

Article

# Can Online Education Programs Solve the Cyberbullying Problem? Educating South Korean Elementary Students in the COVID-19 Era

Eunsun Choi <sup>1</sup>  and Namje Park <sup>2,\*</sup> 

<sup>1</sup> Major in Computer Education, Faculty of Science Education, Graduate School, Jeju National University, Jeju-si 63294, Korea; choi910624@jejunu.ac.kr

<sup>2</sup> Department of Computer Education, Teachers College, Jeju National University, Jeju-si 63294, Korea

\* Correspondence: namjepark@jejunu.ac.kr; Tel.: +82-64-754-4914

**Abstract:** Due to the COVID-19 lockdown, public education has been forced to hold classes online, which increases the time students are on the internet at home. While this situation has significantly reduced the incidence of physical violence between students, cyberbullying has increased sharply, even among younger students. This paper examines a program developed to educate elementary school students on how to best respond to cyberbullying—a social issue that hinders the achievement of sustainable development goals (SDGs). The program was applied to students, and the educational effects were tracked. First, we analyzed education programs in South Korea and the United States that teach students how to cope with cyberbullying, extracted characteristic parts, and developed the online education program in accordance with the current situation in South Korea. Next, we conducted an online education preference survey through an independent sample *t*-test and one-way ANOVA. As a result, regardless of gender and grade, most study subjects preferred online education. In addition, we conducted a paired sample *t*-test to determine the prevention and response effects of suggested online education programs. According to the test, the study subjects experienced less cyberbullying and victimization after participating in the online education program. Additional benefits were the students' increased ability to defend against cyberbullying and a decreased need for defenders and assistants in warding off the cyberbullies.

**Keywords:** cyberbullying; online education; COVID-19; victim; defender; assistant; bystander



**Citation:** Choi, E.; Park, N. Can Online Education Programs Solve the Cyberbullying Problem? Educating South Korean Elementary Students in the COVID-19 Era. *Sustainability* **2021**, *13*, 11211. <https://doi.org/10.3390/su132011211>

Academic Editor: Nikos E. Mastorakis

Received: 15 September 2021

Accepted: 8 October 2021

Published: 11 October 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Due to the recent development of information and communication technology, most adolescents in South Korea use smartphones and computers [1]. Although the ubiquitous access to and use of digital devices has increased the convenience of life, the downsides include addiction to smartphones and games and cyberbullying among teenagers [2,3]. The cyber-world is the primary communication and play space for teenagers, where individual identity is expressed and values are formed. To them, the cyber world is not regarded as a secondary space but a continuum of life and an essential social space for forming relationships [4–9]. Based on their long-term virtual experience, they recognize that the cyber world strongly correlates with the actual community to which they belong [10]. As such, the increasing value and influence of online experiences in the realm of an individual's life make the damage of cyberbullying a more fundamental threat and fear [11]. Moreover, the victims and perpetrators of cyberbullying are becoming younger day by day [12–14]. Those engaged in cyberbullying lack ethical awareness of their actions due to the non-face-to-face (or anonymous) nature of cyberbullying, they impart unrelenting damage on others without time or space restrictions, and the indefinite increase in the number of perpetrators increases the likelihood of more students suffering severe effects from cyberbullying [13]. A bigger problem is that the age group exposed to cyberbullying is

getting younger and younger. Considering this, the experiences of alienation and violence in online communities can be threatening and even destructive events for children [15]. As such, cyberbullying makes it difficult to achieve sustainable development goals (SDGs). The UN has identified the SDGs as targets to be achieved by 2030. They are common goals for humanity to realize the ideology of sustainable development. To achieve SDGs, the UN presents 17 goals and 169 clear goals for humanity in 5 areas of people, planet, prosperity, peace, and partnership, along with the slogan “Leave no one behind [16]”.

In South Korea specifically, as the number of online classes increased due to the COVID-19 pandemic, the proportion of cyberbullying among other incidents of school violence increased sharply [17]. The Blue Tree Foundation, an organization specializing in the prevention of youth violence, conducted a survey of 6230 students (second graders in elementary school to second graders in high school) from 17 cities and provinces nationwide from December 2020 to January 2021, and found that verbal abuse was the most common type of victimized school violence with 32.1%, followed by cyberbullying, reported by 16.3% of students, and bullying by 13.2%. The percentage of students who said they had suffered school violence in the past year was 6.7%, down 4.5 percentage points from 2019. However, the share of cyberbullying in the total victim experience nearly tripled from 5.3% in 2019 to 16.3% 2020. The types of online harassment were cyber verbal violence (37.0%), cyber defamation (16.7%), and cyberbullying (10.5%). In terms of the frequencies of harassment, cyber verbal violence (30.6%), cyber defamation (16.8%), and cyberbullying (10.1%) occurred in that order. The rates of cyberbullying on social network services were KakaoTalk (18.7%), Facebook (17.6%), and TikTok (9.5%) [18]. In South Korea, cyberbullying is emerging as a severe problem with the development of IT technology. As a representative example, the Nth Room Case is a digital sex crime and sexual exploitation case. Suspects lured victims and threatened them using social media such as Telegram, Line, and KakaoTalk from the second half of 2018 to March 2020. The victims include many minors, including middle school students. A total of 1,154 victims were confirmed at the end of the investigation in December 2020, of which 60.7% were in their 20s or younger. As of March 2020, the number of criminal participants was at least 60,000, including the main suspect, Joo-bin Cho [19].

Like traditional violence (face-to-face violence and bullying, including physical, verbal, and relational harassment), cyberbullying has negative consequences for both the bully involved and the victim in the form of decreased psychological, social, and physical health [20]. Cyberbullying needs to be monitored continuously by a multidisciplinary panel of experts because its importance will unfortunately continue to grow in the foreseeable future. The words and concepts of cyber violence, cyberbullying, and cyber outcast were unknown a few decades ago [12,21], but are now important social issues that warrant careful study and development of effective means of coping with this endemic form of noncontact violence. Research on cyberbullying prevention education and response strategy has been woefully insufficient [22–24].

Anonymity strongly influences students’ use of social networks, and relational attacks tend to be deeply involved in cyberbullying [15,25]. For this reason, it is necessary to focus on anonymity and relationships when reporting or protecting victims. Accordingly, online education on cyberbullying can be one way to increase students’ safe participation in education. The reasons for proposing an online education program to prevent and stop cyberbullying are as follows [26–30]:

1. Both victims and perpetrators of cyberbullying will prefer education that guarantees anonymity;
2. Due to the COVID-19 lockdown, the educational environment that combines online and face-to-face education has become common, and cyberbullying-related education can be provided to students even when online education is unavoidable;
3. Most of the current generation of teenagers born after 2000 have grown up under the influence of online culture, thus it is a generation that is familiar and comfortable with learning online.

