

An Investigation of Cyberbullying and Cyber-Victimization of Mathematics and Science Pre-Service Teachers

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ABSTRACT

The purpose of this study is to examine mathematics and science pre-service teachers' cyberbullying behaviors and victimization conditions by gender, year in university, time spent on the Internet, and social media usage status. Survey study model was employed in the study. The sample of the study was comprised of 219 mathematics and science pre-service teachers whose ages ranged between 18 and 24 years. The data of the study were collected via the Cyber Victim and Bullying Scale and the data were analyzed by using Mann-Whitney U test and Kruskal Wallis test. Based on the average scores, it was revealed that the cyberbullying and cyber victimization scores of mathematics and science pre-service teachers participating in the study were significant in terms of gender variable. However, they were not found to be significant regarding their year in university, time spent on the Internet and social media usage status.

Keywords: *Cyberbullying, cyber victimization, mathematics, pre-service teachers, science.*

INTRODUCTION

With developments in information technologies, social media and web2.0 technologies, which enable individuals to access and share information, to express themselves freely, to discover their identity, to entertain themselves, to speak fearlessly with other people, and to interact with others, have entered our lives. Even though these technologies provide some opportunities that are believed to facilitate our lives, they have also introduced various negative situations into our lives. The most important of these situations are cyberbullying or cyber victimization of individuals in social media. While cyberbullying behavior resembles common bullying behavior, it is methodologically done through information and communication technologies. Cyberbullying refers to using the computer, Internet, mobile phone and other communication tools insistently and repeatedly to give harm to others (Hinduja & Patchin, 2009). Based on this definition, the most important elements of cyberbullying is insistence, repeatedness and malignant behavior (Belsey, 2007; Hinduja & Patchin, 2014). Threatening victims via information and communication technologies, sending victims messages including abusive words, utterances including sexual threats, and messages including aggression can be listed among some cyberbullying behaviors (Özdemir & Akar, 2011; Şahin, Sarı, Özer & Er, 2010). Accordingly, it can be understood that while in physical bullying bullies derive their power from being physically strong or being social, in cyberbullying practiced in virtual environments, competencies regarding virtual environments come into play (Patchin & Hinduja, 2006). As stated by Srivastava, Gamble & Boey (2013), individuals can use their own competencies to make individuals encounter some features of virtual environments as more insidious and serious threats. While those who use their technical skills in information technologies to give harm to others can engage in cyberbullying, individuals whose skills are not

at a sufficient level can become cyber victims. That is, the abuse of these competencies of individuals who effectively use information and communication technologies leads to an increase in bullying behavior.

It can be stated that particularly victims subjected to cyberbullying by their peers can be adversely affected personally, socially, psychologically, and emotionally (Şahin, Aydın & Sarı, 2012). Antisocial personality characteristics, school phobia, introvertedness, a decrease in self-respect, loneliness, sexual abuse, absence from school, depression, sadness, anxiety, sleep disorder, nightmares, and even suicides can be observed in individuals exposed to cyberbullying (Arseneault, Bowes, & Shakoor, 2010; Batmaz & Ayas, 2013; Beran & Li, 2007; Brewer & Kerlake, 2015; Hoff & Mitchell, 2008; Horzum & Ayas, 2014; Li, 2010; von Marees & Petermann, 2012; Semerci, 2017; Serin, 2012; Yılmaz, 2010). To illustrate, 14-year-old Molly Russell committed suicide in England in 2017 after watching some disturbing, suicide-related content on the social media. Subsequently, in his explanation to BBC, Molly's father said, "Instagram has been a medium for my daughter's death." That various measures should be taken in England has been brought to the agenda many times, the latest of which was a BBC news in January 2019 titled "UK could ban social media over suicide images, minister warns" Based on the sharing of suicide videos and images of people giving harm to themselves, Hancock, Minister of Health in England, made a call to social media companies to remove such content. However, the Minister reported that social media companies had still not taken the necessary measures regarding the increase in suicidal events experienced among the youth England and, thus, they might have to take measures themselves by enforcing a law to ban these companies (URL-1, 2019). Yet, rather than such measures as bans imposed by the government, the important roles that particularly families and educators play in preventing the increase in cyberbullying victims can be considered. Hence, Eroğlu and Peker (2011) have reported that social support by the family predicts cyber victimization negatively, while cyber victimization predicts social support by friends negatively. Thus, it can be deduced from this finding that support provided by the immediate social circle is believed to be an important factor in decreasing cyber victimization.

