

Drawing Your Opinion: An Activity of Visualizing Student Opinions in Comics Form Regarding Waste Problems in Coastal Areas

Fadhlan Muchlas Abrori^{1*}, Dwiriani Puspitajati²

¹Biology Education Department, Universitas Borneo Tarakan, Tarakan, Indonesia

²PAUD Si Jempol, Tarakan, Indonesia

Corresponding Author* Email: fadhlan1991@gmail.com

ABSTRACT

The purpose of this research is to develop a comic strip as the final form of a learning project. Comics were developed by students to express their opinions and points of view regarding the problem of waste in coastal areas. The model used in the learning process is an Issue-Based Instructional learning model, where the thing that is highlighted is the comic products produced by students after the learning process. The results obtained were 45% of students chose the problem of plastic waste in coastal areas, 25% of students chose the problem of waste from seaweed farming and fishing activities, 15% of students chose the problem of diaper waste in coastal areas, and 15% of students chose other waste problems. The solutions offered by students in the comics that have been developed are very diverse. For example, sorting waste, processing waste into useful materials, and disseminating to coastal communities

Keywords: Comic, Waste Problem, Coastal

1. Introduction

Coastal can be defined as a zone along the coastline, an area where there are saltwater and land. Coastal areas are very close to community settlements that generally have pollution problems. Generally, pollution in coastal areas is mostly caused by humans. Pollution can occur in inland areas or waters in coastal areas, which will impact species' survival in the area [1] [2].

Human activity, as one of the causes of pollution problems in coastal areas, contributes to reducing biodiversity. One of the primary pollutants found in coastal areas is plastic waste. Plastic waste is consistently a type of pollutant found in coastal areas, around 60% - 80% of the total other pollutants [3]. Some data has even been collected over time regarding the impact of plastic waste on ecosystems in coastal areas, both on land and in the ocean [4] [5] [6].

All parties' role in tackling waste in coastal areas is urgently needed, especially in Tarakan - Indonesia as an island with a large coastal area. In line with the data above, the percentage of plastic waste in the Tarakan area is one type of pollutant which dominates around 50% [7]. One of the most needed roles is advice from lecturers and students regarding solving waste in coastal areas. Currently, lecturers and students are always involved in developing creative ideas in solving social science problems in society [8] [9].

The collected ideas need to be developed in the media to disseminate to both stakeholders and the community itself. A project between lecturers and students was carried out; wherein this project students expressed opinions in comic form. The task of the lecturer here is to guide the development of comics-related to student opinion. The opinions presented by the students were creative ideas for solutions to tackle waste problems in coastal areas in Tarakan City.

The selection of comics as a medium in describing student opinion is based on several things. These include the ease with which comics can be understood by the wider community, which is higher than similar media which only emphasizes text or images [10]. Comics are also a very suitable medium for conveying messages because the combination of text and images is balanced so that the things that are informed and visualized get the same portion [11]. In fact, in some opinions, comics are considered more communicative than scientific articles to convey research results or ideas from researchers [12].

Based on some of these considerations, it is necessary to do projects related to students' composition of ideas in the form of communicative comic media. Furthermore, the lecturer and students develop a comic that contains a description of the waste problem in the coastal area of Tarakan city based on the results of observations or literature studies. In the next section, the comic content describes student

opinion in presenting solutions related to the waste problem.

2. Methods

This research is a case study, where the research subject discussed is the output of the environmental education course in comic form. Before developing comics, lecturers conducted learning using socioscientific issue-based instruction (SSI-based instruction) [13]. In learning, the lecturer emphasizes three core aspects in SSI-based instruction, namely design elements, student experiences and teachers

attributes. The core aspects will later be integrated into the classroom, school, community and government policies.

Regarding comics developed by students, they were assessed using an adaptation of the rubric for caricature creation assessment [14]. This assessment is adjusted to comics as the main output of learning outcomes. The assessment rubric is described in Table 1. The assessment of each aspect of each criterion is assessed using a Likert scale with an assessment range of 1-5. The results of the assessment are then presented in percentage.