At this point, we recognized cyberbullying as a serious problem that needs to be solved socially. In particular, we noted that the age of perpetrators and bystanders of cyberbullying is increasingly younger. Thus, this paper shows the result of carrying out an educational program that can contribute as a countermeasure against cyberbullying in Elementary school students in South Korea. The primary purpose of this paper is to reduce the incidence of cyberbullying among children and to nurture students' coping abilities after cyberbullying, and ultimately, to contribute to the achievement of sustainable development goals.

To achieve these goals, this paper intends to prove three hypotheses, which are as follows:

**Hypothesis 1 (H1).** (*Preference of Online Education*) *The proportion of study subjects who prefer online education, regardless of gender or grade, will increase.*

**Hypothesis 2 (H2).** (*Prevention Education Effectiveness*) *The experience of cyber violence and damage will be reduced after applying the online education program.*

**Hypothesis 3 (H3).** (*Response Education Effectiveness*) *After providing the online education program, the frequency of assistant behavior in support of cyberbullying perpetrators will be lessened, the frequency of bystander behavior pretending not to have known after witnessing the cyber violation will become less frequent, and the response behavior actively criticizing perpetrators and taking defensive action will increase.*

## 2. Materials and Methods

### 2.1. Design

#### 2.1.1. Participants and Procedures

For this study, we randomly selected 12 elementary schools in Seoul, South Korea, and investigated whether they were willing to participate in cyberbullying prevention education and answering surveys. A week after the date we contacted the schools, five elementary schools expressed their intention to participate in the study. The online education program was distributed to schools so that students could participate at any time. We provided online cyberbullying education four times from April to June 2021 for 137 elementary school students.

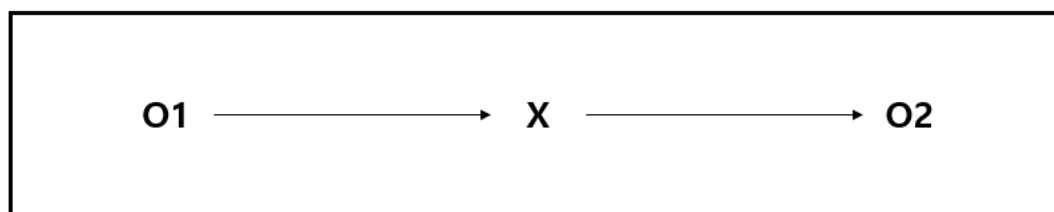
In this study, a pretest–posttest design was used to infer causal relationships by testing whether there were significant differences between the dependent variables before and after applying the program. After the first and fourth sessions of the online education program, a survey was conducted to verify the hypotheses. The form of the survey was an online survey using Google Forms. A total of 128 students responded to the survey, and 118 responses were analyzed, excluding 10 insincere responses. The survey respondents were 35 fourth graders, 41 fifth graders, and 42 sixth graders, with 58 male students and 60 female students. The demographic characteristics of the survey respondents are shown in Table 1.

**Table 1.** Demographic Details of the Respondents.

Demographic Variables		Number	Percentage
Gender	Male	58	49.15
	Female	60	50.85
Grade	4th Grade	35	29.66
	5th Grade	41	34.75
	6th Grade	42	35.59

This study adopted an empirical research method to conduct an objective study using quantities and numerical values. We thereby intend to verify the effectiveness of the study. Pre- and post-tests were conducted for the study using test tools such as preferences for

online education, the cyberbullying victimization experiences and cyberbullying behaviors scales, and cyberbullying participation. In addition, the online cyberbullying education program was used as a test treatment, and the schematic of the test design is shown in the following Figure 1.



**Figure 1.** Schematic design of the test. O1: Pre-test. X: Cyberbullying Online Education Program. O2: Post-test.

### 2.1.2. Online Education Program to Prevent and Stop Cyberbullying

This study was initiated to lower the incidence of cyberbullying, which has become more serious as the time spent in an online environment has increased due to the COVID-19 pandemic. To this end, the online education program was developed to cope with cyberbullying. The proposed education program was developed to address cyberbullying experienced by students in schools. The online class began suddenly without systematic preparation, which has caused a lot of confusion for students. Physical violence appears to have decreased; however, the space of violence has moved online, and the number of student victims exposed to violence has increased sharply [18,31]. The cyberbullying victimization experience was found to affect children's depression and suicide ideation [32]. In response, the education program was designed as a countermeasure to reduce cyberbullying victimization among children, a plague affecting students' mental and physical health, which must be resolved. In addition, this program can be provided for specific subjects or incorporated in the creative experience activities in the elementary school curriculum in Korea, depending on the situation. For example, the proposed education program may be used in elementary school's fifth-grade moral class. Lastly, this program is an online education program developed in line with the domestic educational situation in which online classes are commonly operated. Online education has the advantage of increasing accessibility, allowing more students to be educated, and allowing students to attend education anytime, anywhere [33,34]. In particular, since cyber violence is violence that takes place online, and the generation familiar with digital devices is the subject of education, this program was organized as an online education program. The program consists of less than 10 minutes per class and is completed within the time that students can remain focused [35–37].

The proposed education program was designed based on the Successive Approximation Model (SAM) approach developed to overcome the weaknesses of the ADDIE model. The ADDIE model is a representative instructional design model that explains the instructional design procedure in the stages Analyze, Design, Develop, Implement, Evaluate. However, it has the disadvantage of being too detailed and taking a long time to complete each step [38]. Therefore, we judged that SAM, which compensated for these weaknesses, was appropriate for designing the proposed cyberbullying education. First, various definitions of cyberbullying were examined in the Design stage, and countermeasures against cyberbullying were investigated for each institution [38]. At this stage, we realized that both prevention and follow-up measures were important in response to cyberbullying. Students' exposure to cyberbullying has increased, especially after the COVID-19 outbreak. Through this process, the purpose and direction of the development of the education program at this stage were established. Second, at the Develop stage, the content related to cyberbullying education from various educational institutions was analyzed in earnest, and the content system of the proposed education program was constructed. Lastly, in the Evaluate stage, the prototype program was constructed through evaluation among

education program developers. The education program was revised and supplemented with experts in education, ethics, and information security.

Before constructing the content system of the online education program for countering cyberbullying, we first examined and analyzed the content composition of the education program related to managing cyberbullying for elementary school students in Korea and abroad. In this way, we tried to establish a content system of the cyberbullying education program for schools that was most appropriate for the actual situation in South Korea. The Korea Internet & Security Agency (KISA) is conducting education programs to prevent cyberbullying and verbal abuse on mobile messengers for students in elementary, middle, and high schools, and local children's centers in South Korea, and is promoting activities to support victims. The subjects of this education program are divided into elementary, middle, and high school students and are composed of four different topics for each subject. Education for elementary school students begins with the definition of violence and deals with cyber defamation, infringement of portrait rights, bullying, and verbal violence [39].

