Enhancing Motivation and Attitudes of Teacher Candidates Through Digital Citizenship Training

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Abstract **– This study examined the impact of multimedia-based training on the digital citizenship levels of senior class teaching staff. The objective of this research is evaluating the numerical citizenry stages of probable teaching staff for primary school in their last year of study based on sub-dimensions of digital citizenship. Experimental model was used in this study as a research method. In addition, quantitative data were used in conjunction with the research design. The "Digital Citizenship Scale" has been developed to assess participants' motivation and attitudes toward numerical citizenry, before and after training. The experimental study included 60 participants from a private university in Northern Cyprus. Using SPSS 25.0, the data revealed significant improvements in participants' insights of numerical citizenry. Results of the analysis show that, before-service teaching staff was successful in education at the expected and desired level in all sub-dimensions.**

Keywords **– Digital citizenship, pre-service teachers, ADDIE model, multi-learning environment.**

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1. Introduction

Digital citizens have the ability of using information and communication opportunities critically when available to them. This person understands the ethical consequences associated with the behaviors he/she encounters and practices in the digital environment.

Furthermore, the digital citizen has the right to communicate and express themselves in digital environments while utilizing technology.

In other words, they are individuals who demonstrate the right attitude when they share and demonstrate these attitudes as an example to others [9]. Furthermore, Çubukçu and Bayzan [9], in the same study, outlined numerical citizenry composed of rights as well as responsibilities related to the use of technology. The digital citizenship can be defined as the attitudes and behaviors of individuals concerning the benefit from technology as well as their aptitude for assuming responsibility [18]. At a young age, digital citizenship should be acquired. There is a great deal of responsibility on the part of teachers and administrators in this regard. With the advent of information processing technology in many educational institutions, education is increasingly being provided to students according to their needs [5]. The educational process in which technological developments are effective reveals the characteristics that should be present in the people of today. Nowadays, those who are able to follow the world more closely, are continuously active, are fast in thinking and apply what they think, are open to production, know what to learn, enable them to learn quickly, know themselves and their limits, know where and how to get information, use technology correctly, and are aware of the importance of people who are able to use technology safely [1], [20]. There is no doubt that the training of people with these characteristics can only be done under the guidance of teachers [3].

Both teachers and administrators must renew themselves by reviewing their own knowledge before bringing digital citizenship awareness to students. Taking continuous precautions against the use of incorrect technology is also essential [13].

Karaduman Öztürk [14] recommends that digital citizenship education should be integrated into school curricula or offered separately. The dimensions of digital citizenship must be considered when planning digital citizenship education. It is also important to take into account the relationship between digital citizenship and all courses when conducting this training and instilling it in students. According to them, it can be included in school programs in the form of a separate class, a unit within any course, or by considering the dimensions of digital citizenship, by determining general education principles and achievements and associating them with appropriate achievements in each course, or by incorporating them into any course as a unit. Following the completion of a systematic planning process in this regard, digital citizenship education should continue in schools in order to achieve effective and productive outcomes.

Due to the increasing importance of technology in our daily lives, it has become necessary to use it safely and effectively. An individual who is digitally literate is capable of not only using technology, but also utilizing it appropriately and correctly. Today, the concept of digital citizenship is becoming increasingly prominent and will continue to grow in importance over time. According to reviews, there have been many research articles about the privacy, security, access, health, and ethical dimensions of technology for digital citizens [15], [9], [10]. These articles have stated that teacher candidates possess good knowledge of digital citizenship. A study has not been conducted. Therefore, it is considered pertinent to regulate the phase concerning numerical citizenry of primary school teacher candidates. In addition, it is considered important to examine their levels in accordance with the sub-dimensions of digital citizenship. Accordingly, the research question was defined as follows.

It represents the objective of this research for evaluating the numerical citizenry stages of probable teaching staff for primary school in their last year of study based on sub-dimensions of digital citizenship. This was achieved by seeking responses for questions given below, which were the sub-objectives of this research. Meanwhile, the research findings were based on the answers received.

1. Does the digital citizenship level score obtained from the single group pretest and posttest of the teacher candidates studying in their final year of primary school teaching differ significantly?

2. Do the digital citizenship levels sub-dimension scores obtained from the single group pretest and posttest of pre-service teachers studying in their last year of primary school teaching significantly differ?

3. In their final year of primary school teaching, pre-service teachers;

- Age,
- Experience with computers,
- Yearly Internet usage,
- Time spent on a computer on a daily basis,
- Time spent using smart devices on a daily basis,
- Time spent on the internet each day.

Can we talk about an important variance among the scores obtained from the single group pretest and posttest on the variables of digital citizenship?

2. Methodological Setting

In this part of the research, it is aimed to give information about the research design, the study cluster, statistics gathering as well as examination, and how the findings are presented.