Table 1. Comic grading criteria

No	Criteria	Rated aspect
1	Content Creation	<ul style="list-style-type: none"> • The suitability of text and images in comics • Comic theme ideas are in accordance with the specified topic • Reflect on current events • Visualizing emotions, thoughts, knowledge and impressions in comics • Comics are in accordance with the learning objectives • The use of panels in comics is balanced • Match between Character and dialogue • The background image matches the theme
2	Presenting Valid and Reliable Information	<ul style="list-style-type: none"> • Interpretation of information into comic content is appropriate • Accuracy of material in comics
3	Creating Effective Presentations	<ul style="list-style-type: none"> • The content in the comic is interesting and creates harmony • Comic content is easy to understand

3. Results and Discussion

Based on the data collection results from 20 students, at least some data on the topic of

waste problems selected by students were obtained. Most data shows that students choose topics related to plastic waste. In detail, the topics chosen by students are described in Fig 1

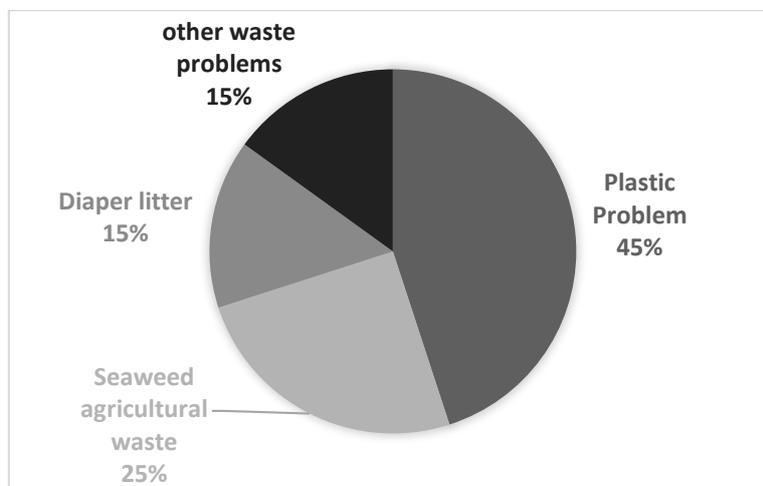


Fig 1. Percentage of waste problem topics selected by students

Based on Figure 1, the results show that the topics that are mostly chosen by students related to plastic waste are 45%. Then, the next

most topic is related to agricultural seaweed waste, as much as 25%. Another unique topic is related to diaper waste; at least 15% of students

choose a topic. Meanwhile, others chose various other waste problems (as much as 15%).

Many students chose topics related to plastic waste because this problem was found in many coastal areas of Tarakan. Several waste identification activities in the coastal area of the city of Tarakan found that at least half of the total waste on the coast was a plastic waste [7]. Of the many topics chosen by students, some topics are interesting related to microplastic problems.

Microplastics can be defined as plastic particles with a size of less than 5 mm [15]. If the impact of sizeable plastic waste causes animals or plants to become entangled [16]. Unlike plastics, most of the effects of microplastics on living things are intestinal obstruction and chemical poisoning due to accidentally consuming microplastics [17] [18]. An example of a comic related to microplastics developed by students can be seen in Fig 2.

