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Statistics Flip-Worksheet: The Key to Improve Students' Critical Thinking Skill

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Abstract

The addition of flip-worksheets to the statistics curriculum is anticipated to enhance students' capacity for critical thinking. This research is a development research that aims to create a worksheet supported by a Flipbook that is reliable and useful for teaching statistics and could influence students' critical thinking skill. Some exercises and open-ended questions from the provided infographics are included in the Flip-Worksheet. The worksheet uses mean, median, and modus material. The flip-worksheet was created during a formative evaluation stage with 15 junior high school students in the eighth grade. Data was analyzed using walkthroughs, questionnaires, interviews, and document reviews. According to the validation results, Flip-Worksheet is extremely valid in terms of media (89.58%), and it is valid in terms of material (79.43%). The practicality percentage was 90.74%. It is in an interval between 80% - 100% which falls into the very practice category. The N-gain value was 0.71. The grade VIII student's capacity to think critically increased as a result of using the Flip-worksheet which had high criteria. Additionally, based on the document analysis of students' responses about the process of interpretation, analysis, assessment, inference, explanation, and self-regulation on a variety of critical thinking tasks, it may have the effect of developing students' critical thinking abilities. It can be used as a learning medium and can develop critical thinking skills needed in the 21st century. It is hoped that next studies of learning media will be conducted in the future to enhance critical thinking abilities with other technologies.

Keywords: worksheet, statistics, flip-worksheet, critical thinking skill

Abstrak

Pengintegrasian Flip-Worksheet pada materi statistika diharapkan dapat meningkatkan kemampuan berpikir kritis siswa. Penelitian ini merupakan penelitian pengembangan yang bertujuan untuk menghasilkan lembar kerja siswa berbantuan Flipbook yang valid dan praktis untuk pembelajaran statistika yang berpengaruh terhadap kemampuan berpikir kritis siswa. Flip-Worksheet ini berisi beberapa aktivitas dan pertanyaan terbuka dari infografis yang disajikan. Materi Flip-Worksheet adalah rata-rata, median, dan modus Flip-Worksheet dikembangkan melalui tahap evaluasi formatif yang melibatkan 15 siswa kelas 8 SMP. Data dikumpulkan dan dianalisis dengan menggunakan lembar validasi, kuesioner, pedoman wawancara, dan analisis dokumen. Berdasarkan hasil validasi, Flip-Worksheet sangat valid dari segi media (89,58%), dan valid dari segi materi (79,43%). Persentase kepraktisan sebesar 90,74%. Berada pada interval antara 80% - 100% yang masuk dalam kategori sangat praktis. Nilai N-gain sebesar 0,71. Kemampuan berpikir kritis siswa kelas VIII meningkat akibat penggunaan Flip-worksheet yang mempunyai kriteria tinggi. Selain itu, berdasarkan analisis dokumen respon siswa tentang proses interpretasi, analisis, evaluasi, inferensi, eksplanasi, dan regulasi diri terhadap berbagai soal latihan berpikir kritis dapat memberikan pengaruh terhadap pengembangan kemampuan berpikir kritis siswa. Sehingga Flip-Worksheet ini dapat digunakan sebagai media pembelajaran yang dapat mengembangkan kemampuan berpikir kritis yang dibutuhkan pada abad 21. Diharapkan kedepannya dapat dilakukan kajian terhadap media pembelajaran untuk meningkatkan kemampuan berpikir kritis dengan teknologi lain..

Kata kunci: lembar kerja peserta didik, statistika, flip-worksheet, berpikir kritis.

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Introduction

The use of multimedia in the classroom has the power to revolutionize the way people learn. Worksheets with visual and graphic features are particularly excellent for learning and have the potential to be used as a guide in multimedia lessons. (Sanova et al., 2022). One of them is Flip-worksheet, multimedia that developed from worksheet with ease of reading and learning without carrying thick paper. The virtual worksheet based on Flip-worksheet has an impact on improving learning outcomes, especially in learning digital basics (Sugianto et al., 2022). It is the way to implement digital technology in education. Digital technology change the situation from offline to online environment (Sanova et al., 2022). The digital technology also change live from traditional to modern (Sailer et al., 2021). The flip-worksheet connects the concepts of time and space constraints in the classroom (Jemudin et al., 2019). This shows that the development of flip-worksheet is important in learning based on some of this research.