Another example is the education program Cyberbullying, Digital Drama, and Hate Speech provided by Common Sense Media, a non-profit organization in the United States. This foundation is researching digital well-being and education in cooperation with the Harvard Graduate School Research Center. The foundation's class teaches about the impact of cyberbullying, digital drama, and hate speech on the community. The class plan is designed for K-12 students, and they learn the importance of media balance, the definition of cyberbullying that must be acquired to become a digital citizen, countermeasures, understanding and mitigation measures for digital drama, which includes disputes and conflicts in the online world, and how to respond to online hate speech. In elementary schools, education is conducted under Think Online, Digital Citizens, Power of Words and Cyberbullying [40]. Table 2 shows a comparison of the content system of online cyberbullying education programs of the Korea Internet & Security Agency (KISA) and Common Sense Education.

**Table 2.** Cyberbullying Education Program in KISA & Common Sense Education.

KISA		Common Sense Education	
Keywords	Title	Keywords	Title
Violence	What do you think of violence?	Netiquette	Pause & Think Online
Cyber Defamation/ Portrait rights	My Space, Your Space	Digital Citizenship	We, the Digital Citizens
Outcast/ Witch Hunt	It's Not Wrong Even If It's Different.	Responding to Cyberbullying	Putting a STOP to Online Meanness
Verbal Violence in Digital Games	How do I Behave on the Internet?	Digital Citizenship Cyberbullying Digital Drama	Be a Super Digital Citizen Is It Cyberbullying? Digital Drama Unplugged

According to analyses of the institutions' content systems, the education program proposed in this paper was designed by dividing the content into prevention education before the occurrence of cyberbullying and response education after cyberbullying. The keywords of the cyberbullying content were extracted from the content system of the cyberbullying education of the Korea Internet & Security Agency and Common Sense Education. Furthermore, in consideration of the increasing number of crimes related to sexual exploitation videos of children, related content was added [41]. This content system provides separate training on the prevention and response of cyberbullying to solve the problem that each institution does not provide separate training on the prevention and response of cyberbullying. Table 3 shows the detailed content system of the education program.



**Table 3.** Online Cyberbullying Educational Program.

Prevention	Keywords	Response
What is the Netiquette?	Verbal Abuse in Cyber Space	Bullies Are Not Cool! Cyberbullying Educational Ignore & Reject
Don't Post Hateful Comments!	Cyber Defamation	How to Secure Evidence
De-escalate Digital Drama!	Digital Drama/ Witch Hunt	Be an Upstander, Not a Bystander!
Put yourself on the others' shoe.	Online Sexual Harassment	Use ECRM <sup>1</sup> !
Become A Mature Digital Citizen.	Cyber-ostracism	How to Recover Stability

<sup>1</sup> ECRM: Electronic Cybercrime Report & Management system.

## 2.2. Instruments Used

This study's online cyberbullying education program is a countermeasure to rapidly increasing cyberbullying due to COVID-19. It aims to help elementary school students acquire this knowledge and develop their ability to respond to cyberbullying. This study sought to verify the prevention and response effectiveness of education programs by measuring students' preference for online education and the effects of cyberbullying education. First, the preference for online education was measured by a scale to measure how much they prefer online education. Then, the effect of cyberbullying prevention was measured using a scale to measure their cyberbullying victimization experiences and cyberbullying behaviors. Finally, the effect of responding to cyberbullying was measured with a scale asking about their participant role experiences in cyberbullying.

An extensive review of the previous literature was conducted, and the survey was prepared based on discussions by experts in education, psychology, technology, and information security to minimize the bias of researchers in measuring the preference for online education [42]. The survey consisted of 10 items, and they were rated on a 5-point Likert scale to analyze and summarize the responses (5 indicated the highest preference and 1 the lowest preference). Examples of measurement items of preference for online education include: "I prefer online education because my anonymity is guaranteed," "I prefer online education because it is not affected by the threat of infectious disease like COVID-19," and "I prefer asking teachers online rather than talking to them face-to-face."

A scale asking about cyberbullying victimization experiences and cyberbullying behaviors was used to measure the effect of cyberbullying prevention [43], consisting of 5 items for cyberbullying behavior and 5 items for victimization experiences, and each experience was evaluated using the 5-point Likert scale, where 5 indicated the strongest experience and 1 was the weakest experience. The questionnaire asked respondents whether they had ever been harmed or committed any harm through chat, e-mail, social media, etc. Examples of items asking for the offense include: "Have you ever posted a sentence or photo in a group chat to mock one of your classmates?" "Have you ever posted malicious comments on your classmate's online post?" and "Have you ever verbally abused or slandered others in a chat?" Examples of items asking for the damage include: "Have you ever been publicly humiliated in an online space?" "Have you ever seen sexually harassing remarks in a chat or message?" and "Have you ever experienced difficulties when someone falsely posted something you didn't do on the Internet?"

A scale asking for participation in cyberbullying was used to measure the effect of responding to cyberbullying [44], consisting of items about the assistant experience encouraging harm in cyberbullying situations, the bystander experience pretending not to see such a situation, and the defender experience stopping perpetrators and helping victims. Experiences in these roles were evaluated using the 5-point Likert scale (5 was the strongest experience, 1 was the weakest experience). It was designed with 5 items for assistant experience, 5 items for bystander experience, and 5 items for defender role, for a total of 15 items. Examples of items asking about the assistant experience include: "Do you stand on the side of the perpetrator when you witness cyberbullying?" and "Do you

blame the victim while sympathizing with articles that slander someone on the internet?” Examples of items asking about the bystander experience include: “I pretended not to know when I witnessed a lie in a group chat that drove my classmates away”, and “I have passed by without helping a friend who was bullied online”. Examples of items asking about the defender experience include: “Have you ever defended a victim by posting good replies?” and “Are you the type of person to criticize the perpetrator by erasing the shameful photos of classmates posted on a group chat?”

To verify the validity of this survey tool and the preference for online education, confirmatory factor analysis was performed on survey tools to measure the effect of cyberbullying prevention and the effect of responding to cyberbullying. Principal component analysis was performed on all variables, and the Varimax method was adopted from the orthogonal rotation method to solve the multicollinearity problem. Only the factors with eigenvalues greater than or equal to 1 were extracted, and the verification methods of Kaiser–Meyer–Olkin (KMO) and Bartlett were adopted [45,46]. The items were verified based on variables with a KMO value of 0.6 or higher and variables whose correlation matrix was not the identity matrix and whose significance probability was less than or equal to 0.05 in Bartlett’s sphericity test.