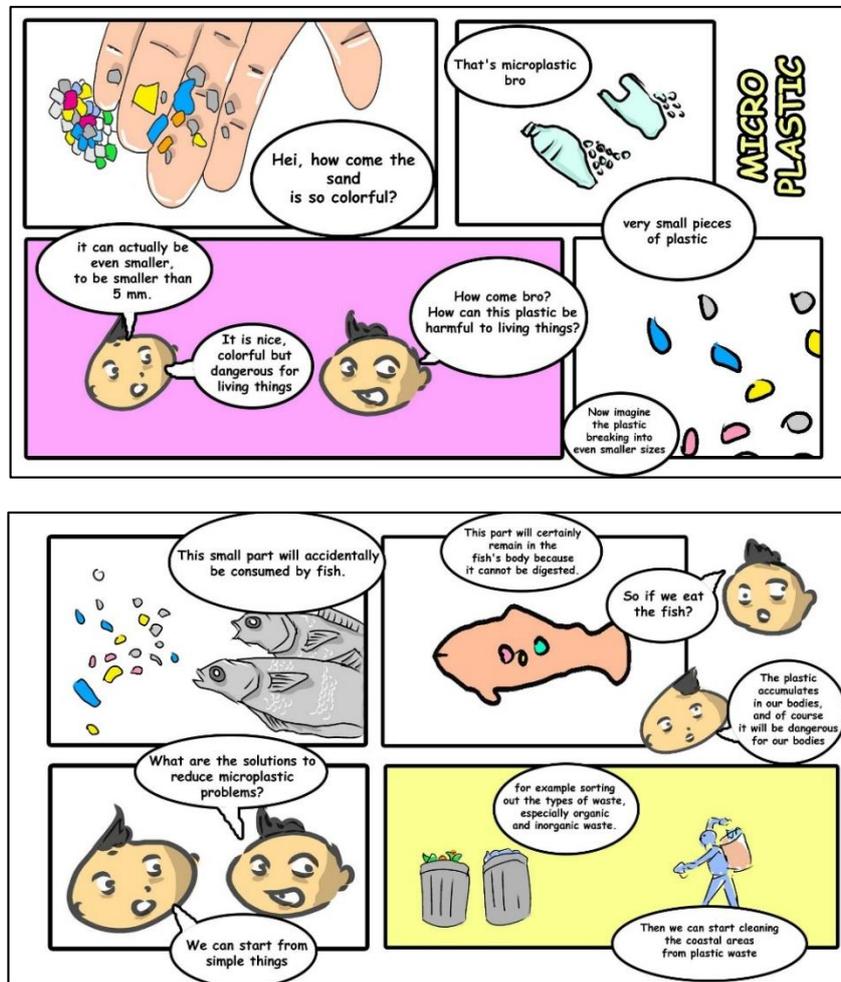


Fig 2. Comic related to microplastic

The comic's story begins when the character in the comic finds pieces of colourful objects in the beach sand, which turns out to be plastic, which has been divided into small pieces. Then in the next panel, the two characters talked about changing plastics into microplastics. On the second page of the comic, it also explains microplastics' impact if they are accidentally ingested by living things. The last panel describes a solution that can be done to reduce microplastics in coastal areas.

The solution chosen by the students consisted of two solutions, namely, waste sorting solutions and cleaning plastic waste. Waste

sorting is a problem which is the most fundamental problem in most regions in Indonesia. Garbage sorting is not carried out at the house level but is carried out at a cleaning officer's temporary disposal site [19]. Of course, it makes the separation not optimal because the initial waste originating from households is mixed with organic and inorganic waste. Waste sorting solution is the first solution which is very important so that inorganic waste can be entirely separated from organic waste. The incomplete separation between organic and inorganic waste will potentially cause inorganic waste such as plastics to mix with organic waste, and it is not

impossible to become microplastics which will disturb the environment.

The second solution chosen by students regarding cleaning plastic waste is an activity to clean coastal areas. It is essential to perfect the first solution. Garbage on the coast, especially plastic waste, has accumulated a lot over the years. Coastal cleaning is a direct effort to reduce plastic waste. Plastic waste in coastal areas is a pollution problem that has continued to increase in recent decades [20]. This increase in plastic waste will gradually become a complicated problem to handle [21]. Based on this, it is necessary to take immediate and immediate action to reduce plastic waste through a second solution.

The next waste problem that the students chose in the comic was the problem of seaweed

farming waste. Seaweed is an excellent agricultural product in Tarakan, especially *Euchema* spp. and *Gracilaria* spp. It is in line with data from the Food and Agriculture Organization (FAO) that Indonesia contributes 40% of the world's seaweed industry [22]. Unfortunately, this seaweed farming has a new impact because it contributes to increased plastic bottle waste. Plastic bottles are commonly used in seaweed farming to create floating seaweed [23]. However, plastic bottles cannot be used repeatedly, and usually plastic bottles that cannot be used are thrown away by seaweed farmers on the beach. An illustration of this problem is illustrated in the comic in Fig 3.