Researchers have been interested in creating related media with various foci and content as a result of the use of students' worksheets as flip-worksheets in recent years. For example, Flip-worksheets were created to enhance learning outcomes in chemistry (Herawati & Muhtadi, 2018), physics (Marlina, Leni & Gelby Pradina Paramitha, 2022), and computers (Prasetyono & Hariyono, 2020). Flip-worksheets have been utilized extensively in development research and trials, notably in the field of mathematics, to examine how well they can enhance learning outcomes (Andini et al., 2018; Fahmi et al., 2019; Marianti et al., 2022; Mulwanti et al., 2022), through mathematical creative thinking (Setiyani et al., 2022), mathematical communication (Selvia et al., 2016), and mathematical representation (Baroroh & Fitriana, 2022). This study is designing a flip-worksheet to enhance critical thinking abilities based on the analysis..

Developing critical thinking skills is crucial for Indonesian students. It's because the internet has replaced other sources of information as the primary means of communication in today's society, which is undergoing rapid change and is based on the knowledge economy (Sanova et al., 2022). Critical thinking and media literacy have emerged as crucial abilities as the consequences of fake news have grown to be a significant problem. Employers want workers to distinguish between information that is helpful and information that is not, as well as to put new knowledge into practice (Scheibenzuber et al., 2021). No matter the field that requires independent thought and the capacity to create conclusions after taking into account many viewpoints, critical thinking is crucial since it enables us to comprehend information and assess its reliability (van Laar et al., 2019). In summary, it is a higher-order thinking skill that involves problem-solving, decision-making, and creative thinking (Facione, 2015). So that, Indonesian student need to improve critical thinking skill.

The process of learning might help one develop their critical thinking abilities. Institutions of education are required to support their students' growth in critical thinking abilities through the teaching process (Thorndahl & Stentoft, 2020). So, rather than telling pupils what to think, teachers should teach them how to think (Power & Velez, 2020). Critical thinking is a process that involves delving thoroughly into data in order to draw appropriate conclusions through inquiry, discovery, experimentation, and other methods that can dramatically increase students' knowledge (Wahyuni et al., 2019). In addition, critical thinking skills also include students' abilities in analyzing questions, focusing on questions, identifying and determining solutions, writing answers and conclusions (Khotimah et al., 2021). Because they are fundamental to comprehending mathematical topics, critical thinking abilities in students should be developed throughout the learning process (Setiyowati & Shodikin, 2022; Dewi et al., 2013). Building an argument, evaluating the reliability of information, or coming to judgments all require the use of critical thinking skills (Fisher, 2019)

Several studies have been done, such as the study of Firdaus & Wilujeng (2018), which resulted in the development of the student flip-worksheet with the theme Gunung Meletus According to the

study's findings, students' critical thinking abilities have improved. The research was then carried out by Sari and Bharata (2021) that creating a student flip-worksheet on circular material. The findings of his research showed that students' critical thinking abilities improved after using student worksheets in learning, with all critical thinking indicators improving. This Finding demonstrates how student flip-worksheets might raise students' capacity for critical thought (Sari, 2021).

The material discussed in Flip-worksheet is statistics in eighth grade. To comprehend data that frequently appears in different mediums, statistical material is required. Students need essential materials like statistics in order to function on a daily basis. However, it is still common to find students who are not doing at their best academically. As a result, when engaged in learning, they are less critical and active. When answering statistical issues, students frequently make factual, conceptual, theoretical, and procedural errors (Agustiva et al., 2016).

Flip-worksheet has many advantages in learning process. According to (Asmadi, 2006), One of the flip-worksheet's benefits was an interactive tool designed to make the work of educators easier in the classroom. Students can learn happily and without getting bored. A cutting-edge learning tool to assist learning goals was the flip-worksheet. Flip-worksheets can therefore be used as a substitute teaching tool to encourage students to participate more actively in lessons that aim to develop their critical thinking abilities (Prasetyono & Hariyono, 2020). FlipbookPDF.net is one of the websites that makes it easier to create flip-worksheets, and teachers can access it for free. The benefit of flip-worksheets is that they may be completed and given straight to the teacher. In this development research, researcher wants to combine flip-worksheet technology with infographics issue to increase critical thinking skill in statistics material.