As a result of the verification, among the survey tools for verifying the preference for online education, the effect of cyberbullying prevention, and the effect of responding to cyberbullying, one item was found to have a factor load of 0.30. In response, we deleted this item and then re-examined the factor analysis for nine items. As a result, it was found that the KMO value of the survey tool for the preference for online education was 0.896, and the significance probability was 0.000 in Bartlett’s spherical test, indicating that it was suitable for factor analysis. It was found that the KMO value of the survey tool for the effect of cyberbullying prevention was 0.913, and the significance probability was 0.000 in Bartlett’s spherical test. Lastly, it was found that the KMO value of the survey tool for the effect of responding to cyberbullying was 0.875, and the significance probability was 0.000 in Bartlett’s spherical test, verifying the validity of the survey tool. Table 4 shows the results of factor analysis for all survey tools.

**Table 4.** Factor Analysis.

Items to Be Measured	KMO	Bartlett’s Sphericity Test		
		Chi-Square Approximation	Degree of Freedom	Chi-Square Approximation
Preference for online education	0.896	2569.674	46	0.000
Effect of cyberbullying prevention	0.913	2056.264	37	0.000
Effect of response to cyberbullying	0.875	1578.568	35	0.000

### 2.3. Analysis and Data Handling

In this study, to develop an online education program to prevent cyberbullying and examine the effect of the education program, the following six methods were used to analyze the materials collected with the test tools. The SPSS 24.0 was used for all analyses, and all were verified at a significance level of  $p < 0.05$ .

1. A descriptive statistical method was used to summarize the given data in the form of the frequency and percentage to examine the characteristics of the demographic background of the study subjects.
2. The experiment was designed to estimate the causal relationship by conducting a pre-test on the research subjects followed by a post-test after the intervention of the online education program to prevent cyberbullying.
3. Exploratory factor analysis was conducted to verify the validity of test tools in determining the preference for online education, the cyberbullying prevention effect, and the effect of responding to cyberbullying; ungrouped items were removed by

checking whether the variables measuring the same concept were grouped into the same factor; the appropriateness of items in the test tool was confirmed using methods of Kaiser–Meyer–Olkin (KMO) and Bartlett’s test of sphericity.

4. The survey on the preference for online education was conducted once before the education program was applied. An independent sample *t*-test was conducted on the study subjects’ gender to measure their preference for online education, and the one-way ANOVA test was conducted depending on the study subjects’ grades in school.
5. A paired samples pre/post *t*-test was conducted to determine whether there are significant differences in cyberbullying behavior and cyberbullying victimization experience before and after receiving the education program to identify whether the online education program had the cyberbullying prevention effect.
6. A paired samples pre/post *t*-test was conducted to determine whether there are significant differences in the participation roles of cyberbullying, i.e., defender behavior, bystander behavior, and assistant behavior, before and after receiving the education program to identify whether the online education program affected the subjects’ response to cyberbullying.

### 3. Results

#### 3.1. Preference

A survey was conducted before applying the education program to identify the subjects’ preferences for the online education program. Regarding the subjects’ preference for the online education program, pre- and post-tests were not conducted in this study because it was important to analyze whether the preference for online education programs was inherently higher than that of face-to-face education, not the subjects’ preference for this online education program. Instead, it was confirmed whether there was a difference in preference depending on the independent variables of gender and school grade. The survey results on the preference for online education of all students are shown in Table 5. As a result of the survey, all survey respondents’ mean preference for online education was 4.33 with a standard deviation of 0.44, showing a relatively high preference.

**Table 5.** Preference for online education of all survey respondents.

Mean	No.	Standard Deviation
4.33	118	0.44

Table 6 shows the results of an independent sample *t*-test conducted to examine differences in the preference for online education by gender. Looking at the results, the mean for the male group was 4.30 with a standard deviation of 0.43; the mean for the female group was 4.36 with a standard deviation of 0.45. The preference of the female group was higher by 0.06 than that of the male group, showing no significant difference by gender ( $t = -0.662, p = 0.510$ ). Therefore, it can be seen that the preference for online education is not related to gender.

**Table 6.** Preference for online education of all survey respondents.

Dependent Variable	Group	Sample Size	Mean	Standard Deviation	<i>t</i>	<i>p</i>
Preference	Male	58	4.30	0.43	−0.662	0.510
	Female	60	4.36	0.45		

Table 7 shows the results of one-way ANOVA, conducted to identify whether the preference for online education varied from grade to grade. According to the results, the mean preference for fourth graders was 4.08 with a standard deviation of 0.49; the mean



preference for fifth graders was 4.37 with a standard deviation of 0.38; the mean preference for sixth graders was 4.42 with a standard deviation of 0.42. In terms of mean values alone, sixth graders showed the highest preference, but there was no significant difference in preference for online education by grade ( $F = 3.002$ ,  $p = 0.054$ ). Therefore, it can be seen that the variables between grades and the preference for online education and gender are not interrelated.

**Table 7.** Preference for online education by grade.

Dependent Variable	Group	Sample Size	Mean	Standard Deviation	F	p
Grade	4th Grade	35	4.18	0.49	3.002	0.054
	5th Grade	41	4.37	0.38		
	6th Grade	42	4.42	0.42		

As a result of analyzing the overall preference, it was found that students had a very high preference for online education and that all groups, regardless of gender and grade, considered online education a positive experience. In response, Hypothesis 1 (H1) was adopted.