During the review of the related literature, a research study by Semerci (2017) was encountered. The findings of this study, conducted with high school students, yielded a significant relationship between grade level and conditions of cyberbullying and cyber victimization. Moreover, Semerci stated that the direct correlation between the increase in grade level and the increasing bullying behavior could stem from students' adaptation to the school environment over time, the establishment of friendships in school, and their over self-confidence of being final year students. In another study, which was conducted by Özdemir and Akar (2011), it was revealed that Internet users of five or more hours engaged in more cyberbullying behavior when compared to those who spent fewer hours using the Internet. Various other studies conducted with university students, in which the gender variable was also examined, reported that male students displayed more cyberbullying behaviors than female students, and that a higher number of girls were prone to become victims of cyberbullying (Arıca, 2009; Calvete, Orue, Estévez, Villardón & Padilla, 2010; Dehue, Bolman & Vollink, 2008; Dilmaç, 2009; Hay, Meldrum & Mann, 2010; Huang & Chou, 2010).

Finally, Süslü and Oktay (2018) mentioned that there was no consistency in research findings regarding the relationship between cyberbullying/victimization and age; while some studies reported a direct correlation between cyberbullying and age, some other studies reported that cyberbullying decreased as age increased. Thus, it can be observed in the literature that such factors as grade level, gender, age, time spent on the Internet are important variables with respect to cyberbullying behavior. The fact that rapid development in information and communication technologies enabled accessibility and interaction among individuals established a platform where individuals of almost any age and educational level can be affected by cyberbullying. Different from other studies, the current study addresses cyberbullying, which is characterized by many countries as a universal problem among children and adolescents, with the aim of contributing to solution-oriented work and measures that can be taken in this area by investigating various variables regarding university students. Preservice teachers were chosen in the research as university students. As stated in the literature, awareness levels of teachers are an important factor in coping with cyberbullying (Ayas & Horzum, 2012; Şahin, Sarı, Özer & Er, 2010; Özdemir & Akar, 2011). This indicates the need for examining teacher and preservice teacher interactions with cyberbullying. Accordingly, studies have been conducted on cyberbullying in the national literature with preservice classroom teachers (Mutlu, 2017;

Özçelik and Kale, 2019; Sakallı, 2015), preservice CEIT teachers (Dikmen and Çağlar, 2017; Gezgin and Çuhadar, 2012), preservice science teachers (Hançer and Mişe, 2017), faculty of education students (Elmas, 2016; Karakurt, 2014; Odacı and Berber Çelik, 2018; Uysal, Duman, Yazıcı and Şahin, 2014; Yılmaz, 2010) and teachers (Ayas & Horzum, 2011; Yildirim, Celikten, Desiatov & Khmelnytsky, 2019). However, among those studies, only few have been specifically conducted with preservice teachers of science and mathematics which are associated with technology (Tanık and Önal, 2019). It can be accordingly argued that this is an important study in term of filling a gap in the national literature. Individuals are sometimes unaware that what they do is cyberbullying or what they are exposed to is cyber-victimization. Indeed, in the research performed Tanık and Önal (2019), it was found that preservice science and mathematics teachers either were not aware of cyberbullying or misunderstood its meaning. In this sense, this study is considered to have a remarkable value to attract attention to cyberbullying. Furthermore, studies in the literature have generally been conducted to identify sensitivity of teachers and preservice teachers to cyberbullying (Dikmen and Çağlar, 2017; Gezgin and Çuhadar, 2012; Odacı and Berber Çelik, 2018). One can argue that this research stands out among others in the literature from this aspect.