Based on the description of the problems above, the purpose of this research is to develop Flip-worksheet on statistics material to improve the critical thinking skills of junior high school students in terms of validity, practicality, and effectiveness.

Method

Research Design

Formative evaluation is used in this design research style of development study. According to Tessmer (Tessmer, 2013), the stages include the preliminary stage, self-evaluation, expert evaluations, one-on-one, small group, and field test. Media can be said to be appropriate if it meets three aspects of criteria, namely validity, practicality and effectivity. In order to improve students' critical thinking abilities, this study attempts to generate student statistical flip-worksheets. Students in the eighth grade who had taken statistical mathematics courses served as the study's subjects. There are three persons working one-on-one, two small groups of three people each, and fifteen people participating in the field test in groups of five. A formative evaluation flow is shown in Figure 1 as follows.

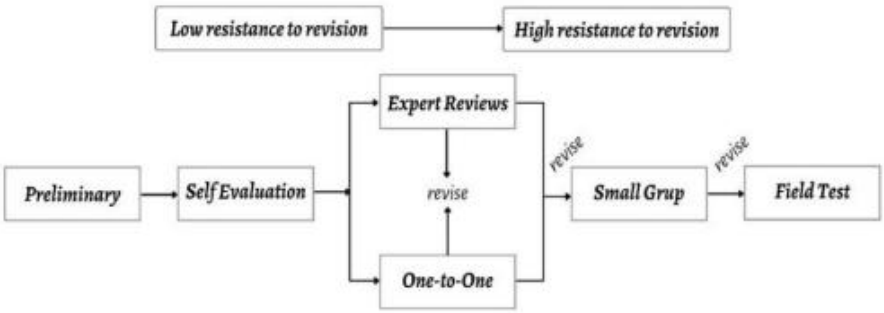

Figure 1. Formative evaluation flow (Tessmer, 2013)

The stages of constructing the worksheet can be seen as the following:

Preliminary Stage

This preliminary stage consists of two stages of research that is analysis and design.

- Analysis stage
  The researcher will make numerous preparations during this analysis stage, including choosing the location for the research and carrying out the analysis, which includes student analysis, curriculum analysis in junior high schools, and material analysis by collecting research instruments.
- Design Stage
  At this stage, the researchers developed student statistics flip-worksheet to increase junior high school students' mathematical critical thinking skill.

Formative Evaluation Stage

- Self-Evaluation
  A self-evaluation of the initial prototype design was done in this step to identify its advantages and disadvantages. Prototype I is what came out of this stage's revision. Along with creating student worksheets, the researcher also created validation sheets, interview guidelines, student answer surveys, and students' pretest questions.
- Expert Review and One-to-One Stage
  Prototype I was approved by two media and material experts—two lecturers in mathematics education and one math teacher—during the expert review stage. At this point, the appropriateness of the student worksheet will be checked against the content, construct, and language. The worksheet was also examined to see if it included the critical thinking indicators, which include self-regulation, interpretation, analysis, and evaluation (Facione, 2015).
  Prototype I is employed as a testing tool during the one-to-one stage. Three eighth graders who have studied statistical mathematics and heterogeneous mathematics ability that high, medium, and low will be tested individually during the one-to-one stage.. Furthermore, the revision results at the expert review stage and one-to-one are valid worksheet. This valid worksheet becomes prototype II.
- Small Group
  In the small group stage, the second prototype modified from the expert reviews and one-to-one stages was tested using two groups of students, each composed of three heterogeneous kids depending on their math daily test results' results of high, medium, and low skills. A worksheet that is legitimate and useful is the prototype III, which was developed from this stage.
- Field Test
  At the field test stage, the third prototype was tested to 15 students of eighth grade that divided by 3 groups, each group consisted by 5 students. Students given the worksheet. Before giving the worksheet, students gave a pretest. The score of pretest and posttest were used to know the effectiveness of flip-worksheet to increase critical thinking skills.

