher explained the quadratic function solution with the Geogebra application. The researchers used Geogebra once the learners mastered the basic concept and used the formula manually. This mechanism is important to ensure the learners' solving mastery based on the theory before applying innovative media, such as Geogebra, to improve the effectiveness. The teacher provided one example of solving the question with a Geogebra application. The teacher explained the changes in the quadratic function curve if the coefficient values were changed. With this example, the learners could find the cut-off point between the X and Y axes, the peak and symmetrical axes. Then, the teacher asked the learners to practice the solving step on their gadget so they could explore the characteristics and the questions about quadratic functions independently. After that, the teacher shared the question test to measure the cognitive levels of the learners about the given material. The questions consisted of three essay items about the quadratic function graphic. Then, the teacher asked the learners to determine the cut-off point of the X-axis and Y-axis, the symmetrical axis on the curve, the optimum value on the curve, and the peak point coordinate of the curve.

Then, the teacher and researchers reflected on the learning results taught by NHT and assisted with Geogebra and Flipbook during the cycle I implementation. The result showed excellent implementation with minor hindrances. An example of hindrances was that some learners' smartphones needed help accessing Geogebra. Thus, the learners needed help to learn. In this case, the researchers recommended the learners join the other friends so that they could keep their attention on the material explanation. The researchers expected this solution to facilitate the learners' question-solving. The learners were joyful when they worked on the questions using Geogebra. They could directly find the cut-off point of the coordinate axis, symmetrical axis, and the peak point of the curve after typing the quadratic function in the Geogebra application.

The researchers found the classical accomplishment mean of 80.00 based on the test result. The accomplishment percentage reached 73.53%. Figure 2 shows the results.



**Figure 2.** The Graphic of Cycle I Accomplishment

Tuntas: accomplished  
Tidak tuntas: unaccomplished

The test result in cycle I, from 34 learners of X-5, found the mean score was 80.00, with a maximum score of 100 and a minimum score of 60. Learners that could achieve the minimum standard mastery score were 25, 73.53%. The other 9 learners, 26.47%, needed help to meet the accomplishment criteria. The result showed a mean score of 80.00, and the percentage of the learners' accomplishments was lower than 80%. Therefore, the learning process should be improved in cycle II.

### 3. Cycle II

The results of the cycle I showed the learning accomplishment was lower than 80%. Thus, the researchers and the teacher had to promote cycle II. The applied syntax remained the same as in cycle I. The applied materials were - associated with the common formula to draw the quadratic function (cycle I) and the implementation of a quadratic function in daily life.

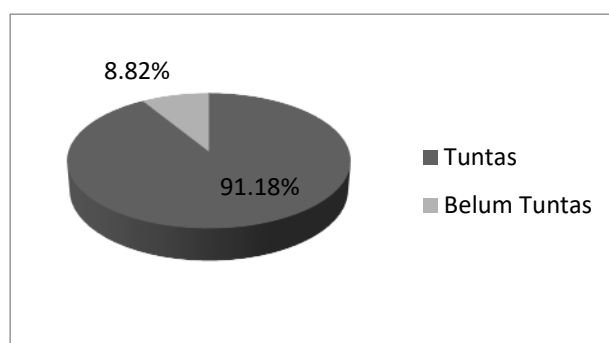
The initial learning process began with phase 1) labelling the number, the researchers grouped the learners into a group of 4 to 5 members and labelled them based on the question numbers; 2) sharing the questions, the learners received questions based on the numbers of the groups. The questions were presented via Flipbook; 3) Thinking together, the learners had to work on the questions based on the grouping in the number labelling phase. Each group had to ensure all members understood and knew the question solutions. The teacher-guided each group and ensured all group members worked on the questions in each group. While working on the questions, the teacher allowed the learners to use Geogebra as the answer control. In this phase, the meeting only ran once until the phase of thinking together. Then, the researchers continued the activity the next day due to limited learning time.

The researchers continued implementing cycle II on the second meeting with phase 4) answering the question. The teacher asked the representatives of each group to present their work while the other groups responded. 5) conclusion, all members presented the answers from their groups while the teachers concluded the most accurate answer; 6) acknowledging the teachers acknowledged the best group that answered the questions

correctly and got the highest score. The teacher motivated the learners to keep studying and practising to solve related problems with quadratic functions.