In this context, the aim of the present study was to examine the cyberbullying and victimization conditions of pre-service teachers, who could be considered to be among the future educators of Turkey, in terms of the variables of gender, grade level, time spent on the Internet, and social media usage status. Research questions can be listed as follows:

1. Is there a statistically significant difference in the status of cyberbullying and cyber-victimization by gender?
2. Is there a statistically significant difference in the status of cyberbullying and cyber-victimization by year?
3. Is there a statistically significant difference in the status of cyberbullying and cyber-victimization by using of social media?
4. Is there a statistically significant difference in the status of cyberbullying and cyber-victimization by time spent on the internet?.

RESEARCH METHOD

Research Model

The present study employed the descriptive survey method, which aims to reveal the existing condition under study; that is, there is no attempt to change or impact the conduction under study (Fraenkel & Wallen, 2006).

Participants

The study population of this research was composed of preservice science and mathematics teachers attending a public university in the Central Anatolia Region of Turkey in the academic year of 2018-2019. Sampling was not preferred in the research, and the research was performed with 219 volunteered participants from among the preservice teachers in the population. The demographic characteristics of the participants are presented in Table 1.

Table 1. Demographic Characteristics of the Participants of the Study

| Demographic Features | | Frequency | % |
|----------------------|-----------|-----------|------|
| Gender | Female | 131 | 59.8 |
| | Male | 88 | 40.2 |
| Year | Freshman | 62 | 28.3 |
| | Sophomore | 50 | 22.8 |

| | | | |
|---|----------------|-----|--------|
| | Junior | 57 | 26.0 |
| | Senior | 50 | 22.8 |
| How many hours per day do you use the Internet? | 1-3 hours | 99 | 45.2 |
| | 4-6 hours | 83 | 37.9 |
| | 7-9 hours | 15 | 6.8 |
| | 10 hours and + | 22 | 10.0 |
| Do you use social media? | Yes | 206 | 94.1 |
| | No | 13 | 5.9 |
| | Total | 219 | 100.00 |

As seen in Table 1, 59.8% (131) of the participants were female, while 40.2% (88) were male pre-service teachers. As regards time spent on the Internet, 97.3% (213) of the participants were found to be on-line and 94.1% (206) used the social media every day. However, only 48.9% (107) of the participants indicated in the scale that they had heard of the word cyberbullying before.

Data Collection Tool

The data for the research were collected by means of the Cyber Victim and Bullying Scale, developed by Çetin, Yaman and Peker (2011). This scale consists of two parallel forms, namely engaging in cyberbullying and being a cyber victim. It includes 22 items. The participants were asked to indicate whether or not they were victims of cyberbullying by marking "I have been a victim," and whether or not they engaged in cyberbullying by marking "I engaged in cyberbullying." If they did so, they were asked to mark the frequency of their cyberbullying behavior by marking the appropriate point on a five-point likert scale: (1) never, (2) rarely, (3) Sometimes, (4) Frequently, (5) Always. The highest and lowest scores that could be received from the cyberbullying and cyber victim forms of the Scale were 110 and 22, respectively. A high score in the cyberbullying form of the Scale indicated an engagement in cyberbullying, while a higher score in the cyber victim form indicated a higher frequency of being a cyber victim. The cyberbullying and victim forms consist of three sub factors: cyber forgery (CF), cyber verbal bullying (CLB) and hiding identity (DI). The internal consistency reliability coefficient of the research scale is reported to be .89 for both the cyber victim form and the cyber bullying form as a whole. The internal consistency reliability coefficient of the present study conducted with mathematics and science pre-service teachers calculated as .94 for the entire victim form, and the reliability coefficient for the cyber bullying form was found to be .88.

Data Analysis

In data analysis, descriptive statistics such as frequency, percentage, and average values were used. In addition, the non-parametric Kruskal-Wallis and Mann-Whitney U tests were used as Kolmogorov-Smirnov and Shapiro-Wilk tests indicated that data did not meet normality criterion.