Data Sources

Students in the eighth grade who have been given statistics reading material are the focus of this study. According to the results of the math daily test, there were 3 kids who were subject overall. These children had high, medium, and low abilities. These students are conducting a one-on-one evaluation to get feedback from other students while utilizing the Flip-Worksheet. In a small group evaluation, there were two groups of students, each with three diverse individuals depending on ability levels (high, medium, low), and there was a field test with 15 eighth graders divided into three groups, each with five students.

Data Collection

Data for this study was collected through walkthroughs, questionnaires, interviews, and test scores. The data collection process is used at the walkthrough stage to evaluate the validity of the student worksheet by obtaining validation data from experts and teachers. The data gathering process was utilized during the interview stage to pinpoint problems with the student worksheet that had been created and to get input and ideas from students to determine the worksheet's applicability. By delivering a questionnaire to the students, the method for gathering data was used to determine the applicability of the developed student worksheet. The data collection technique was employed at the test data stage to assess students' capacity for mathematical critical thinking with regard to statistical content.

Data Analysis

Walkthrough given to experts analyzed descriptively by considering comments/suggestions given. The data that gotten for revising the flip-worksheet so that flip-worksheet is valid. At this step, descriptive analysis will be used to support the validity and applicability of the worksheet by using interview data collected from the one-to-one and small group testing phases that have been tested on students, as well as comments and responses addressing questions posed by students.

The value of practicality (Np) gotten from questionnaire that has been carried out by students will be analyzed using a Likert scale (Azwar, 2015).

Table 1. Likert Scale Format

Response	Score	
	Positive	Negative
Very Agree	4	1
Agree	3	2
Disagree	2	3
Very Disagree	1	4

(Azwar, 2015)

The score calculate with the following formula (1).

$$\%Np = \frac{Total\ score\ obtained}{The\ ideal\ score}\ x\ 100\% \qquad (1)$$

Note:

$\%\ Np$ = The value of practicality percentage every indicators

Total score obtain = $(4xR_{total} + 3xR_{total} + 2xR_{total} + 1xR_{total})$

The ideal score = 4 x Respondence total

The average score every indicator categories are presented in Table 2 (Sugiyono, 2013).

Table 2. Practicality Criteria

Criteria	Description
$81\% \leq Np \leq 100\%$	Very Practice
$61\% \leq Np < 80\%$	Practice
$41\% \leq Np < 60\%$	Less Practice
$0\% \leq Np < 40\%$	Impractice

(Sugiyono, 2013)

The value of validity (Nv) that give to the expert and mathematics teacher analyzed by a likert scale with the following formula (2).

$$Nv = \frac{Total\ score\ obtained}{The\ ideal\ score}\ x\ 100\% \qquad (2)$$

Validity criteria are presented in Table 3 (Sugiyono, 2013).

Table 3. Validity Criteria

Criteria	Description
$81\% \leq Nv \leq 100\%$	Very Valid
$61\% \leq Nv < 80\%$	Valid
$41\% \leq Nv < 60\%$	Less Valid
$0\% \leq Nv < 40\%$	Very Inappropriate

(Sugiyono, 2013)

The media can be said to be appropriate if it is on valid and practice criteria which the validity and practicality score is 61% up.

Test Data Analysis

The normalized gain average score (N-gain) and student worksheet replies were used to compile data on the Flip-worksheet's efficacy. Utilizing formulation (3), the N-gain was determined, and Table 4 is the category scale average. (Asyhari, 2015)

$$N - Gain = \frac{S_{Posttest} - S_{Pretest}}{Maksimum\ score - S_{Pretest}}\ x\ 100 \qquad (3)$$

Table 4. Category Scale Avarage Score N-Gain.

Criteria	Description
$g \geq 0.7$	High
$0.7 > g \geq 0.3$	Medium
$g < 0.3$	Low

The media can be said to be appropriate if it is on effective criteria which the N-Gain Score is up to 0,7.

