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The Social Studies and Science Pre-Service Teachers' Experiences of Creative Comics for Environmental Education

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Abstract

The aim of the study is to reveal the experiences of social studies and science pre-service teachers on the use of creative comics in the teaching of subjects related to environmental education. Since this study focuses on the pre-service teachers' experiences was used phenomenology design. A totally of 65 pre-service teachers participated in the study (35 social studies teacher candidates, and 30 science teacher candidates). Within the scope of the research, environmental education was given to pre-service teachers during one semester. This education process also includes creating and using creative comics in environmental education. Semi-structured interviews and observations were used as data collection methods. Thematic analysis method was used in the analysis of the data. The results of the research show that creative comics can be used as an alternative teaching material in environmental education. According to pre-service teachers, creative comics enrich the learning environment. Results of the research, teachers need to pay attention to some issues for efficient use of creative comics. When using creative comics, teachers should keep students away from competition and negative criticism, which can negatively affect creativity.

Introduction

The source of environmental problems in the world is usually human. For a sustainable life, people's negative behaviors towards the environment should be reduced. Environmental behavior change can be supported by environmental education (Ntanos et al., 2018). It is predicted that people will exhibit positive behaviors toward the environment with the increase in their knowledge about the environment (Owein & Hourri, 2006). Because people with high environmental awareness and positive attitudes towards the environment exhibit positive behaviors towards the environment (Dogan, Cicek & Sarac, 2018). In order for the political, economic and technological efforts to minimize environmental problems, people with environmental education and advanced environmental awareness are needed (Sever & Yalçinkaya, 2018). Teachers can use various methods and materials in environmental education. However, not including interactive activities in the lessons and not using interesting materials distract students from the lesson (Greenfield, 2017). Creative comics, which are the teaching materials covered in this research, are teaching materials that can create high interaction.

Creative comics can be expressed as teaching material that combines comics, which can be an artistic product or

a teaching material, and creative writing, which is an exciting and fun way of writing. Senturk and Topkaya (2021) introduce creative comics by reflecting on the characteristics of comics and creative writing. According to the authors, creative comics combine the fluency, attractiveness, and representation of texts with visual elements, and the power of creative writing in conveying emotions and thoughts. To better understand creative comics, it is necessary to first examine comics and creative writing.

Comics

A comic is a combination of pictures and writing with a humorous style. Comics humorously convey realistic or fanciful ideas with visual images (Toh, et al., 2016). Because comics are easy to understand, they can be used as teaching materials in educational activities for large audiences (Weitkamp & Burnet, 2007). When comics are used for educational purposes, they have a positive effect on the achievement of learning outcomes and the permanence of learning (Cicek Senturk, 2020; Ilhan & Oruc, 2019; Kaba, Şin & Ilhan, 2020; Senturk & Simsek, 2021; Senturk & Simsek, 2022). When teaching with comics, students are in control of the pace of learning. Senturk and Simsek (2021) explain this feature of comics with the metaphor of remote control and see comics as a teaching material that supports creativity in the learning environment.

The use of comics in education is based on Clark and Paivio's (1991) binary coding theory. This theory, which points to the importance of visuality in cognitive processes, is based on increasing the level of recall of transmitting information both visually and verbally (Marianthi et al., 2016). Creative comics have added both writing and creative thinking to this process.

Creative Writing

Creative writing is the combination of people's impressions with their imagination and experiences and transferring them to writing with original fiction (Sahin, 2020, p. 279). Creative writing provides opportunities for students to dream and express their dreams and thoughts (Gocen, 2018). Since creative writing is based on establishing original, interesting, and fluent relationships with different thoughts and dreams (Temizkan, 2010), it helps people to understand their inner world (Yilmaz, 2013). This is a functional way for people to know and understand themselves (Orhon, 2020, p.15).