Table 2. Normality Test Results of the Cyber Victim and Bullying Scale

| Cyber bullying | Kolmogorov-Smirnov | | | Shapiro-Wilk | | |
|-----------------------------------|--------------------|-----|-------|--------------|-----|-------|
| | Statistics | sd | p | Statistics | sd | p |
| <i>I have been a victim</i> | .242 | 219 | .000* | .726 | 219 | .000* |
| <i>I engaged in cyberbullying</i> | .271 | 219 | .000* | .650 | 219 | .000* |

*p<.001

FINDINGS

This section initially reports the descriptive statistics of the scores that the mathematics and science pre-service teachers participating in the study received from the "Cyber Victim and Bullying Scale". The average score of those who reported that they had been cyber-victims was \bar{x} =30.86, sd =12.6, while the

average score of those who reported having been engaged in cyberbullying was $\bar{x}=26.68$, $sd=7.7$. When each of the items measuring cyberbullying in the Cyber Victim and Bullying Scale was examined individually (Table 2), it was revealed that the highest average score in terms of both victimization ($\bar{x}=1.78$) and bullying ($\bar{x}=1.73$) belonged to the act of "Hiding one's identity on the Internet". On the other hand, the lowest average scores received on the cyber victim form belonged to the items, "rearranging photographs on the Internet in an insulting way" ($\bar{x}=1.28$) and "forcing the correspondent to speak about sexual topics" ($\bar{x}=1.28$). As for the cyberbullying form, the lowest scores were obtained for the items, "Using the Internet for purposes of fraud" ($\bar{x}=1.05$).

Table 3. The Average Scores of Participants Exposed to or Engaged in Cyberbullying by Encountering a Cyber Behavior on the Scale at Least Once by Gender

| <i>I have been a victim</i> | | | <i>I engaged in cyberbullying</i> | | | |
|-----------------------------|------------------|-----------|--|--------------------|------------------|-----------|
| Female=131 | Male=88 | N=219 | | Female=131 | Male=88 | N=219 |
| \bar{x}_{Female} | \bar{x}_{Male} | \bar{x} | Cyber Behaviors | \bar{x}_{Female} | \bar{x}_{Male} | \bar{x} |
| 1,24 | 1,55 | 1,36 | 1. Initiating rumor on the Internet | 1,06 | 1,25 | 1,14 |
| 1,17 | 1,52 | 1,31 | 2. Giving a disturbing nickname on the Internet | 1,12 | 1,30 | 1,19 |
| 1,26 | 1,52 | 1,37 | 3. Using an insulting symbol on the Internet | 1,16 | 1,39 | 1,25 |
| 1,32 | 1,65 | 1,45 | 4. Mocking on the Internet | 1,31 | 1,64 | 1,44 |
| 1,39 | 1,60 | 1,47 | 5. Making fun of the shared information on the Internet | 1,44 | 1,57 | 1,49 |
| 1,24 | 1,55 | 1,36 | 6. Writing insulting responses about news on Internet sites | 1,08 | 1,28 | 1,16 |
| 1,23 | 1,43 | 1,31 | 7. Using insulting statements on the Internet | 1,05 | 1,20 | 1,11 |
| 1,21 | 1,43 | 1,30 | 8. Using another person's identity on the Internet | 1,17 | 1,49 | 1,30 |
| 1,64 | 1,99 | 1,78 | 9. Hiding one's identity on the Internet | 1,63 | 1,86 | 1,73 |
| 1,31 | 1,44 | 1,36 | 10. Accessing others' websites without consent on the Internet | 1,27 | 1,40 | 1,32 |
| 1,32 | 1,45 | 1,37 | 11. Hacking passwords on the Internet | 1,17 | 1,31 | 1,22 |
| 1,45 | 1,69 | 1,55 | 12. Sending infected files/software on the Internet | 1,11 | 1,15 | 1,12 |
| 1,27 | 1,45 | 1,35 | 13. Showing videos without consent on the Internet | 1,10 | 1,20 | 1,14 |
| 1,31 | 1,50 | 1,38 | 14. Publishing photographs without consent on the Internet | 1,09 | 1,19 | 1,13 |
| 1,21 | 1,39 | 1,28 | 15. Rearranging photographs on the Internet in an insulting way | 1,11 | 1,22 | 1,16 |
| 1,19 | 1,41 | 1,28 | 16. Forcing correspondents to talk about sexual content | 1,05 | 1,17 | 1,10 |
| 1,27 | 1,40 | 1,32 | 17. Using sexual symbolism while chatting on the Internet | 1,10 | 1,19 | 1,14 |
| 1,18 | 1,48 | 1,30 | 18. Sharing sexual visuals on the Internet | 1,04 | 1,15 | 1,08 |
| 1,40 | 1,76 | 1,54 | 19. Sending messages using foul/insulting language on the Internet | 1,10 | 1,35 | 1,20 |
| 1,31 | 1,63 | 1,43 | 20. Using the Internet as a means of denigration | 1,13 | 1,14 | 1,13 |
| 1,34 | 1,61 | 1,45 | 21. Using the Internet as a means of manipulative propaganda | 1,05 | 1,11 | 1,08 |
| 1,43 | 1,64 | 1,51 | 22. Using the Internet for purposes of fraud | 1,05 | 1,07 | 1,05 |