Then, the teacher and researchers reflected on the learning results taught by NHT and assisted with Geogebra and Flipbook during the cycle II implementation. The result showed excellent implementation. The learners solved the question with the given formula by the teacher. They also could use Geogebra to ensure their answer accuracy. Learners felt happy while practising with Geogebra as the learning media. They could receive a clear explanation and look at the figures directly. The learners encountered difficulties when they attempted to solve a question about the maximum production of a factory. They needed clarification about the applied quadratic model in the form of fractions. The teacher explained that the solution to work on fraction equations required the learners to change the fraction. The method was - multiplying the denominator of the fraction. After receiving the explanations from the teachers, the learners could understand and work on the questions.

At the end of the lesson, the teacher provided a test consisting of three items: determining the optimum height of a vertically shot bullet, the period of the vertically shot bullet to return to the ground, and the optimal production cost of a product. The obtained mean score was 82.21 with the following classical accomplishment.



**Figure 3.** The Graphic of Cycle II Accomplishment

Tuntas: accomplished
Tidak tuntas: unaccomplished

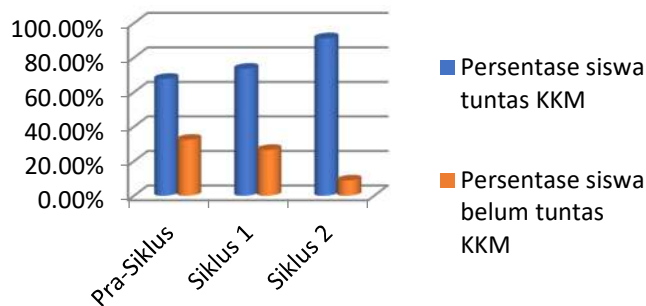
The test results of cycle II, from 34 learners of X-5, found a mean score of 82.21 with a maximum score of 100 and a minimum score of 60. Learners that could achieve the minimum standard mastery score were 31, 91.18%. The other 3 learners, 8.82%, needed help to meet the accomplishment criteria. From the results, the obtained mean score of 82.21 and the percentage of accomplishment higher than 80%, the researchers concluded that the revised learning in cycle II was successful.

#### 4. The Comparison Among the Cycles (Pre-Cycle, Cycle I, and Cycle II)

From the results, the obtained initial data was 78.24 (67.65%), indicating poor learner skills in quadratic functions and equations. This matter encouraged the researchers to

improve learning by applying the NHT-type cooperative learning model assisted with Geogebra and Flipbook.

The researchers compared the calculation of the accomplishments from pre-cycle, cycle I, and cycle II with the mean score of learners reaching the accomplishments and those not. The following figure shows the learning outcome data of the learners from pre-cycle, cycle I, and cycle II.



**Figure 4.** The Percentage Comparison of the Learners' Accomplishments During the Pre-Cycle, Cycle I, And Cycle II

Pra-siklus = pre-cycle  
 Siklus 1 = cycle 1  
 Siklus 2 = cycle 2

persentase siswa tuntas KKM = the percentage of learners achieving the minimum mastery standard  
 Persentase siswa tidak tuntas KKM = the percentage of learners achieving no minimum mastery standard

Table 2 shows the mean score comparison of the test results and the percentage of the learners' accomplishments from pre-cycle, cycle I, and cycle II.

**Table 2.** The Comparisons Among the Pre-Cycle, Cycle I, and Cycle II Results

	Pre-Cycle	Cycle 1	Cycle 2
The mean score	78,24	80	82,21
The percentage of learners reaching the minimum mastery standard	67,65%	73,53%	91,18%
The percentage of learners under the minimum mastery standard	32,35%	26,47%	8,82%

Table 2 shows the percentage increment of the learners' accomplishments on each cycle based on the test results. The data also show that the classical accomplishment on cycle I reached a lower percentage than 80%. Thus, the researchers had to carry out cycle II. In cycle II, the classical accomplishment reached more than 80%. Thus, the researchers stopped the research cycle.