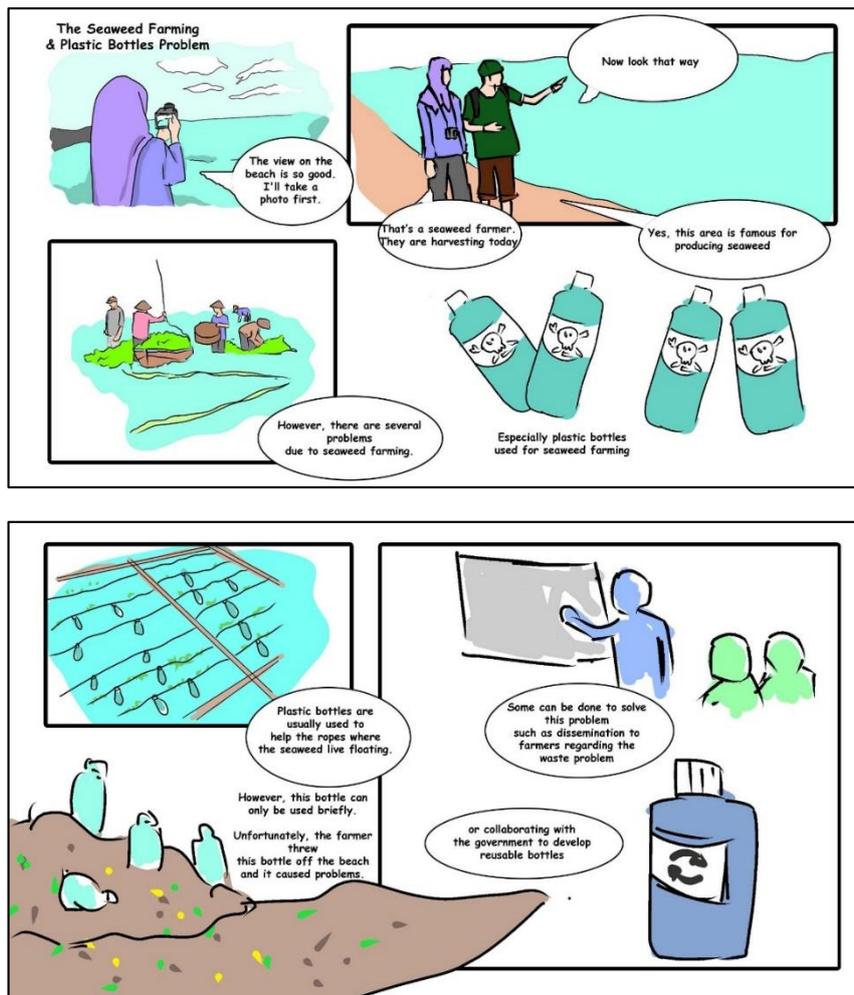


Figure 3. Comics related to seaweed agricultural waste

The problem of plastic bottles as waste from seaweed farming creates a big problem regarding coastal waste. Students provide several solutions to this problem. The first solution from students is providing dissemination to seaweed farmers. This dissemination is considered essential to impart knowledge regarding the impact of waste on ecosystems in coastal areas.

Continuous dissemination impacts changing attitudes and knowledge of the community [24]. It is hoped that this change in attitude and knowledge will change seaweed farmers' habits related to littering.

The second solution proposed by the students was the development of reusable bottles. The development of reusable bottles that can be

used repeatedly for seaweed farming activities requires cooperation from various parties. Related parties are the government, seaweed farmers and the plastic industry. Related parties need to discuss together to design and produce reusable plastic bottles. The use of reusable bottles will undoubtedly have an impact on reducing plastic bottle waste in coastal areas.