Creative writing, which starts with creative thinking (Sahin, 2020), aims to change existing texts or write new texts with imagination and various activities (Yilmaz, 2013). In this process, students have the opportunity to think creatively, solve problems, approach events from different perspectives and make comments in a fun learning environment (Arshavskaya, 2015; Stillar, 2013; Susar Kirmizi, 2015; Wang, 2021). There are some points that teachers should pay attention to in creative writing activities. The first of these is that students' outputs at the end of the creative writing process should be compared with each other. Faults should not be sought in these products. Because creative writing does not aim to reach correct results with correct information and correct grammar. On the contrary, it aims to reveal original ideas, feelings, and thoughts, even if they are wrong (Orhon, 2020).

Creative Comics

Creative comics allow for conveying emotions and thoughts in different ways by taking advantage of the ability of comics to convey both visual and written messages. Creative comics that offer a way of seeing and thinking about events from a different perspective (Sousanis, 2015) requires creativity. Creative comics, on the other hand, draw a systematic way of this process. Here, we come across the usage processes of creating comics in educational activities.

The creative comic is a teaching material that offers a variety of uses. Senturk (2022a) highlights four different ways of using this teaching material. The first of these is created by cutting the script of the comic at one or more points. It is expected that the students continue the squares with the unfinished scenario with their knowledge, emotions, thoughts, and value judgments. Thus, teachers have the chance to determine the level of knowledge of students about a subject through creative comics. In addition, since students will complete the creative comic in line with their feelings and thoughts, teachers can have an idea about students' attitudes about a subject.

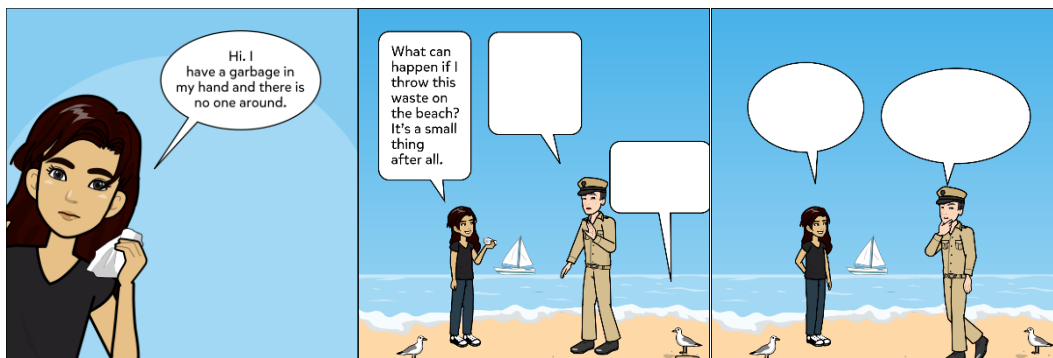


Figure 1. Example of First Type Creative Comics

The second use of creative comics is based on changing the existing scenario, that is, reproducing it. In this form of usage, students change the storyline in line with their knowledge, feelings, and thoughts about the visual elements in the comic. In this way of use, the current scenario can be changed completely, or it is possible to change a part of the scenario. Teachers can spot erroneous information or misconceptions with such creative comics.

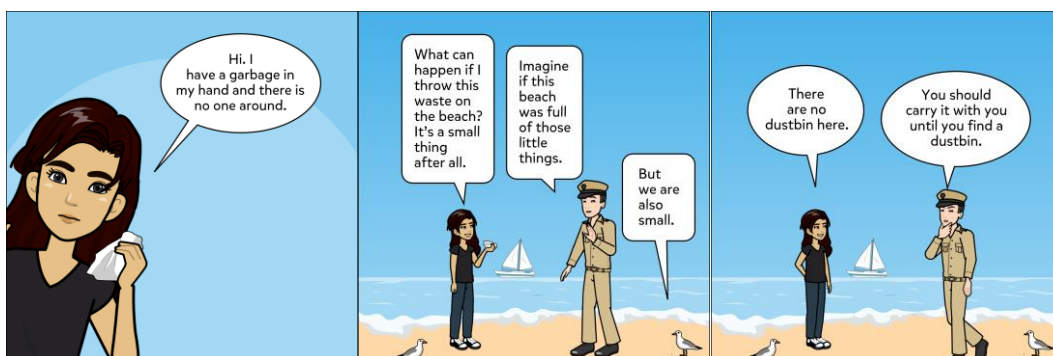


Figure 2. Example of Second Type Creative Comics

In the third use of creative comics, there are visual backdrops and characters in the squares of the comics. However, these squares do not include speech balloons or scenarios. Students are expected to create a scenario in line with the subject of the lesson and make the characters talk through speech bubbles. In this use of creative comics, when students need to creatively interpret the visual elements presented in the comics and complete the scenario, this usage is likened to a mute map.