Upon an overall examination of Table 3, it can be observed that the average scores of all the items expressing cyber behavior on the Scale are below 2.00. These low average scores are believed to have derived from the fact that the participants marked "Never" or "Rarely" as they do not have a sufficient level of digital competence to engage in cyber behavior or they believe that these behaviors are culturally inappropriate. Whether or not the scores regarding the participants' conditions of cyber bullying and victimization were normally distributed was tested via the Kolmogorov-Smirnov test; the test yielded a normal distribution of the scores ($p<.05$).

Findings Related to the First Research Question

The results of the Mann Whitney U test, conducted to test whether or not there was a significant statistical difference in cyber bullying/victimization by gender, are presented in Table 4.

Table 4. The U Test Results of Cyber Bullying/Victimization by Gender

| Cyber bullying | Gender | n | Mean Rank | Sum of Ranks | U | z | p |
|-----------------------------------|--------|-----|-----------|--------------|--------|--------|-------|
| <i>I have been a victim</i> | Female | 131 | 99.95 | 13093.5 | 4447.5 | -2.918 | .004* |
| | Male | 88 | 124.96 | 10996.5 | | | |
| <i>I engaged in cyberbullying</i> | Female | 131 | 99.62 | 13050.0 | 4404.0 | -3.069 | .002* |
| | Male | 88 | 125.45 | 11040.0 | | | |

* $p < .05$

As can be observed in Table 4, the analysis yielded a significant statistical difference between male and female participants in terms of cyber bullying/victimization conditions [$U=4447.5$ and $U=4404.0$, ($p < .05$)]. When the average scores of those who marked "I was exposed to cyberbullying" and those who marked "I engaged in cyberbullying" are taken into consideration, it can be observed that the male participants' average score was higher when compared to that of female participants. This finding based on the research results indicates that cyber bullying/victimization is observed more among men than among women.

Findings Related to the Second Research Question

The results of the Kruskal Wallis H test, which was implemented to observe whether or not there was a statistically significant difference among the participants' cyber bullying/victimization conditions by grade level, are presented in Table 5.

Table 5. The Kruskal Wallis H Test Results of Cyber Bullying/Victimization by Grade Level

| Cyber bullying | Grade | n | Mean Rank | sd | χ^2 | p | Significant Difference |
|-----------------------------------|-------|----|-----------|----|----------|------|------------------------|
| <i>I have been a victim</i> | 1th | 62 | 101.56 | 3 | 6.513 | .089 | - |
| | 2nd | 50 | 105.38 | | | | |
| | 3rd | 57 | 106.19 | | | | |
| | 4th | 50 | 129.43 | | | | |
| <i>I engaged in cyberbullying</i> | 1th | 62 | 101.44 | 3 | 2.180 | .536 | - |
| | 2nd | 50 | 108.50 | | | | |
| | 3rd | 57 | 116.21 | | | | |
| | 4th | 50 | 115.04 | | | | |

According to the findings presented in Table 5, no statistically significant difference was found among the participants' cyber bullying/victimization conditions by grade level [$X^2(sd=3, N=219) = 6.513$ and $X^2(sd=3, N=219) = 2.180$, ($p > .05$)]. This finding indicates that grade level did not account for any variance among the pre-service teachers who marked either "I was exposed to cyberbullying" or "I engaged in cyber bullying."