2.1. Research Model

Within the context of this research, that examines level of digital citizenship of pre-service teaching staff in the classroom teaching department, a sole group pre-test-post-test experimental model was chosen over other experimental models. In addition, quantitative data were used in conjunction with the research design. This helped to improve the validity and credibility of the research describing the implementation process of digital citizenship activities for senior students within the classroom teaching department. The diversification of research was effective in this regard. For accomplishing the general goal of the research, it was benefited from a quantitative method.

2.2. Study Group

The model for this research comprises 60 schoolchildren in the classroom teaching department who will participate in applications to be made within the scope of the course in the spring semester of the 2020-21 academic years. The ages of the probable primary school teaching staff participating in the research in this section are given in the table below.

Table 1. Distribution of teacher candidates by age

Age	F	%
20-25 Range of ages	16	26,7
26-31 Range of ages	20	33,3
32-37 Range of ages	24	40,0
Total	**60**	**100,0**

As seen in Table 1, when the age status of the probable primary school teaching staff joining within the experimental group is examined, it is seen that there are 16 people between the ages of 20-25 (26.7%), 20 people between the ages of 26-31 (33.3%) and 32-37 people. It was concluded that there were 24 people (40.0%) between the ages of 18 and 18.

2.3. Data Collection

In this research, firstly, digital citizenship training was given to the participants for 14 weeks, and then the effect of the training on the students was examined. Students were evaluated according to the "digital citizenship" scale before beginning their education. The scale was collected using a 39-item questionnaire consisting of a two-part 6-point Likert developed by researchers Akcil [2]. The first part of the survey contains 9 items on the personal information form. In the second part, the digital citizenship scale was used. While the second part consists of inquiries with regard to the age of the teachers involved in this research, their duties in the institution, their educational status, what portable devices they use, their computer usage times, their internet usage times, their daily computer usage times for their job, their daily portable device usage times for their job, and their internet usage frequency for their job. In the 2nd part, “always approve (6)”, “mostly agree (5)”, “approve a little (4)”, “do not agree (3)”. It was calculated as “never agree (2)” and “do not know (1)” and scored. Frequency (f) and percentage (%) were used in the analysis. The legitimacy and consistency of the questionnaire objects were supported by experts (Cronbach Alpha value α= 0.838).

Büyüköztürk [7] considers a reliability coefficient of 0.70 and greater as sufficient for a test score's reliability.

During the technology and media literacy course for 14 weeks, teacher candidates were given training on how to develop their own digital citizenship levels, as well as their students' digital citizenship levels. At the same time, information about what to pay attention to and how to behave in digital environments was provided. After the process was completed, the numerical citizenry measure remained reapplied towards the possible teaching staffs and the development processes were compared before and after the education.

2.4. Data Analysis and Interpretation

As part of the experimental research conducted in the 2020-21 academic year, the researcher applied the quantitative data from the research to the before-service teaching staff within the relevant department as a before-testing and after-testing. Teacher candidates who filled out questionnaires incompletely or incorrectly were not included in terms of this research. Designed for statistical examination of the study figures, SPSS 25.0 software program was used. Based on statistical analysis, a level of significance of 0.05 was used.

For testing the figures’ normality, a pilot examination was pursued with SPSS. Kolmogorow-Smirnov, and Shapiro-Wilk examinations ($p>0.05$) stood used for determining the usual spreading of dependent variables within subgroups [7]. Calculations are used to fix the mean and standard deviation of the explanations for the scale items. To evaluate quantitative data, regularity, ratio, mean, average unconventionality, two-factor recurring procedures ANOVA, and Wilcoxon were applied. The implication phase of the data remained set at 0.05. Table 2 shows the average criterion ranges used in interpreting the survey results.

Table 2. The average range of criteria

Weight	Limit of Point	Options
1	1.00 – 1.81	I don't know
2	1.82 – 2.65	Never agree
3	2.66 – 3.49	I do not agree
4	3.50 – 4.33	I agree a bit
5	4.34 – 5.17	Mostly agree.
6	5.18 – 6.00	I always agree.

2.5. Preparation of Training and Training Materials

Before digital citizenship education was planned, previous trainings, studies, animations, and videos on the Internet were examined and extensive information was obtained about digital citizenship. After experiencing all applications and contents related to the topic, research was conducted on how and what kind of training was prepared.

Upon completion of all the research, the course content regarding digital citizenship education was prepared in order to determine how the education would be conducted.

The ADDIE model, one of the instructional designs, served as the basis for preparing course content and materials. This model was selected in order to add new information on top of some of the skills that the participants already possess. In the end, the training materials were prepared using the Powtoon program, which is one of the multi-media programs, and the 14-week training began. As part of the preparation of the training materials, daily events were also taken into account.