The next waste problem described in the comics is the problem of used diaper waste. The use of baby diapers in Indonesian society is very high; at least 97.1% of families who have babies use diapers for their daily needs [25]. Used

diapers have an impact on the environment because they have a huge carbon footprint. Used diapers are responsible for 630 kg of greenhouse gases [26]. Even though they are not the most garbage, at least used diapers are a type of waste that contributes 1.5 - 4% of the total waste [26].

Students' solution in comics is to use the superabsorbent gel in diapers to become a planting medium. From one diaper trash, at least 7% of superabsorbent gel can be taken [26]. At least three used diapers can be used for one plant pot.

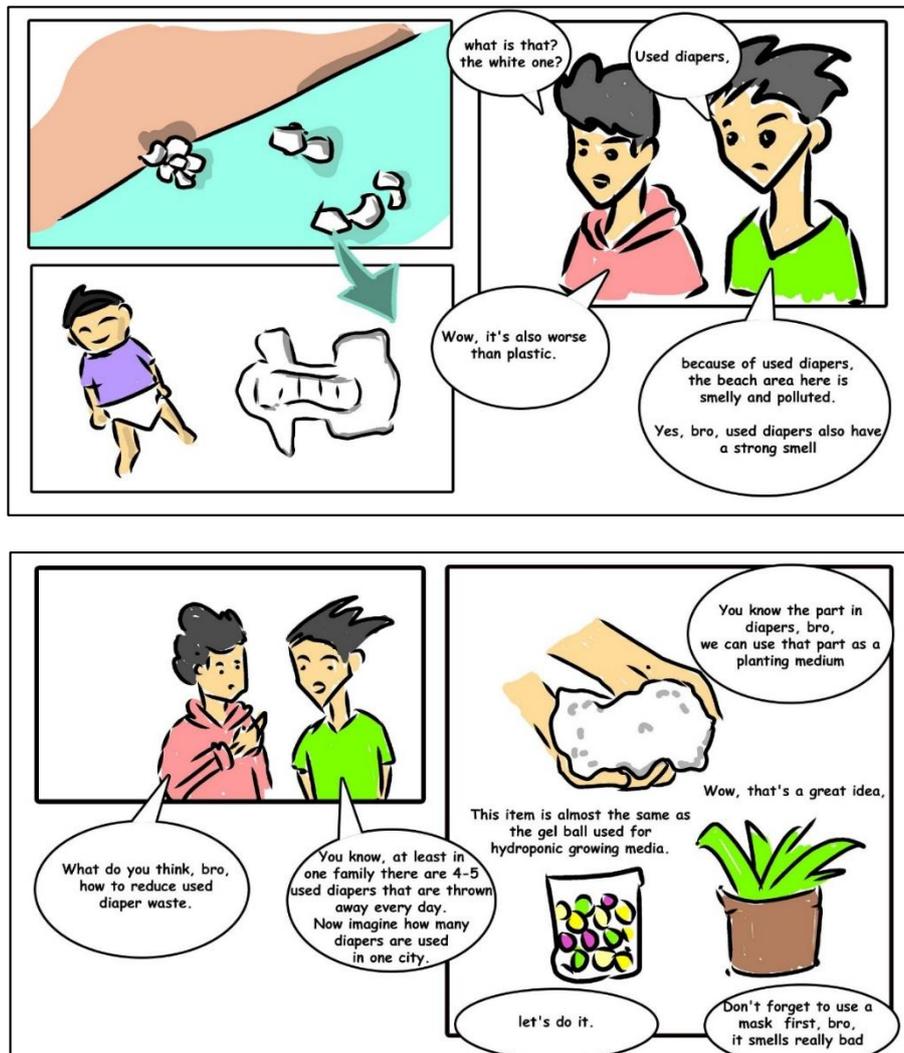


Fig 4. Comic related to used diaper waste

All 20 comics developed by students were assessed by two lecturers related to 3 assessment criteria based on Content Creation, Presenting Valid and Reliable Information, Creating Effective Presentations—content creation assessment related to comic content and elements (Fig 5). Meanwhile, the assessment is

related to presenting valid and reliable information related to assessing information in comics and sources used by students in developing comics (Fig6). Finally, creating an effective presentation is the attractiveness and ease of use of comics (Fig 7).