Findings Related to the Third Research Question

The results of the Kruskal Wallis H test, which was implemented for non-relational measurements to observe whether or not there was a statistically significant difference among the participants' cyber bullying/victimization conditions by time spent on the Internet, are presented in Table 6.

Table 6. The Kruskal Wallis H Test Results of Cyber Bullying/Victimization by Time Spent on the Internet

| Cyber bullying | Hours | n | Mean Rank | sd | χ^2 | p | Significant Difference |
|-----------------------------------|---------|----|-----------|----|----------|------|------------------------|
| <i>I have been a victim</i> | 1-3 | 99 | 107.20 | 3 | 1.809 | .613 | - |
| | 4-6 | 83 | 116.66 | | | | |
| | 7-9 | 15 | 107.00 | | | | |
| | 10 and+ | 22 | 99.55 | | | | |
| <i>I engaged in cyberbullying</i> | 1-3 | 99 | 103.96 | 3 | 3.652 | .302 | - |
| | 4-6 | 83 | 119.75 | | | | |
| | 7-9 | 15 | 98.30 | | | | |
| | 10 and+ | 22 | 108.36 | | | | |

According to the findings displayed in Table 6, it was found that there was no statistically significant difference among the cyber bullying/victimization conditions of the participants by time spent on the Internet [χ^2 (sd=3, N=219) =1.809 and χ^2 (sd=3, N=219) =3.652, ($p>.05$)]. This finding indicates that time spent on the Internet does not account for any variance among the pre-service teachers who marked either “I was exposed to cyberbullying” or “I engaged in cyber bullying.”

Findings Related to the Fourth Research Question

The results of the Mann Whitney U test, which was implemented to compare the participant pre-service teachers’ cyber bullying/victimization conditions in terms of their social media usage, are presented in Table 7.

Table 7. The U Test Results of Cyber Bullying/Victimization by Social Media Usage Status

| Cyber bullying | Social Media | n | Mean Rank | Sum of Ranks | U | z | p |
|-----------------------------------|--------------|-----|-----------|--------------|--------|-------|------|
| <i>I have been a victim</i> | Yes | 206 | 110.18 | 22697.5 | 1301.5 | -.172 | .863 |
| | No | 13 | 107.12 | 1392.5 | | | |
| <i>I engaged in cyberbullying</i> | Yes | 206 | 109.30 | 22516.5 | 1195.5 | -.672 | .502 |
| | No | 13 | 121.04 | 1573.5 | | | |

Based on the results presented in Table 7, no statistically significant difference was found among the participants’ cyber bullying/victimization conditions with respect to whether or not they used social media [U=1301.5 and U=1195.5, ($p>.05$)]. This finding based on the research results indicates that the condition of using or not using social media does not account for any variance among pre-service teachers’ cyber bullying/victimization conditions.

DISCUSSION AND CONCLUSION

The present research study was conducted to examine mathematics and science pre-service teachers’ cyberbullying/victimization conditions by variables of gender, year in university, time spent on the Internet, and media usage status. Horzum (2011) accounts for this finding by claiming that in such countries as Turkey, males who do not have access to the Internet at home can visit Internet cafés more frequently than can girls. Thus, it was deduced that cyber bullying/victimization could be observed more among males than among females. The finding that there is variation by gender in favor of males regarding cyberbullying and victimization is consistent with those findings reported in other studies in the related literature (Erdur-Baker, 2010; Horzum & Ayas, 2011; Özdemir & Akar, 2011; Slonje & Smith, 2008; Şahin, Sarı, Özer & Er, 2010; Yaman & Sönmez, 2015). In contrast, studies conducted to examine teacher participants’ sensitivity to cyberbullying by Dikmen and Çağlar (2017), Gezgin and Çuhadar (2012), Yılmaz (2010) reported a significant difference by gender in favor of females. In some other studies, no significant difference was found by gender (Patchin &

Hinduja, 2006; Ybarra & Mitchel, 2004). Thus, it can be asserted that female pre-service teachers are more sensitive to cyberbullying behavior than male pre-service teachers. Owing to the fact that some studies report cyberbullying in favor of males and some others report cyberbullying in favor of females, it can be considered that there is no general agreement regarding this issue, and thus, cyberbullying can emerge based on other factors than gender.