## Discussion

The results found the positive influence of NHT-type cooperative learning on the learners' learning outcomes. Group learning, collaborative discussion, peer teaching, and answer confirmation were useful for the learners. This learning process provided an effective learning situation and improved the interactive pattern among the learners. Hamdani (2010) and Puspita (2019) explain that NHT-type cooperative learning is learning to influence the interaction pattern of the learners. This model provides various activities for the learners to review the lesson. The learning model also applies a labelling strategy for every learner with different numbers that become the learners' responsibility to solve and share. They must also ensure that the teammates understand the materials and solve the questions.

The implementation of NHT-type cooperative learning, with Geogebra and Flipbook, facilitated the learners to imagine the curve in a real manner. This mechanism facilitated the learners to improve their mathematical reasoning skills (Unisty & Jaenudin, 2021). In cycle I, the teacher shared the application, Geogebra, after the learners worked on the questions and discussed. This mechanism was important to ensure the learners knew the steps of solving the material. Then, the implementation of Geogebra was useful to improve the outcomes (Vinsensia et al., 2022). The learners also received detailed explanations about Geogebra by directly using the application on the learners' smartphones. In cycle II, the teacher asked the learners to use Geogebra independently by giving three questions to solve. From all questions, the learners did not encounter difficulties to use the application. They also could review the characteristics of the drawn curve correctly with Geogebra. Based on this observation, Geogebra facilitated the learners to confirm and draw conclusions about the characteristics of quadratic functions by clearly observing the curve.

The material delivery with Flipbook media also influenced the learning process because the learning process became more attractive. This matter made the learners motivated to participate in the learning. Any attractive activity encouraged learners to joyfully learn in the class. Flipbook, in this research, consisted of materials and questions to solve by the learners while discussing with their groups. Flipbook became the solution to create a joyful, communicative, and supportive atmosphere for the learners (Vikiantika et al., 2022). Flipbook media could facilitate the learning process while reading the ebook (Hasanah et al., 2020). When the learners used Flipbook on their smartphones, they could reduce the frequency of playing games while learning. Thus, the learning process with smartphones would be optimum. In this research, the learners could not run their games on their phones because they had to use Flipbook to work on the given questions. This matter became the additional benefit of using Flipbook in the learning process (Halim et al., 2023).

Based on the current and previous results, implementing a new model for the learners to learn the materials collaboratively with peer learning facilitated the material cognition of the learners. The applied applications, Geogebra and Flipbook, could also improve the learning outcomes of the learners in visualizing the mathematics objects. Based on these findings, teachers should facilitate the learners' learning necessities by improving

their skills, designing excellent learning, and applying effective, efficient, and optimum media. Based on cycle I and cycle II, implementing an NHT-type cooperative learning model with the assistance of Geogebra and Flipbook could improve the learning outcomes of the tenth graders at Public SHS 3 Salatiga. The evidence was the increased mean score of classical accomplishment from cycle I to cycle II, with a percentage of 17.65%.

#### D. Conclusion

Based on the research results, the researchers concluded the following matters: Implementing an NHT-typed cooperative learning model with Geogebra and Flipbook could improve the learners' learning outcomes about quadratic functions. The evidence showed the improved mathematics learning results of a quadratic function from the pre-cycle, cycle I, and cycle II. The mean score of the pre-cycle was 78.24. The mean score improved to 80.00 in cycle I and 82.21 in cycle II. The statistic test also found that this NHT-type cooperative learning with Geogebra and Flipbook was effective for learning. The evidence was the classical accomplishment with improvements from the pre-cycle with 67.65% into 73.53% in cycle I and 91.18% in cycle II.

Implementing NHT-typed cooperative learning with Geogebra and Flipbook had some implications for the educational field's future research. Selecting an appropriate learning model should consider the learners' interests. This action is important to activate the learners' participation in learning and use the technology maximally. The learners could also understand the materials and solve the given problems with the application. This result showed that implementing the NHT-type learning model with Geogebra and Flipbook could strongly contribute to educational field development.

From the results, the researchers recommend future research to encourage teachers to use the developed media. Schools must also support every teacher to develop the teaching material, teaching media, and learning innovation to improve the quality of the learning and the teachers. On the other hand, the researchers expect future researchers to use the current results as a reference to create other media for other materials. Thus, they could meet the necessity to create qualified education.

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