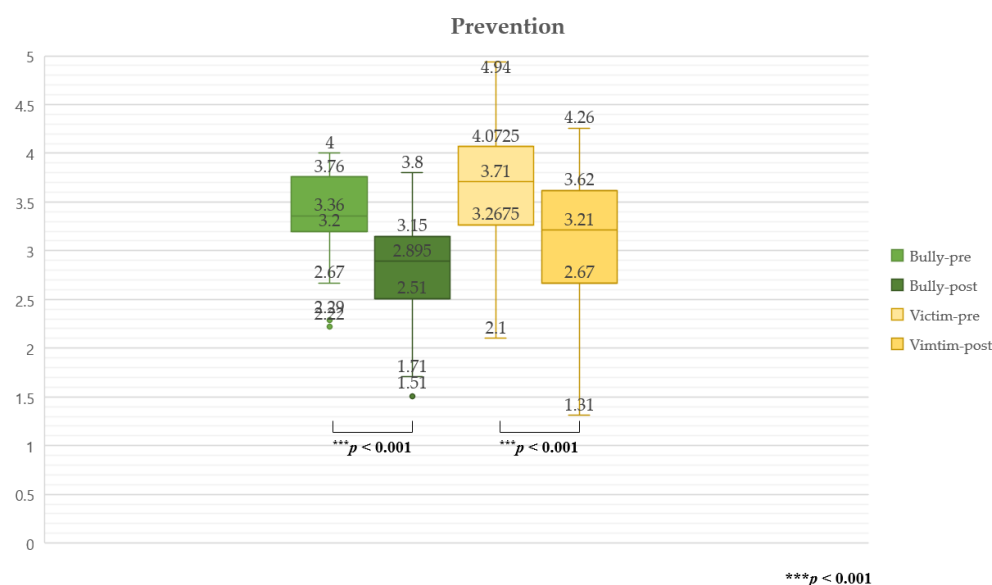
### 3.2. Prevention

To measure the effect of cyberbullying prevention before and after the application of the online cyberbullying education program proposed in this paper, the paired samples pre/post *t*-test was conducted. Table 8 shows the results. Specifically, the cyberbullying behavior in the study group before the application of the online education program had a mean of 3.38 with a standard deviation of 0.41; after the application, the cyberbullying behavior had a mean of 2.80, exactly 0.58 lower than before, with a standard deviation of 0.49, reflecting a statistically significant difference ( $t = 12.304$ ,  $p < 0.001$ ). On the other hand, the cyberbullying victimization experience before the application of the online education program had a mean of 3.68 with a standard deviation of 0.47; after the application, it decreased to 3.11, exactly 0.57 lower than before, with a standard deviation of 0.65. This difference was also statistically significant ( $t = 9.601$ ,  $p < 0.001$ ). In Figure 2, it can be seen that the study subjects had more intense cyberbullying victimization experiences than cyberbullying behaviors, showing significantly correlated declines in both cyberbullying victimization experience and cyberbullying behavior areas. In response, Hypothesis 2 (H2) was adopted.

**Table 8.** Test results for the difference in preventive effect before and after application of online education program (N = 118).

Prevention		Mean	Standard Deviation	t	p
Cyberbullying behavior	Pre	3.38	0.41	12.304	0.000 ***
	Post	2.80	0.49		
Cyberbullying victimization experience	Pre	3.68	0.47	9.601	0.000 ***
	Post	3.11	0.65		

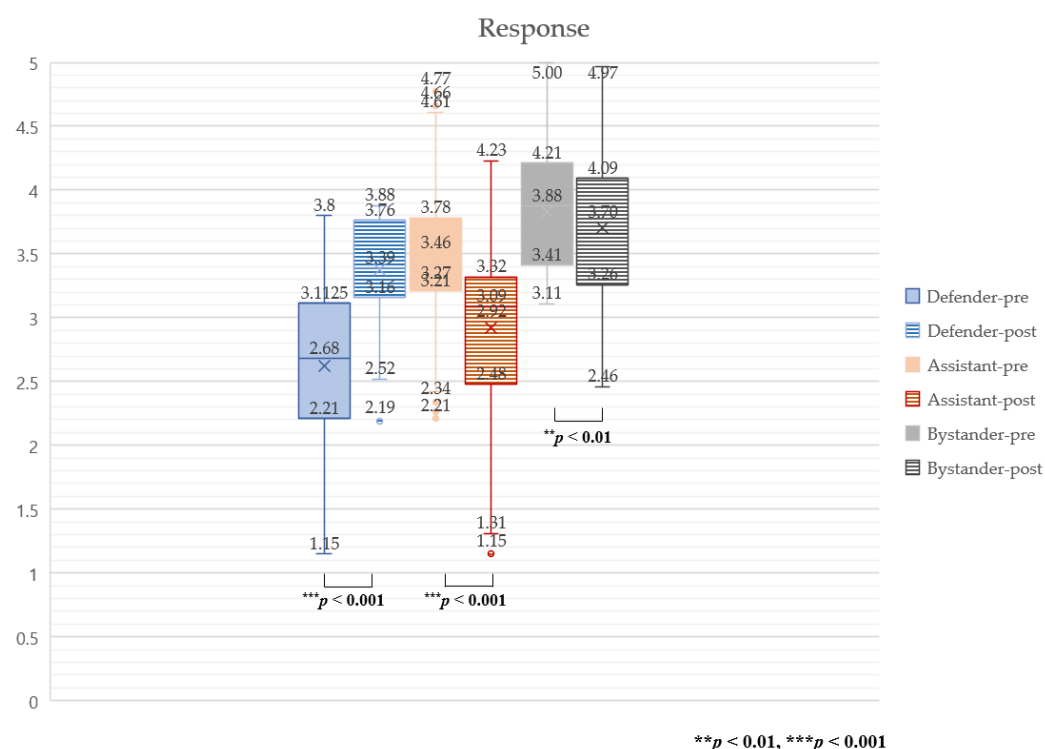
\*\*\*  $p < 0.001$ .



**Figure 2.** Boxplot of pre- and post-test results of preventive effects of applying the online education program.

### 3.3. Response

The paired samples *t*-test was conducted to measure the effect of responding to cyberbullying before and after applying the online cyberbullying education program proposed in this paper. Table 9 shows the results. In detail, the defender behavior before the application of the education program had a mean of 2.63 with a standard deviation of 0.56; after the application, it had a mean of 3.37 with a standard deviation of 0.40. The mean increased by 0.74, indicating a statistically significant difference ( $t = -14.014$ ,  $p < 0.001$ ). In addition, before the application of the education program, the assistant behavior had a mean of 3.46 with a standard deviation of 0.51; after the application, it had a mean of 2.92, 0.54 lower than before, with a standard deviation of 0.69. The results indicated a statistically significant difference ( $t = 7.925$ ,  $p < 0.001$ ). On the other hand, the bystander behavior before the education program application had a mean of 3.83 with a standard deviation of 0.464; after the application, it had a mean of 3.70 with a standard deviation of 0.13. The mean for the bystander behavior seems to have decreased relatively less than those for the defender behavior and assistant behavior, but it was also a statistically significant difference ( $t = 2.703$ ,  $p < 0.01$ ). As can be seen from the *t*-value, the mean for the defender behavior has declined to the right, unlike the assistant behavior and the bystander behavior. Figure 3 shows the boxplot pre- and post-test results of the preventive effects of applying the online education program. According to this graph, it can be seen that students experienced the bystander role more than the defending or assistant role in cyberbullying situations. In addition, the pre- and post-mean difference revealed that the defender behavior and the assistant behavior rose and fell, respectively, and the bystander behavior appeared to have a mean difference less than the other variables. Hypothesis 3 (H3) was adopted from the analysis results.



**Figure 3.** Boxplot of pre- and post-test results of responsive effects of applying the online education program.

**Table 9.** Test results of the difference in responsive effects before and after the application of the online education program (N = 118).