Result and Discussion

Preliminary Stage

The researcher looked at what the students needed. According to observations and an interview with a math teacher, the worksheet that the student is given lacks activities and questions that would foster critical thinking. Student's inability to think critically, lack of response to the challenge presented by the teacher, and propensity for passivity. According to a questionnaire given to eighth-graders, kids' critical thinking abilities are lacking. Students' inability to think critically and their fear of making mistakes prevent them from solving problems effectively. There is a propensity for students to think in ways that mirror those suggested by books or teachers. The manner that students think has a tendency to resemble that of their instructors or textbooks. The content and research subjects were then decided upon by the researchers, specifically the statistical mean material for grade 8 students. At this point, Canva was used to design and produce the first prototype. The steps for making a Flip-Worksheet design in the Canva program are shown in Figure 2.

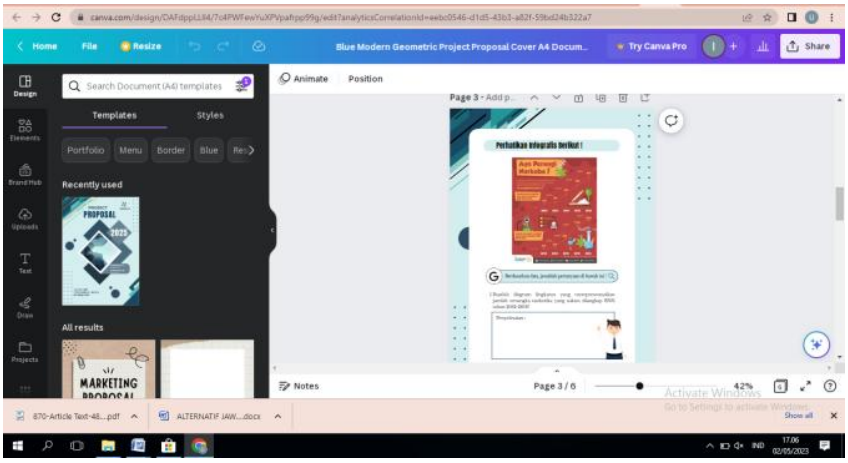

Figure 2. Flip-Worksheet design process by Canva application

The Flipbookpdf.net application is then used to convert the developed Flip-Worksheet design into a flipbook format, allowing books, modules, or worksheets to be turned over like a real book. The procedure for creating a Flip-Worksheet on Flipbookpdf.net is shown in Figure 3.