2.5. The Implementation of Education

As soon as the environment was developed, it was implemented. Using the "Google Meet" environment, applications were made online. Prior to the application, a questionnaire was administered for the purpose of determining the phase of numerical citizenry of the candidates. Following this issue, it was implemented. Within the context of the application, the pre-service teaching staffs remained given information about the sub-dimensions, different teaching environments were also used, and the content was viewed through support training that included multiple learning environments. First, the definitions and features of the sub-dimensions were described, and then case studies were presented. After the contents were viewed, the pre-service teachers were provided with a communication and discussion environment regarding the case studies, allowing each teacher in pre-service to reflect upon the case and also for gaining a well comprehension of the subject. The pre-service teachers also discussed events they encountered in their daily lives, and a discussion environment was created by the teachers in order to facilitate the discussion. In line with what they gained from education and added to it, pre-service teachers responded to the events they encountered by saying, "I would do this if it were happening now."

2.6. Findings

In this part of the research, which aims to examine the numerical citizenry levels of prospective teaching staff studying in the classroom teaching department at the faculty of education, the data gained is suitable for the purposes and sub-aims of the study and the frequency (F), percentage (%), calculation mean ($\bar{X}$), standard deviation (SD), two-factor recurrent procedures ANOVA test, findings and interpretations of the tables created are included.

In order to address the second study inquiry, the digital citizenship level outcomes gained as a result of the pre-test and post-test of pre-service teaching staffs enrolled in their final year of primary school teaching were examined. Table 3 sets forth the average scores of pre-service teaching staffs' digital citizenship levels for this sub-purpose.

Table 3. Descriptive analysis of the pre- and post-test levels of digital citizenship in the investigational cluster

Test	**N**	$\bar{X}$	**SD**	**Sd**	**t**	**p**
Pre-test	60	4,65	0,34	59	-6,98	0,00
Post-test	60	5,18	0,39			

It has remained discovered that the numerical citizenry measure mean scores applied as a posttest to the experimental group ($\bar{X}$=5.18 - SD=0.391) were higher than the digital citizenship scale mean scores applied as a pretest ($\bar{X}$=4.65-SD=0.347) when applied clearly. Table 1 shows that the pre-service teaching staff gave the answer "Mostly Agree" to the items before the training, whereas they responded "Always Agree" after the training. Since the data followed a normal distribution, we conducted a paired t-test to assess whether there was a significant difference between the pretest and posttest mean results of the digital citizenship for the experimental group ($p>0.05$). A paired t-test indicated a significant difference in favor of the posttest ($t(59)= -6,984$; $p<0.05$). As a result, the average score on the digital citizenship scale applied as a post-test in the tentative cluster stands meaningfully greater than the middling result on the pre-test in this case.

A third question of the study compared the outcomes obtained from the sub-dimensions of numerical residency levels in the single group pretest and posttest of pre-service teaching staff whom were studying in their last term of principal school teaching. As the data were not normally distributed, two related samples were analyzed using Wilcoxon tests as shown in Table 4 to compare the outcomes of pre-service teaching staff according to the sub-dimensions of numerical citizenry levels.

Table 4. The Wilcoxon test results for the pretest posttest digital citizenship levels sub-dimensions in the experimental group

Test	Dimension	Z	p
Pre- and post-test	Digital literacy	-2,14	,03*
Pre- and post-test	Digital rights and responsibilities	-0,98	,33
Pre- and post-test	Digital communication	-0,62	,54
Pre- and post-test	Digital security	-3,26	,00*
Pre- and post-test	Digital commerce	-6,28	,00*
Pre- and post-test	Digital access	-6,16	,00*
Pre- and post-test	Digital ethics	-5,34	,00*
Pre- and post-test	Digital health	-0,72	,57
Pre- and post-test	Use of portable smart devices (Digital)	-6,19	,00*
Pre- and post-test	Use of digital storage spaces	-0,08	,93

Since the data were not normally distributed, Wilcoxon tests remained benefited for comparing whether it has been an important variance in terms of sub-dimension scores of the digital citizenship scale applied in the experimental group as pretest and posttest in two related samples. The tests revealed a momentous variance in support of the posttest in the dimensions of numerical literateness, numerical safety, numerical trade, numerical admission, numerical morals, and portable smart devices (digital) use ($p<0.05$). A substantial variance stood discovered amid the before-test and after-test scores for the digital citizenship scale sub-dimensions numerical literateness, numerical safety, numerical trade, numerical admission, numerical morals and use of portable smart devices (digital) in the experimental group.