Prevention		Mean	Standard Deviation	<i>t</i>	<i>p</i>
Defender	Pre	2.63	0.56	−14.014	0.000 ***
	Post	3.37	0.40		
Assistant	Pre	3.46	0.51	7.925	0.000 ***
	Post	2.92	0.69		
Bystander	Pre	3.83	0.46	2.703	0.008 **
	Post	3.70	0.47		

\*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

#### 4. Discussion

This study shows the results of developing and applying an online cyberbullying education program for elementary school students in South Korea in response to rapidly increasing cyberbullying behaviors after the outbreak of COVID-19. In this education program, preventive education and responsive education were conducted, respectively, under the five types of cyberbullying categories: cyber verbal abuse, cyber defamation, digital drama / witch hunt, online sexual harassment, and cyberbullying. The study subjects were elementary school students in Seoul, South Korea. They took the online education program for two months. We conducted a questionnaire survey to analyze the effect of education before and after taking the education program. Although 137 people attended the education program, only the 118 subjects who responded sincerely were selected as subjects for the study.

First, the preference for online education of students was measured before taking the education program. We assumed that students would prefer online classes regardless of gender or grade. As a result of the analysis, the subjects showed a very high preference with a mean of 4.33 and a standard deviation of 0.44. The independent samples *t*-test, which

checked whether there was a difference in preference by gender, showed no correlation between gender and preference because the mean difference was not statistically significant. In addition, the results of the one-way ANOVA to identify the difference in preference by grade also showed that the difference in the mean was not statistically significant. These results indicate that the study subjects think positively about online education regardless of gender and grade. However, this study does not include a detailed analysis of the reasons why subjects prefer online education. There can be various influencing factors: it is easy to guarantee the anonymity of the perpetrator and the victim, students' familiarity with digital devices, or preference for safer online education over face-to-face classes due to the threat of infectious diseases caused by COVID-19. It is considered necessary to study these influencing factors in subsequent studies.

To measure the preventive effect of the online education program proposed in this paper, we investigated students' cyberbullying and victimization experiences before and after taking the education program. During the research design process, the application of the online cyberbullying education program proposed in this paper is expected to reduce students' cyberbullying victimization experiences and cyberbullying behaviors. As a result of the pre/post paired samples *t*-test, it was confirmed that the student's cyberbullying victimization experiences and cyberbullying behaviors decreased within a statistically significant range. On the other hand, the responsive effect was measured by taking the education program and then measuring the students' experience of participation in cyberbullying in the form of defending, conforming, and bystander. Students showed a slightly smaller difference in the bystander behavior before and after compared to other variables, but in conclusion, statistically significant differences were observed in all defender, assistant, and bystander behaviors. Therefore, it can be seen that the preventive and responsive effects of the online education program proposed in this study have been proven. However, it was impossible to collect opinions from all grades of elementary school students because the lower grades were excluded because of the elementary school students who had difficulty understanding the survey questions. In addition, because the study was conducted on elementary school students, it was not possible to subdivide the survey questions. Given that cybercrime perpetrators and victims are getting younger, we recognize that research on lower grades should be conducted through qualitative research methods such as counseling with students and that detailed research on various factors is needed.

In addition, overall, since the number of study samples was limited to only 137 elementary school students in Seoul, Korea, the number of samples should be increased in future studies to reflect the experiences and opinions of a more comprehensive sampling of subjects. In addition, this study cannot be regarded as having been unconditionally influenced by this education program because neither all the programs conducted at school nor the information acquired by students through media other than the education program proposed in this paper could be controlled. Furthermore, follow-up studies are necessary to determine whether the effect of education can be expanded over time.

## 5. Conclusions

Cyber violence is a major obstacle to achieving the SDGs [16]. In particular, South Korea has built a strong infrastructure and gained fame as an IT powerhouse since the introduction of 5G for the first time globally, but, indeed, it is not free from the shadow of cyberbullying [47–49]. Information and communication technology are now globalized, and digital device users are getting younger [14]. For this reason, cyberbullying is an impactful social problem that needs to be urgently solved in South Korea and throughout the world. Moreover, various measures are needed to cope with cyberbullying. For example, there are policies that legally rescue victims, psychotherapy, cybercrime reporting, and counseling services [50–53]. However, most importantly, it is essential to raise students' awareness of cyber ethics and cyberbullying awareness through education. Through this

education, the number of perpetrators, bystanders, and assistants should be reduced so that the incidence of cyberbullying can ultimately be reduced [54–58].

Therefore, this paper proposed an online education program to solve cyberbullying of elementary school students in South Korea and attempted to verify its educational effectiveness through pre- and post-surveys.

The results indicated that students had a very high preference for online education, regardless of gender or grade. In addition, after conducting cyberbullying online education, students had fewer incidents of cyberbullying victimization and cyberbullying behavior, which verified the program's effect on preventing cyberbullying. The program's efficacy was also confirmed by a decrease in the reported incidents of conforming and bystander behaviors and increased defender behavior.

However, this study's limitations include small sample size and limited control of some variables and test tools, thus future studies must overcome these limitations. To this end, test tools should be fine-tuned by securing a larger number of research subjects and recruiting them from various age groups to analyze better the various factors affecting cyberbullying and perform more extensive follow-up research on the same subjects.

This study addresses the COVID-19 lockdown's effect on the rapidly increasing numbers of cyberbullying incidents among elementary school students in South Korea and proposes an online education program to impact students' behavior toward their classmates and their behavioral response to cyberbullying incidents. Cyberbullying is a pervasive problem affecting a growing number of today's youths, so it is necessary to investigate the means of curbing and responding to this plague.

**Author Contributions:** Conceptualization, methodology, investigation, validation, formal analysis and writing—original draft preparation and project administration, E.C. and writing, review, editing and supervision N.P. All authors have read and agreed to the published version of the manuscript.

**Funding:** This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2019S1A5C2A04083374), and, this work was supported by the Korea Foundation for the Advancement of Science and Creativity (KOFAC) grant funded by the Korea government (MOE).

**Institutional Review Board Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author. The data are not publicly available due to Confidentiality Agreement.

**Conflicts of Interest:** Authors declare no conflict of interest.

## References

1. Chu, H.S.; Tak, Y.R.; Lee, H. Exploring Psychosocial Factors that Influence Smartphone Dependency among Korean Adolescents. *PLoS ONE* **2020**, *15*, e0232968. [[CrossRef](#)] [[PubMed](#)]
2. Kwon, M.; Lee, J.; Won, W.; Park, J.; Min, J.; Hahn, C.; Gu, X.; Choi, J. Development and Validation of a Smartphone Addiction Scale (SAS). *PLoS ONE* **2013**, *8*, e56936. [[CrossRef](#)] [[PubMed](#)]
3. Kim, J.; Park, N. Blockchain-Based Data-Preserving AI Learning Environment Model for AI Cybersecurity Systems in IoT Service Environments. *Appl. Sci.* **2020**, *10*, 4718. [[CrossRef](#)]
4. Alim, S. Cyberbullying in the World of Teenagers and Social Media: A Literature Review. *Int. J. Cyber Behav. Psychol. Learn.* **2017**, *6*, 68–95. [[CrossRef](#)]
5. Rizza, C.; Pereira, A.G. *Social Networks and Cyber-Bullying among Teenagers*; European Commission Joint Research Centre: Ispra, Italy, 2013.
6. Park, J.; Kim, J.; Gupta, B.B.; Park, N. Network Log-Based SSH Brute-Force Attack Detection Model. *Computers, Mater. Contin.* **2021**, *68*, 887–901. [[CrossRef](#)]
7. Choi, E.; Park, N. The Effect of the Future IT Convergence Curriculum on Teaching Efficacy of Prospective Teachers. *J. Korean Assoc. Inf. Educ.* **2021**, *25*, 207–215.