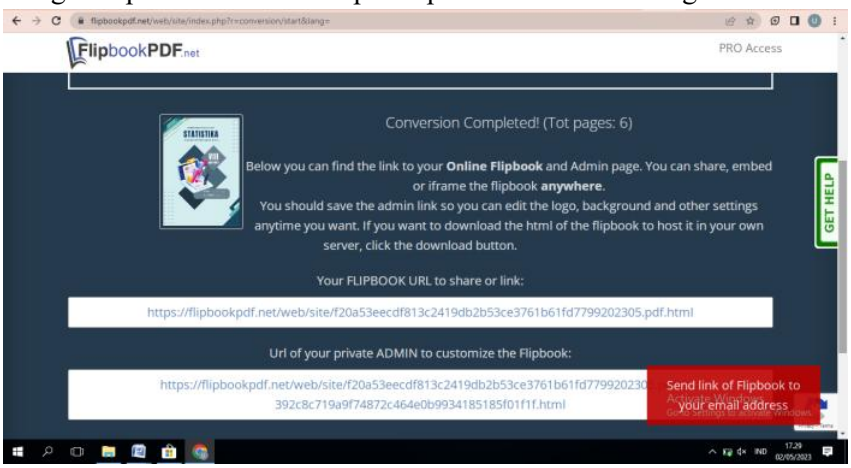

Figure 3. Flip-Worksheet Application Development Process by Flipbookpdf.net

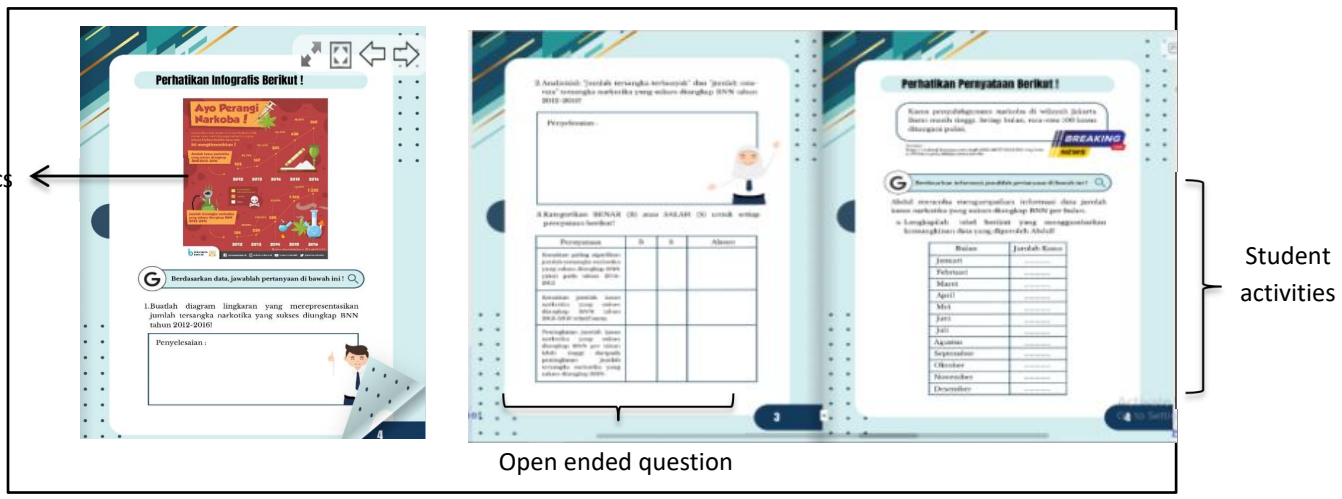

Figure 4. Flip-Worksheet in PC

The researcher offers Flip-Worksheet as a link that may be utilized both online and offline for access using a PC. Simply click the Flip-Worksheet link to access it, and the Flip-Worksheet display will appear. The researchers used the AppsGeyser program to convert the link into an APK for Android access. Figure 4 shows how to access the application following successful installation of the Flip-Worksheet app for Android and PC. The Flip-Worksheet contains some activities and open-ended questions from the infographics served. The material of the worksheet is mean, median, and modus from data and graphic given in infographics. It aims to increase students' ability to read and understanding infogragphics.

Self-Evaluation Stage

The initial prototype is evaluated and examined by researchers. Additionally, the researcher created a number of tools, including worksheet validation sheets, guidelines for student interviews, and student media response questionnaires. Based on material validity indicators, such as content validity, presentation validity, language evaluation, and critical thinking skills assessment, material validation sheets are created. Based on media validity indications, such as worksheet size, worksheet cover design, and worksheet content design, the media validation sheet is created. The interview protocol was developed to meet the demands of academics seeking student feedback and ideas. To gather student responses to the Flip-Worksheet, the researchers created a questionnaire sheet.

Expert Review and One-to-One Stage

In this stage, the validation was conducted with media and subject matter experts and a math teacher using likert scale. Tables 3 and 4 show the flip-worksheet validation's result.

Table 3. Media validation results

Aspects	Total Item	Average Score	Percentage
Worksheet legibility	3	3.33	83.33%
Worksheet illustration and picture	3	3.67	91.67%
Worksheet Desaign	4	3.75	93.75%
Total	10	3.58	89.58%

Table 4. Material validation results

Aspects	Total Item	Average Score	Percentage
Content Eligibility	5	3	75%
Critical Thinking Skills Qualification	5	3.2	80%
Language Assessment	3	3.33	83%
Total	13	3.17	79.43%

According to the validation results, Flip-Worksheet is extremely valid in terms of media (89.58%), and it is valid in terms of material (79.43%). Experts in the media and materials made recommendations to improve the validity of flip-worksheets. The media expert gave suggestions, the learning objectives in the flip-worksheet better use a numbering, the font of student answer link collection use bold font, and the quality of an infographics change with a better quality, so that the students can read easily. The material expert also gave suggestion, the question in the worksheet do not charge one indicator of critical thinking skills, which is inference with sub indicator is making

conclusion, so the expert material suggest to add the last question by "to find the other data alternative, what condition must be?".