Figure 3. Example of Third Type Creative Comics

The fourth use of creative comics is characters and scenarios. However, there is no expression on the faces of the characters. Students are expected to draw facial expressions that express the emotions that the character may have in line with the plot in the creative comics. Here, a basic smiley or sad face can be drawn, as well as drawings expressing more complex emotions. This usage is aimed to reveal the feelings of the students in the context of the subject. The fourth use of creative comics can be beneficial, especially in line with affective acquisitions.



Figure 4. Example of Forth Type Creative Comics

Some important points should be reminded to students when creative comics are included in the learning process. One of these is that the aim of reaching perfection is not adopted, but the clues given by the characters and other visual elements should be followed carefully. It is important to inform students that it is possible to express themselves with simple and coherent expressions instead of complex ones and that they can do trials before making the final decision. What is more important is that imagination will make the learning process more enjoyable (Senturk, 2022b). Thus, a more accurate way is followed in the use of creative comics.

Examination of pre-service teachers' experiences with creative comics can offer important clues for the effective

use of this material. Therefore, in this study, the experiences of social studies and science pre-service teachers on the use of educational comics in environmental education were examined. In this context, the research questions of the study are as follows:

- What are the opinions of social studies pre-service teachers about environmental education with creative comics?
- What is the experience of social studies pre-service teachers in preparing creative comics?

Method

Research Pattern

Qualitative research is research in which data collection methods such as observation and interview are used to try to understand human behavior in its environment in a multifaceted way (Creswell, 2012). Phenomenology is one of the qualitative research types used to reach the basic structure underlying experience (Merriam, 2018). In this study, phenomenology design was adopted to describe the views of social studies and science pre-service teachers on the use of creative comics in teaching environmental subjects and to explain their experiences in the process with their expressions.

Study Group

In this study, the criterion sampling method was used. Criterion sampling is based on the selection of participants from individuals who represent the main phenomenon of the research (Creswell, 2012). The criterion for determining the pre-service teachers to be included in the study group of this research is that they have taken courses on environmental education and have experience in preparing creative comics as teaching materials. In this context, the study group the research consists of 35 social studies and 30 science pre-service teachers who meet these criteria. To ensure the confidentiality of the teachers' identity and to be suitable for the nature of qualitative research, the participants were coded according to their gender instead of being coded with numbers and letters.

Data Collection

Observations, interviews and questionnaires, documents, and audio-visual materials are the main types of data collection in qualitative research (Creswell, 2012). In this study, two different types of data collection were used, namely the notes taken by the researchers during the observation and the transcription of the interviews made with open-ended questions. Observation, which is one of the qualitative data collection types, means that the researcher watches the situation he wants to examine in his natural environment, takes notes, and records the observation results (Patton, 2014). The authors of the study informed the pre-service teachers in the study group that observation will be made in the process only for data collection. Observation notes are presented in the findings section of the research.

Before the interview questions were formed, the literature was examined. The prepared questions were presented

to the opinions of three field experts whose fields of expertise are science education, social studies education, and comics. The interviews lasted approximately 35-40 minutes. The interviews were recorded with the permission of the prospective teachers in the study group to be transcribed later.

In this study, pre-service teachers were asked to share their views on the use of creative comics in teaching environmental issues within the framework of the following questions:

1. How would you evaluate the education you received on environmental education and methods and materials that can be used in environmental education during a course period (12 weeks - 2 hours per week)?
2. How would you evaluate the creative comics preparation process for yourself?
3. When you become a teacher, would you prefer to use creative comics in teaching environmental issues? Why?
4. How would you evaluate the use of creative comics in learning environmental issues in terms of secondary school students?