8. Choi, E.; Park, N. Demonstration of Gamification in Education for Understanding Artificial Intelligence Principles at Elementary School Level. *Ilkog. Online* **2021**, *20*, 709–715. [\[CrossRef\]](#)
9. Arce, G. Chapter 11: The Internet and its Hidden Cyberthreats for Teenagers. In *Cybersecurity and Legal-Regulatory Aspects*; World Scientific Publishing Co. Pte. Ltd.: Tuck Link, Singapore, 2021; pp. 245–278. [\[CrossRef\]](#)
10. Weru, T.; Sevilla, J.; Olukuru, J.; Mutege, L.; Mberi, T. Cyber-Smart Children, Cyber-Safe Teenagers: Enhancing Internet Safety for Children. In Proceedings of the 2017 IST-Africa Week Conference (IST-Africa), Windhoek, Namibia, 30 May–2 June 2017; pp. 1–8. [\[CrossRef\]](#)
11. Randa, R. The Influence of the Cyber-Social Environment on Fear of Victimization: Cyberbullying and School. *Secur. J.* **2013**, *26*, 331–348. [\[CrossRef\]](#)
12. Epelde-Larrañaga, A.; Oñederra Ramírez, J.A.; Estrada-Vidal, L.I. Music as a Resource Against Bullying and Cyberbullying: Intervention in two Centers in Spain. *Sustainability* **2020**, *12*, 2057. [\[CrossRef\]](#)
13. Barlett, C.P.; Chamberlen, K. Examining Cyberbullying across the Lifespan. *Comput. Hum. Behav.* **2017**, *71*, 444–449. [\[CrossRef\]](#)
14. Pichel, R.; Foody, M.; O'Higgins Norman, J.; Feijóo, S.; Varela, J.; Rial, A. Bullying, Cyberbullying and the Overlap: What Does Age Have to Do with It? *Sustainability* **2021**, *13*, 8527. [\[CrossRef\]](#)
15. Hosseinmardi, H.; Ghasemianlangroodi, A.; Han, R.; Qin, L.V.; Mishra, S. Towards Understanding Cyberbullying Behavior in A Semi-Anonymous Social Network. In Proceedings of the 2014 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2014), Beijing, China, 17–20 August 2014; pp. 244–252. [\[CrossRef\]](#)
16. Sittichai, R.; Ojanen, T.T.; Burford, J. Tracing the Connections Between Sustainable Development, Bullying, and Cyberbullying: The Case of Thailand. In *Developmental Science and Sustainable Development Goals for Children and Youth*; Social Indicators Research Series; Verma, S., Petersen, A., Eds.; Springer: Cham, Switzerland, 2018; Volume 74. [\[CrossRef\]](#)
17. Mori, R.; Fien, J.; Horne, R. SDGs in Universities: Challenges, Opportunities, and Lessons Learned. *Sustainability* **2019**, *12*, 129–133. [\[CrossRef\]](#)
18. The Blue Tree Foundation. *2021 National School Violence and Cyberbullying Research Report*; The Blue Tree Foundation: Seoul, Korea, 2021.
19. Kim, H. A study on the actual conditions of digital sex crime policies in major countries and issues and direction of the sex crime policy in Korea: Case studies of the U.S., Australia, Japan, and Germany. *J. Digit. Converg.* **2020**, *18*, 85–95. [\[CrossRef\]](#)
20. Yoo, S.; Kim, M. The Suggestion and Validation on the Structural Model of the Causes of Cyber-violence. *J. Korean Assoc. Comput. Educ.* **2011**, *14*, 23–33.
21. Calmaestra, J.; Rodríguez-Hidalgo, A.J.; Mero-Delgado, O.; Solera, E. Cyberbullying in Adolescents from Ecuador and Spain: Prevalence and Differences in Gender, School Year and Ethnic-Cultural Background. *Sustainability* **2020**, *12*, 4597. [\[CrossRef\]](#)
22. Yoon, H. A Case Study on the Development of a Serious Game “Happy Class” for Preventing Cyber Bullying. *J. Korea Game Soc.* **2020**, *20*, 45–60. [\[CrossRef\]](#)
23. Jang, H.; Lee, S. An Integrated Test of Interaction Effect between Causes and Internet Ethics of Smart Phone Cyber Bullying. *Informatiz. Policy* **2019**, *26*, 46–61. [\[CrossRef\]](#)
24. Lukavská, K.; Burda, V.; Lukavský, J.; Slussareff, M.; Gabrhelík, R. School-Based Prevention of Screen-Related Risk Behaviors during the Long-Term Distant Schooling Caused by COVID-19 Outbreak. *Int. J. Environ. Res. Public Health* **2021**, *18*, 8561. [\[CrossRef\]](#)
25. Sticca, F.; Perren, S. Is Cyberbullying Worse than Traditional Bullying? Examining the Differential Roles of Medium, Publicity, and Anonymity for the Perceived Severity of Bullying. *J. Youth Adolesc.* **2013**, *42*, 739–750. [\[CrossRef\]](#)
26. Barlett, C.P.; DeWitt, C.C.; Maronna, B.; Johnson, K. Social Media Use as a Tool to Facilitate or Reduce Cyberbullying Perpetration: A Review Focusing on Anonymous and Nonanonymous Social Media Platforms. *Violence Gend.* **2018**, *5*, 147–152. [\[CrossRef\]](#)
27. Barlett, C.P.; Heath, J.B.; Madison, C.S.; DeWitt, C.C.; Kirkpatrick, S.M. You're Not Anonymous Online: The Development and Validation of a New Cyberbullying Intervention Curriculum. *Psychol. Pop. Media* **2020**, *9*, 135–144. [\[CrossRef\]](#)
28. Ševčíková, A.; Šmahel, D.; Otavová, M. The Perception of Cyberbullying in Adolescent Victims. *Emot. Behav. Difficulties* **2012**, *17*, 319–328. [\[CrossRef\]](#)
29. Bochaver, A.A.; Khlomov, K.D. Cyberbullying: Harassment in the Space of Modern Technologies. *Psychol. J. High. Sch. Econ.* **2014**, *11*, 178–191.
30. Moshfegh, N.; Ebrahimi, P. Elementary School Students, The Anonymous Victims of Cyberbullying. *Int. E J. Adv. Soc. Sci.* **2018**, *4*, 205–208. [\[CrossRef\]](#)
31. Sheikh, M.K.; Chaudhry, N.; Ghogare, A. Depression in Teachers Due to Cyberbullying Who are Working in COVID-19 Pandemic: A Cross-Sectional Study. *Int. J. Cur. Res. Rev.* **2020**, *12*, 98–102. [\[CrossRef\]](#)
32. Oh, S.Y.; Sim, H.I.; Cho, Y.O. Impact of Victimization Experience of Domestic Violence, School Violence and Cyber Bullying on Suicidal Ideation of Juveniles. *Korean Crim. Psychol. Rev.* **2020**, *16*, 87–110. [\[CrossRef\]](#)
33. Foody, M.; Samara, M.; Carlbring, P. A Review of Cyberbullying and Suggestions for Online Psychological Therapy. *Internet Interv.* **2015**, *2*, 235–242. [\[CrossRef\]](#)
34. Li, H. Distance Education: Pros, Cons, and the Future. In Proceedings of the Instructional Division WSCA Annual Conference, Long Beach, CA, USA, 2–5 March 2002; pp. 10–38.
35. Kim, D.C.; Park, J.T. Analysis of the Change in Student Concentration Over Time During Class. *J. Serv. Res. Stud.* **2014**, *4*, 11–19.
36. Na, B. Attention Span during Lectures: 8 Seconds, 10 Minutes, or More? *Adv. Physiol. Educ.* **2016**, *40*, 509–513. [\[CrossRef\]](#)