The researcher also administered tests to as many as 3 children at a time that had high, medium, and low math ability levels based on the test's results. The one-to-one evaluation's main goal is to determine how students respond when utilizing the Flip-Worksheet. The students gave some response, there are positive response as like: The Flip-Worksheet is interesting, easy to access, and The Flip-Worksheet gave new study situation to the students. However, there are a few criticisms that the Flip-Worksheet cannot open because internet network problem, students cannot read the infographics clearly because the picture resolution.

The comments and critics from the experts and students were the basis revision and the flip-worksheet has revised become prototype II. Figure 4 is the Flip-Worksheet appearance after it was revised.

Figure 5. Flip-Worksheet After Revised.

The author reviewed by giving number in learning objectives, changing the infographics picture quality, adding the last question by "to find the other data alternative, what condition must be?"

Small Group Stage

The study employed two groups of students, each made up of three diverse students with various levels of high, medium, and low ability. The purpose of the small group evaluation is to confirm that the Flip-Worksheet II prototypes was prepared for usage in field testing. Student feedback following the second prototype attempt revealed it. The comments were that the students wanted more flip-worksheets in other arithmetic topics and were provided brief readings prior to the question and exercise. The researcher will incorporate it into the upcoming Flip-Worksheet development due to time restrictions.

Field Test Stage

This phase of the study was conducted by the researcher with 15 eighth graders. Three groups of five students each were formed from the student body. Students were instructed to complete the Flip-Worksheet and submit their submissions via Google Form. The researcher gave students a survey to complete regarding the Flip-Worksheet after the field test. The results of the survey given to students are shown in table 5 below.

Table 5. Student response questionnaire results

Aspects	Total Item	Average Score	Percentage
Appearance	4	3.67	91.67%
Context	3	3.72	93.05%
Critical Thinking Skills and Usefulness	2	3.5	87.5%
Total	9	10.89	90.74%

From each indicator in Table 5, the results showed that the practicality percentage was 90.74%. It is in an interval between 80% - 100% which falls into the very practice category.

After using the Flip-worksheet to learn, the students' critical thinking abilities were developed by the trial test in this development study. Students' comments following the use of the Flip-worksheet in educational activities were also included. Six critical thinking indicators that were adapted from Facione (2015) could be used to measure and evaluate students' critical thinking abilities based on the outcomes of formative assessments. Both a pretest and a posttest were employed as the testing methods; the pretest was administered prior to the use of the flip-chart, while the posttest was administered following its use. Table 7 displayed the result reached by the students after using the Flip-worksheet in their learning process.

Table 6. Critical Thinking Ability Test Results

Componnents	Pretest	Posttest	N-gain	Criteria
N	15	15		
Xmax	85	100	0.71	High
Xmin	50	85		

Based on Table 7, it was determined that the N-gain value was 0.71. The grade VIII student's capacity to think critically increased as a result of using the Flip-worksheet on environmental contamination, which had high criteria.

Overall, the research's findings support the validity, applicability, and effectiveness of the Flip-Worksheet in fostering critical thinking abilities. Flip-Worksheets were successfully developed using the formative evaluation method, starting with the preliminary, self-evaluation, expert review, one-on-

one, small group, field tests, and product improvement stages during development. This allowed them to be used effectively in the learning process. The attractive worksheet design, the question provided in accordance with indicators, the easy-to-understand language, text readability, ease of access, and the emergence of learning motivation all contributed to the positive results of expert validation and student responses. An appealing worksheet layout could assist students comprehend the subject (Serevina et al., 2018). Flip-worksheets' simplicity of use inspires students to learn. (Diantari et al., 2018). It can be said that the results of this study are in line with previous research studies.

This study has given educators a resource for providing modern technology for use that was not discovered in earlier research. The research's flaw is that only one type of material was used to produce the flip-worksheet, which is still in its early stages of development. The benefits of flip-worksheets can boost students' critical thinking abilities needed in the twenty-first century and increase their motivation to learn.