Analysis of Data

The data obtained in this study, which aims to reveal the opinions of pre-service social studies and science teachers on the use of creative comics in teaching environmental subjects, were analyzed with content analysis. The thematic analysis involves conceptualizing the data and revealing the themes that can describe the phenomenon. While analyzing the data in this study, the interviews were first converted into written documents. Repeated readings were made on these written documents by the authors of the study. In this way, the expressions in the data were marked for coding. Encodings are divided into categories. Then the themes were created. The themes obtained from these interviews were supported by the direct sentences of the pre-service teachers and presented in the findings section.

Validity and Reliability

Within the scope of validity in the research, long-term interaction was made with the pre-service teachers for credibility (internal validity), and data diversity (observation and interview) was made. Expert review was applied for the collection and analysis of the research data and the writing of the results, and participant confirmation was made regarding the obtained data.

Within the scope of transferability (external validity), direct quotations regarding the themes reached were included to make detailed descriptions. To ensure the consistency of the data for reliability in the research, the opinion of an expert, who was outside the research, was consulted regarding the analysis and reporting processes.

To ensure internal consistency (reliability) in coding, the data were analyzed separately by each researcher, and the reliability formula suggested by Miles and Huberman (1994) was used to calculate reliability. As a result of the calculation made with the formula $\text{Reliability} = \text{Consensus} / (\text{Agreement} + \text{Disagreement})$, the reliability of

the research was calculated as 84%. Reliability calculations over 70% are considered reliable for research (Miles & Huberman, 1994). The result obtained here is considered reliable for research.

Results

In this section, the findings obtained as a result of the analysis of the data collected through semi-structured interview forms and researchers' observations and explanations about these findings are given. As a result of the analysis of the data obtained from the interviews with pre-service social studies and science teachers, four different themes were reached: "Strengths, Benefits, Limitedness, and Points to Take into Account".

Findings on the Strengths Theme

The codes in the statements of pre-service social studies and science teachers regarding the strengths of creative comics and "The Strengths Theme" created by these codes are shown in Table 1.

Table 1. Codes for Strengths Theme

Theme	Codes
Strengths	Supporting creative thinking
	Revealing thoughts
	Visuality
	Multi-channel message forwarding
	Creating a superhero
	Humorous
	Compliance with self-regulation
	Technology support

When Table 1 is examined, it is understood that pre-service social studies and science teachers attribute various meanings to the strengths of creative comics. Pre-service teachers stated that creative comics support creative thinking. Daisy stated this as *"This comics style deserves its name. Creative comics come to life with creative thinking"*. Edgar stated this as *"It develops creative thinking as it forces us to think differently"*. Pre-service teachers emphasized that creative comics allow for the explanation of ideas. Brandy stated this as *"It facilitates the expression of thoughts"*. Frederick stated this as *"It provides an environment for sharing thoughts"*. Pre-service teachers also emphasized that creative comics can visually support environmental education. Elsa expressed it as *"It attracts children thanks to its colorful structure"*. Martin expressed this as *"It can visually support environmental issues"*. Pre-service teachers emphasized that creative comics provide the opportunity to transmit multi-channel messages. Jefferson stated this as *"It supports written expression with visual expression."* Kelly stated this as *"It supports narrative both in writing and visually"*. Pre-service teachers stated that environmentally friendly superheroes (characters) can be placed in creative comics. These superheroes can be role models for children. Brittney stated this as *"I can create a hero to be a role model for students"*. Raul stated this as *"An eco-friendly superhero sometimes teaches faster than anyone else."* When the table is examined, it is understood that

pre-service teachers accept the humorous nature of creative comics as a positive feature. Paris stated this as *“This material contains humor. Humor offers students a happy learning environment”*. Victor stated this as *“Humor is very useful when used correctly”*. Pre-service teachers emphasized that creative comics give students the chance to adjust their learning speed. Richard stated this as *“It allows students to organize their learning”*. Rose stated this as *“I think it is suitable for individual learning”*. Pre-service teachers consider the digital production of creative comics among the features that make this material stand out. Emily stated this as *“I can easily create creative comics in digital environments when I need it”*. Tom stated this as *“It enables to use the opportunities offered by technology in education in a creative way”*.