37. Park, N.; Kang, N. Mutual Authentication Scheme in Secure Internet of Things Technology for Comfortable Lifestyle. *Sensors* **2016**, *16*, 20. [CrossRef] [PubMed]
38. Allen, M.; Sites, R. *Leaving ADDIE for SAM: An Agile Model for Developing the Best Learning Experiences*; American Society for Training and Development: Alexandria, VA, USA, 2012.
39. Korea Internet & Security Agency: Cyberbullying Prevention Education. 2021. Available online: [https://www.kisa.or.kr/business/promotion/promotion5\\_sub2.jsp](https://www.kisa.or.kr/business/promotion/promotion5_sub2.jsp) (accessed on 13 August 2021).
40. Common Sense Education: Digital Citizenship Curriculum. 2021. Available online: <https://www.commonsense.org/education/digital-citizenship/curriculum?topic=cyberbullying-digital-drama--hate-speech> (accessed on 13 August 2021).
41. Kim, H. Current Status of Response to Digital Child Sexual Slavery and Comparative Analysis of Overseas Crime Prediction System Using Artificial Intelligence. *J. Digit. Converg.* **2020**, *18*, 357–368. [CrossRef]
42. Muthuprasad, T.; Aiswarya, S.; Aditya, K.S.; Jha, G.K. Students' Perception and Preference for Online Education in India during COVID-19 Pandemic. *Soc. Sci. Humanit. Open* **2021**, *3*, 100101. [CrossRef] [PubMed]
43. Hinduja, S.; Patchin, J.W. Offline Consequences of Online Victimization. *J. Sch. Violence* **2007**, *6*, 89–112. [CrossRef]
44. Salmivalli, C.; Lagerspetz, K.; Björkqvist, K.; Österman, K.; Kauliainen, A. Bullying as a Group Process: Participant Roles and Their Relations to Social Status within the Group. *Aggress. Behav.* **1996**, *22*, 1–15. [CrossRef]
45. Kaiser, H.F. An Index of Factorial Simplicity. *Psychometrika* **1974**, *39*, 31–36. [CrossRef]
46. Bartlett, M.S. The Frequency Goodness of Fit Test for Probability Chains. In *Mathematical Proceedings of the Cambridge Philosophical Society*; Cambridge University Press: London, UK, 1951; Volume 47, pp. 86–95. [CrossRef]
47. Tastle, W.J.; Wierman, M.J. Consensus and Dissent: A Measure of Ordinal Dispersion. *Int. J. Approx. Reason.* **2007**, *45*, 531–545. [CrossRef]
48. Opensignal: Benchmarking the Global 5G Experience—April 2021. Available online: <https://www.opensignal.com/2021/04/15/benchmarking-the-global-5g-experience-april-2021> (accessed on 19 August 2021).
49. Choi, E.; Ko, J.; Choi, G.; Kim, H.; Lee, H.; Park, N. Creative Convergence Course Future Confluence IT Humanities Development and Operational Effectiveness Verification. *J. Korea Multimed. Soc.* **2021**, *24*, 569–582. [CrossRef]
50. Jung, W.; Park, N. A Safe Web in Network Separation Environment. *J. Comput. Theor. Nanosci.* **2020**, *17*, 3243–3249. [CrossRef]
51. Park, N.; Lee, D. Electronic Identity Information Hiding Methods using a Secret Sharing Scheme in Multimedia-centric Internet of Things Environment. *J. Pers. Ubiquitous Comput.* **2018**, *22*, 3–10. [CrossRef]
52. Park, N.; Sung, Y.; Jeong, Y.; Shin, S.; Kim, C. The Analysis of the Appropriateness of Information Education Curriculum Standard Model for Elementary School in Korea. *J. Stud. Comput. Intell.* **2018**, *791*, 1–15. [CrossRef]
53. Jung, W.; Kim, J.; Park, N. Web-Browsing Application Using Web Scraping Technology in Korean Network Separation Application. *Symmetry* **2021**, *13*, 1550. [CrossRef]
54. Cross, D.; Lester, L.; Barnes, A.; Cardoso, P.; Hadwen, K. If It's about Me, Why Do It without Me? Genuine Student Engagement in School Cyberbullying Education. *Int. J. Emot. Educ.* **2015**, *7*, 35–51.
55. Washington, E. An Overview of Cyberbullying in Higher Education. *J. Index. Metr.* **2014**, *26*, 21–27. [CrossRef]
56. Macaulay, P.; Betts, L.R.; Stiller, J.; Kellezi, B. Perceptions and responses towards cyberbullying: A systematic review of teachers in the education system. *Aggress. Violent Behav.* **2018**, *43*, 1–12. [CrossRef]
57. Kim, J.; Park, N. Lightweight Knowledge-based Authentication Model for Intelligent Closed Circuit Television in Mobile Personal Computing. *Pers Ubiquit Comput.* **2019**. [CrossRef]
58. Ryu, S.; Kim, J.; Park, N.; Seo, Y. Preemptive Prediction-Based Automated Cyberattack Framework Modeling. *Symmetry* **2021**, *13*, 793. [CrossRef]