The statistics flip-worksheet is a combination of a digital worksheet and statistics reading material. The availability of this electronic worksheet may also provide teachers and students with a way to improve their digital literacy (Darmaji et al., 2019; Komikesari et al., 2020; Misbah et al., 2021). In addition, more individuals are adopting technology to obtain learning resources to meet their daily needs, which is evidence of growing internet usage in Indonesia (Indarta et al., 2022; Khairunnisa & Ilmi, 2020). Its existence is a significant step in adapting strategies, models, and instructional techniques to the digital age and technical advancements in the field of education. The use of this statistical flip-worksheet can also represent teachers' pedagogical and professional ability because the existence of such a digital worksheet can foster 21st-century critical thinking abilities (Darmaji et al., 2019; Jannah & Atmojo, 2022).

The outcomes of an effectiveness test conducted with 15 students showed that the characteristics present in the statistics flip-worksheet can effectively increase students' capacity for critical thought. Students' motivation to learn can be increased by the presentation of concrete visuals and the "flipping effect" (Hadiyanti et al., 2021; Triwahyuningtyas et al., 2020). Additionally, students' enhanced drive to learn has an impact on both their enthusiastic learning attitudes and their academic accomplishment (Jannah & Atmojo, 2022; Jemudin et al., 2019). As a result, the functions of the statistics flip-worksheet are particularly successful in honing the independent learning and critical thinking abilities of junior high school students (Aprilia, 2021; Asrial et al., 2020). It may improve children's capacity to learn independently and to think critically (Asrial et al., 2020; Sugeng & Suryani, 2020). In order to give students the experiences and projects they need to develop their critical thinking skills, teachers must carefully plan these activities (Ariyatun & Octavianelis, 2020; Davidsen et al., 2019).

The statistical information becomes a key topic of discussion. To comprehend data that frequently appears in different mediums, statistical material is required. Students need essential materials like statistics in order to function on a daily basis. However, it is still common to find students who are not doing at their best academically. As a result, when engaged in learning, they are less critical and active. When answering statistical issues, students frequently make factual, conceptual, theoretical, and procedural errors. (Agustiva et al., 2016) As a result, the discussion of the statistics flip-worksheet is pertinent to the subject of this study. Additionally, e-worksheets are beneficial for developing critical thinking abilities (Aufa et al., 2021; Oktapiani, 2019). They carried out their investigation among seniors in high school, whose pupils are better developed in terms of their cognitive abilities and learning habits. While this study was done among junior high school students, who frequently engage in conversations or issues that are abstract. To enable pupils to more easily master the learning materials, teachers must be able to present them more specifically based on the stages of their development. Although it has been demonstrated that using this flip-worksheet can help students develop their critical thinking abilities, there are a few things that teachers should keep in mind when using digital resources. One of them is the demand for qualified teachers.

This statistics flip-worksheet is only limited to "statistics" topics, despite junior high schools having a variety of mathematics curriculum. Therefore, it is essential to integrate digital media with other subject matter in order to meet the demands of 21st-century learning. Additionally, it is critical to integrate information and communication technology into education to boost learning's effectiveness and efficiency so that technological tools serve as both a supplement and a cornerstone of ongoing education (Syahid et al., 2022). The obvious outcome is that, in order to effectively plan, coordinate, and evaluate learning utilizing information and communication technology, teachers must likewise prioritize digital abilities.

Conclusion

The electronic module Flip-Worksheet meets the requirements, is useful, and helps pupils improve their critical thinking abilities. To be utilized in teaching statistics on eighth-grade material, the Flip-Worksheet was found to be very valid in terms of media (89.58%) and valid in terms of material (79.43%). The proportion of practicality was 90.74%. Based on the feedback from the students, Flip-Worksheet is simple to use. Based on the outcomes of student work, Flip-Worksheet is also helpful in helping students enhance their critical thinking abilities. N-gain had a value of 0.71. After finishing the Flip-worksheet with high criteria, the eighth-grade students' results could be viewed as showing an improvement in their critical thinking abilities. So that, it can be used as a learning medium and can develop critical thinking skills needed in the 21st century. It is hoped that next studies of learning media will be conducted in the future to enhance critical thinking abilities with other technologies.

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