Findings on the Benefits Theme

The codes in the statements of pre-service social studies and science teachers regarding the benefits of creative comics and "The Benefits Theme" created by these codes are shown in Table 2.

Table 2. Codes for Benefits Theme

Theme	Codes
Benefits	Providing fun
	Increase engagement
	Providing attention
	Enhancing empathy
	Use as assessment tool
	Giving clues about attitudes
	Giving clues about behavior
	Giving clues about thoughts
	Presenting different perspectives

When Table 2 is examined, it is seen that pre-service social studies and science teachers stated that creative comics have different benefits for environmental education. The explanations regarding the codes in Table 2 and the sample expressions that enable access to these codes are presented below.

Pre-service teachers pointed out that creative comics would be effective in making the environmental education lesson enjoyable. Lola stated this as *“I think its fun structure attracts students to the lesson”*. Antony stated this as *“It provides a fun learning environment”*. Pre-service teachers stated that creative comics would positively affect participation in classroom activities. Jennifer stated this as *“It encourages everyone to attend lesson”*. Harry stated this as *“It gives everyone something to say”*. Pre-service teachers stated that creative comics would attract students' attention to the subject of the lesson. Linda stated this as *“It enables me to teach an interesting lesson”*. Sophie stated this as *“I get my students' attention when I use it in the classroom”*. It is understood from the statements of pre-service teachers that creative comics can improve empathy. Oscar stated this as *“I can develop empathy through different ways of use”*. Anna stated this as *“It allows students to understand what others are feeling”*. It is seen that pre-service teachers stated that creative comics can be used as assessment tool. Jack stated

this as *“It helps to understand students' misconceptions”*. Kelly stated this as *“We understand how much students have learned”*. Pre-service teachers emphasized that creative comics can give an idea about student attitudes. Lily stated this as *“We can see the students' attitudes toward the environment”*. Raul stated this as *“It can give an idea about people's attitudes”*. Pre-service teachers stated that we can understand how students will behave in some situations through creative comics. Edgar stated this as *“We can understand how they will react to a situation”*. Emily stated this as *“We can learn about their behavior towards the environment”*. Pre-service teachers stated that students' thoughts can be clarified through creative comics. Sarah stated this as *“It allows students to write down what's on their mind”*. David stated this as *“It allows students the opportunity to share their thoughts”*. The statements of the pre-service teachers reveal that creative comics can also be effective in revealing different perspectives. Grace stated this as *“It allows us to look from unpredictable points”*. Sage stated this as *“It provides students with the opportunity to see different perspectives”*.

Findings on the Limitedness Theme

Pre-service social studies and science teachers stated that there may be some limitations of creative comics in line with their experiences. The codes in the pre-service teachers' expressions regarding the limitations of creative comics and the theme of Limitedness created by these codes are shown in Table 3.

Table 3. Codes for Limitedness Theme

Theme	Codes
Limitedness	Be time consuming
	Contains limited information
	Weakening classroom management
	Requires creativity
	Technological requirements
	Requires instructor training

When Table 3 is examined, it is seen that pre-service social studies and science teachers have different experiences regarding the limitations of creative comics. The explanations regarding the codes in Table 3 and the sample expressions that enable access to these codes are presented below.