The current study also revealed that there was no statistically significant difference among the participating pre-service teacher' cyberbullying and cyber victimization conditions by year in university, time spent on the Internet and utilization of social media status. The finding that there was no significant difference among the participants' cyberbullying and cyber victimization conditions by year in university could derive from the similarities between ages, while the insignificant difference by time spent on the Internet could be based on the fact that 83.1%, a large percentage, of the participants use the Internet up to an average of 6 hours per day and that almost all the participants used social media. The finding in the current study that cyberbullying and cyber victimization conditions do not vary by year is consistent with the findings of the studies by Özdemir and Akar (2011) and Yaman and Sönmez (2015). There are also different reviews reported by other scholars. Pepler et al. (2006) stated that cyberbullying tendencies increased during transition from primary school to secondary school but decreased in the final year of secondary school. Ayas and Horzum (2012) and Semerci (2017) revealed that as the grade level increased, so did cyberbullying conditions. In a study conducted with high school students by Semerci (2017), no significant difference was found based on grade level and this was attributed to the effect of age. The cyberbullying/victimization condition is considered a universal problem observed primarily among children and adolescents. In a meta-study in which the most recent studies on cyberbullying and on-line harassment were reviewed by Patchin and Hinduja (2012), it was reported that the percentages of cyber bullying ranged between 3% and 44%, and those of cyber victimization ranged between 5.5% and 72%. Semerci (2017) stated that the reasons causing cyberbullying behavior, which increased as grade level increased, should be investigated by means of in-depth qualitative and quantitative studies to examine different variables including social and cultural dimensions.

Another finding of the present study was that there was no significant difference among the participants' cyberbullying and cyber victimization by the average time spent on Internet per day. This finding displays inconsistency with some studies in the literature which report that the as the time spent on the Internet increases, so does the degree of cyberbullying and victimization (Erdur-Baker, 2010; Li, 2007; Patchin and Hinduja, 2006; Ybarra and Mitchell, 2004). When the finding of the present study that pre-service teachers' cyberbullying and victimization does not vary by whether or not they use social media is evaluated in the light of the literature, the study by Twyman et al. (2010) draws attention. In the mentioned study, it was revealed that as adolescents' socialization time on the computer, especially the use of YouTube, increased, so did the rate of cyberbullying and victimization conditions.

The study conducted by Li (2007) found one out of five students to be a cyberbully. In studies with university students in Turkey, it was stated that about one-fourth of students had cyberbullied someone at least once (Dilmaç, 2009), and another research (Arıcağ, 2009) found one-fifth of students had cyberbullied someone in their lives. Hançer and Mişe (2017) stated that one out of about 22 preservice science teachers performed one of cyberbullying behaviors to someone.

Suggestions

It is observed both in daily life and the literature that cyberbullying is widely becoming an inconvenient and moral concern for all layers of society. Hence, based on this research, it is recommended to review current curricula of mathematics and science and to conduct more studies for identifying the effects of educational approaches on the fight against cyberbullying.

In the study, while the participants' cyber bullying/victimization conditions did not show variation by grade level, duration of Internet usage and social media usage status, gender was found to account for a significant variation. The probable reason underlying this finding could be attributed to the fact that males spend more time on the Internet and that families check on boys less than they do on girls as of young ages

due to social culture (Erdur-Baker, 2010). In order to prevent this situation, new teaching materials which are developed by paying attention to the gender variable can be used. Offering various educational trainings on the appropriate use of information and communication technologies, which is a means to cyber bullying, can be an important step towards preventing cyberbullying victims by decreasing cyberbullying. Placement of elective courses explaining cyberbullying and how to protect oneself from cyberbullying into the curriculum of especially education faculties, and organizing academic activities such as various seminars, panels or workshops on this topic can be beneficial in raising awareness. By increasing academic work led by educational scholars, it is recommended that information on cyberbullying should be shared with not only pre-service teachers, but also academicians, teachers, parents, and students in primary, secondary or high school.

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