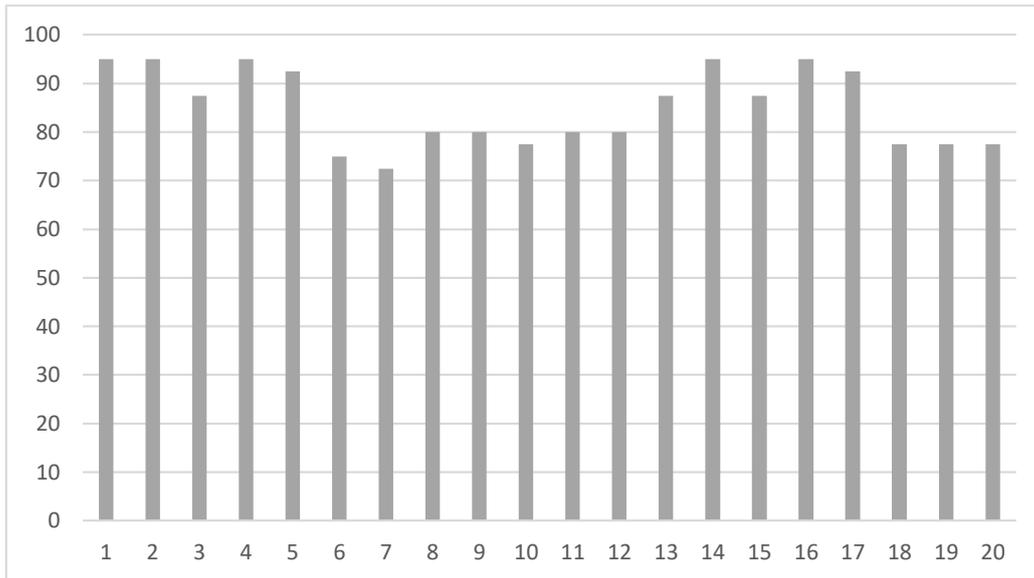


Figure 5. Percentage of student comics based on Content Creation criteria

Based on the content creation, it was found that six students still got scores below 80%, while the rest got a percentage value with a percentage of 80-95%. Several problems were still found in the comics developed by students. The first problem is the suitability of the characters and dialogue. Sometimes the storyline based on the dialogue developed by students is not connected to the problem topic. The dialogue in Speech Balloon in comics plays a vital role in showing character identity and character emotions

[27] [28]. The next problem is the suitability of the background image with the theme. Some comics developed by students sometimes do not include the appropriate setting, and only contain dialogues between characters. Of course, this makes the comics lose a critical element in the form of a story scene. The background represents the background of the problem in a story [29]. So, the absence of background will affect the reader's perspective in understanding the story.

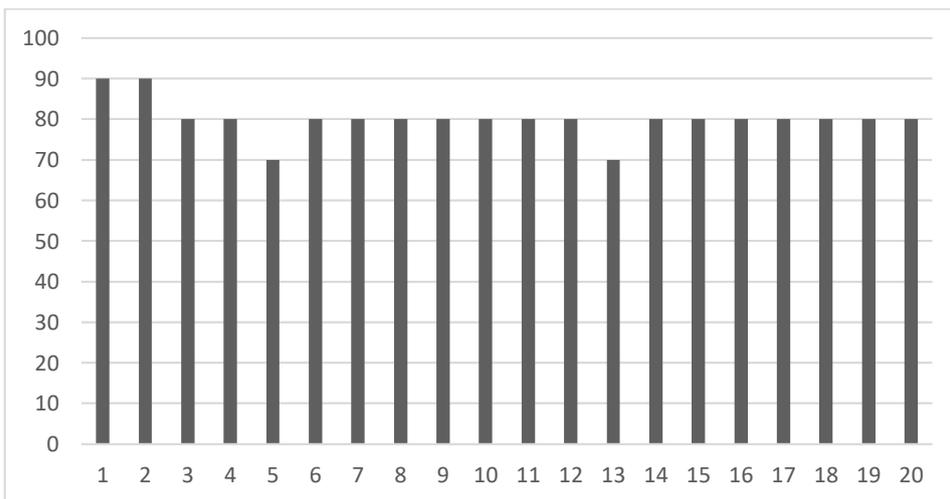


Fig 6. Percentage of student comics based on Presenting Valid and Reliable Information