Pre-service teachers stated that both preparing and using creative comics is time consuming. Martin stated this as *“I waited a long time for inspiration to gear creative comics”*. Julian stated this as *“For the use of creative comics, I have to devote a large part of the lesson to it.”* Pre-service teachers emphasized that creative comics contain limited information by its nature and this would make it difficult to explain the subject in detail. Linda stated this as *“When I want to give extensive information about the environment, it falls short”*. David stated this as *“It cannot be used in subjects that require detailed information”*. Pre-service teachers stated that creative comics can negatively affect classroom discipline. Carter stated this as *“Classroom discipline can become difficult when I use creative comics”*. Kelly stated this as *“It becomes impossible to silence the class. Because it's a fun process.”* When the table is examined, it is understood that pre-service teachers stated that creative comics require creativity

as a negative situation. Joe stated this as *“It is not always possible to think creatively. You can't make creative comics when you can't think creatively”*. Jennifer stated this as *“Creativity is necessary for creative comics. I can't just sit in front of the computer and make creative comics”*. Pre-service teachers stated that they were negatively affected by some lack of equipment while creating creative comics. Bill stated this as *“It's very difficult to make creative comics without a computer”*. Bella stated this as *“It becomes impossible for me to use it without a computer and internet connection”*. Pre-service teachers stated that training should be received on the preparation and use of creative comics. Denise stated this as *“I don't think everyone can use it. Education is necessary”*. Danny stated this as *“People who have not received training in creative comics may not be productive”*.

Findings on the Points to Take into Account Theme

The codes in the statements of pre-service teachers regarding the points to be considered while preparing or using creative comics and the Points to Take into Account theme created by these codes are shown in Table 4.

Table 4. Codes for Points to Take into Account Theme

Theme	Category	Codes
Points To Take into Account	In the process of preparing	Supporting creativity
		Scenario telling
		Using uncertainties
	In the implementation process	Encouraging the student
Avoiding negative comments		
Avoiding competition		

When Table 4 is examined, it is understood that there are some situations that should be considered when using creative comics within the scope of environmental education according to pre-service social studies and science teachers. It is possible to examine these in two categories as in the process of preparing and in the implementation process. The explanations regarding the codes in Table 4 and the sample expressions that enable access to these codes are presented below.

Pre-service teachers emphasized that while preparing creative comics, content that will appeal to students' creativity should be created. Clark stated this as *“An event, situation, object or effect should be used to support creativity.”* Rebecca stated this is *“The plot needs to be designed to unleash creative ideas.”* In addition, the statements of the pre-service teachers drew attention to the importance of determining in which frame the scenario would stand and creating dilemmas in the scenario. Nelson stated this as *“It is very important to determine where to cut the scenario. Decision-making moments are preferable”*. Molly stated this as *“We have to stop the scenario in the right place if we want it to be effective. The place where the excitement is highest is the most suitable place for this”*. Pre-service teachers drew attention to the necessity of creating dilemmas while preparing a creative comics scenario. Marc expressed this as *“We should use examples that are not the only right for the environment”*. Raquel expressed this as *“I think students like more creative comics that create dilemmas”*. Pre-service teachers stated that negative evaluations of the ideas presented during the use of creative comics would not have a positive

effect on environmental education. Bella stated this as *“In order not to spoil the motivation of the students, it is necessary not to make negative comments about the scenarios they wrote”*. Joe stated this as *“Preparing creative comics is not an easy task. It is important to avoid negative comments about the trials made in this process”*. Pre-service teachers stated that the competitive environment should be avoided in the classroom when using creative comics. Antony stated this as *“I don't think it will serve our purpose to compare the products put forward by the students.”* Riley stated this as *“We are not trying to determine who is more creative in environmental education. For this reason, creative comics completed by students should not be competed with each other”*.

Findings Related to Observations

According to the researcher's observations, pre-service social studies and science teachers encountered some difficulties in the process of preparing creative comics. Both social studies and science pre-service teachers had the most difficulty in creating scenarios. In this regard, the pre-service teachers stated that they should be inspired to create creative comics and that it is not easy to prepare a scenario. In addition, pre-service teachers had difficulties in deciding where to pause the scenario. They often want to receive trainer support in this regard. Some pre-service teachers experienced a lack of technological equipment. The pre-service teachers who could not obtain a computer tried to create creative comics through tablets or smart phones. This situation negatively affected the creating process. In this process, it was observed that pre-service teachers had difficulties in placing character or speech balloons.

Discussion and Conclusion

This study aims to reveal the views of pre-service social studies and science teachers on the use of creative comics in environmental education. In this context, the experiences of pre-service teachers in preparing creative comics for environmental education were used. These experiences of pre-service teachers highlighted some features of creative comics. As a result of the analysis, it was understood that the features of creative comics can be grouped under four themes. These themes were named as *“Strengths, Benefits, Limitedness, Points to Take into Account”*.

The features that enable pre-service teachers to see creative comics as an effective material for environmental education are gathered under the theme of strengths. Accordingly, it was concluded that the pre-service teachers saw creative comics as a powerful material as it supports creative thinking and facilitates the explanation of thoughts. These results regarding creative comics can be supported by the results of some research on creative writing (Akyol & Yildiz, 2018; Gocen, 2018; Graham, Tavsanlı & Kaldırım, 2021; Kirmizi & Adiguzel, 2023; Tegnér et. al., 2009).

In addition, it has been concluded that creative comics are considered a functional material because they can create a superhero who can be a role model, have a humorous structure and are supported by technology. These results regarding creative comics can be supported by the results of some researches on comics (Akanca, 2021; Cicek Senturk, 2020; Ilhan, Kaba & Sin, 2021; Kaba, Sin & Ilhan, 2020; Niewiadoma, 2021; Senturk & Simsek, 2021; Topkaya & Simsek, 2016; Yildirim, 2016).

According to this, it was concluded that they saw creative comics as a powerful material because it supports creative thinking, facilitates the explanation of thoughts, and has a colorful and humorous structure. In addition, they see creative comics as a powerful material as it creates an exemplary superhero and is supported by technology. These results can be supported by some research on comics and educational comics (Akanca, 2021, Cicek Senturk, 2020; Niewiadoma, 2021; Senturk & Simsek, 2021; Topkaya & Simsek, 2016; Yildirim, 2016).

The findings of the research are that the use of creative comics as a teaching material will provide various benefits to the educational environment. Pre-service teachers stated that creative comics would be effective in creating a fun learning environment. This result is similar to the results of some studies on comics (Akanca, 2021; Cimermanová, 2015; Cicek Senturk, 2020; Rajendra, 2015; Senturk & Simsek, 2020; Senturk & Simsek, 2021). In addition, pre-service teachers stated that creative comics can be used as a measurement tool. Thus, it is thought that students can be informed about the learning level of environmental issues. Pre-service teachers emphasized that creative comics would provide clues about attitudes, behaviors and thoughts. This result that emerged in the research can be explained by the multi-component structure of the creative comic, which is formed by comics and creative writing. This result is similar to some studies on creative writing (Gocen, 2018; Graham, Tavsanlı & Kaldırım, 2021; Kirmizi & Adigüzel, 2023; Wang, 2021).

Social studies and science pre-service teachers have identified some limitations regarding creative comics in line with their experiences. Pre-service teachers state that a large amount of time is needed to use creative comics in lessons. In addition, pre-service teachers stated that creative comics need technological devices. Also, the pre-service teachers state that this material does not contain intense information.

In the research, it was concluded that there are some situations that educators who decide to use creative comics should pay attention to. Pre-service teachers think that creativity should be supported when using creative comics within the scope of environmental education. For this, they suggest making use of events, situations, objects or effects. The placement and angles of panels, figures and characters in comics can contain different messages (McCloud, 2006, Letizia, 2020; Potts, 2013; Sousanis, 2015). Pre-service teachers suggest using these messages to activate creativity. In addition, it was concluded that it is important where to interrupt the flow of the story and to create dilemmas in the story. In order to draw the reader into a dilemma, events should not be separated by sharp lines as black or white (Dale, 2007). In addition, it was concluded that negative comments and competition should be avoided when using creative comics. As a result, creative comics use the educational power of both comics and creative writing. Creative comics, which are formed by the combination of these two different genres, can be used as an alternative teaching material for environmental education.

Recommendations

In line with the research results the researcher suggests that;

- more comics training should be given to social studies and science pre-service teachers.
- practical lessons on creative comics be given to other pre-service teachers as well.

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