Assessment related to presenting valid and reliable information every student has obtained an excellent percentage score. Most of the range of values obtained ranged from 80% - 90%. In this part of the assessment, only two students scored below 80%. The data used by students in developing comics are valid and

reliable. Students conduct observations related to waste problems in coastal areas by conducting interviews with the community and field studies. Meanwhile, several sources are also used to explain some of the concepts described in the comics.

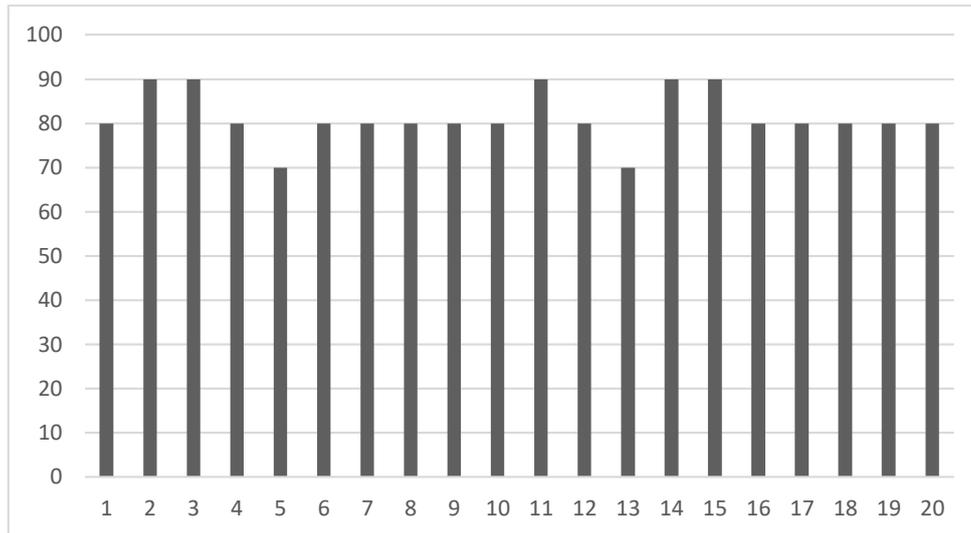


Fig 7. Percentage of student comics based on Creating Effective Presentations

As the criteria for Presenting Valid and Reliable Information, the percentage of the criteria for creating an effective presentation is very good with a range of values between 80% - 90%. Only two students scored below 80%. A good comic fulfils the elements of a comic book or has valid and reliable data. However, the most crucial element is attractiveness and an easy-to-understand character. If the comic meets the elements and has useful data, it is not exciting and easy to understand, it will reduce the comic's selling value [30]. Based on this, most of the comics developed by students have good grades and are worthy of being used as media for dissemination.

4. Conclusion

Based on the project of making comics by students, there are at least three main topics chosen by students regarding the problem of waste in coastal areas. The most topic chosen was the problem of plastic waste in coastal areas as much as 45%. The second-largest topic is related to plastic bottles as agricultural seaweed waste as much as 25%. The last topic that was most chosen was diaper waste. The comics developed by students describe problems in coastal areas and explain possible solutions to solve these problems.

The results of comic assessments based on content creation, presenting valid and reliable information and creating compelling presentations received a great percentage above 80%. It is an indicator that the comics developed by students have the potential to be disseminated as a medium to the broader community

These comics can be disseminated as a medium for socialization or as additional content in environment-based learning. It is hoped that this comic will also have a more significant

impact, especially for the community and the government always to keep the coastal areas clean. It is considered very important because the coastal areas have started to be polluted by garbage, especially in the Tarakan area. Unfortunately, the community and government efforts to eradicate this problem are still lacking.

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