However, after comparing the sub-scopes of the numerical citizenship scale, numerical civil rights and tasks, numerical communication, numerical health and the use of digital storage areas, which stood practiced as before-test and after-test, no significant differences were observed ($p>0.05$). In this case, it can be said that after the experimental study, the posttest digital citizenship scores of the teacher candidates remained at the same level as the pretest.

Examining the age variable of previously employed teaching staff in the last year of elementary school teaching, the study focused on analyzing the digital citizenship level scores obtained from the single group's pre-test and post-test, addressing the fourth research question. Table 5 presents the average scores of pre-service teachers' digital citizenship levels for this sub-purpose.

Table 5. Descriptive statistics results of before-test and after-test digital citizenship levels of the single group-experimental group considering the age variable

Test	Age	$\bar{X}$	SD	N
Pre-test	20-25 age range	4,75	,40	16
	26-31 age range	4,73	,25	20
	32-37 age range	4,52	,36	24
	Total	4,65	,35	60
Post-test	20-25 age range	5,10	,30	16
	26-31 age range	5,22	,34	20
	32-37 age range	5,17	,48	24
	Total	5,16	,39	60

At the beginning, it was understood that the before-service teaching staff, studying in the last year of primary school teaching, had higher average post-test digital citizenship levels than their pre-test levels. This observation held true when the age variable was taken into account. To demonstrate that the digital citizenship level scores obtained from the single-group pre-test and post-test were higher than the scores after 14 weeks of application, the data for each cluster's pre-test and post-test digital citizenship levels collected before and after the experiment, were analyzed considering age. Two-factor recurrent procedures ANOVA test remained applied to the variable.

Table 6. Two-factor repeated measurements ANOVA test results of pretest and posttest digital citizenship levels considering the age variable of single group-experimental group

Source		Sum of quares	Sd	Mean of Squares	F	p
Measurement	Sphericity Assumed	7,15	1	7,15	44,39	,00
	Greenhouse-Geisser	7,15	1	7,15	44,39	,00
	Huynh-Feldt	7,15	1	7,15	44,39	,00
	Lower-bound	7,15	1	7,15	44,39	,00
Measurement * group	Sphericity Assumed	0,45	2	0,22	1,39	,26
	Greenhouse-Geisser	0,45	2	0,22	1,39	,26
	Huynh-Feldt	0,45	2	0,22	1,39	,26
	Lower-bound	0,45	2	0,22	1,39	,26
Lapse Measurement	Sphericity Assumed	9,17	57	0,16		
	Greenhouse-Geisser	9,17	57	0,16		
	Huynh-Feldt	9,17	57	0,16		
	Lower-bound	9,17	57	0,16		

When examining the age variable, a two-factor ANOVA testing system was conducted to determine if a significant difference occurred between the pre-test and post-test digital citizenship levels of pre-service teaching staff within the single-cluster experimental group. The section in the table that relates to the research hypothesis is the Measurement*group joint effect. As a result of the findings in Tables 5 and 6, it has been observed that there has not been any important variance amid the posttest numerical citizenry stages of before-service teaching staff compared to the before-test digital citizenship stage averages [$F(1.57) = 1.39$, $p > 0.05$].

Within the context of the third study inquiry of the research, the digital citizenship level scores obtained from the single group pretest and posttest were examined. It was based on the inconsistent computer practice of would-be teachers during their final year of primary school teaching. Table 7 presents the average scores of prior-service teaching staff's numerical citizenry stages.

Table 7. Descriptive statistics results of pretest and posttest digital citizenship levels considering the inconstant terms of compute practicing on the single group - experimental group

Test	The Year of Computer Use	$\bar{X}$	SD	N
Pre-test	8-11 years range	4,65	,35	27
	12-15 years range	4,65	,35	33
	Total	4,65	,35	60
Post-test	8-11 years range	5,13	,43	27
	12-15 years range	5,20	,36	33
	Total	5,17	,39	60

According to the post-test numerical residency levels, it was observed that when considering variations in computer usage, the pre-test numerical levels of digital citizenship among potential teaching staff who were in the final term of classroom instruction were higher than the pre-test digital citizenship levels. In order to reveal that the digital citizenship level scores from a pretest and posttest within a single group increased compared to the scores after 14 weeks of application, the data obtained from the digital citizenship level tests before and after the experiment were analyzed for each subgroup based on the variable of years of computer use. A two-factor repeated measures ANOVA test was conducted.

Table 8. Two factors repeated measurements ANOVA test results of pretest and posttest digital citizenship levels considering the variable of terms of computer practicing by single group- experimental group

Source		Sum of Squares	sd	Mean of Squares	F	p
Measurement	Sphericity Assumed	7,77	1	7,78	47,02	,00
	Greenhouse-Geisser	7,77	1	7,78	47,02	,00
	Huynh-Feldt	7,77	1	7,78	47,02	,00
	Lower-bound	7,77	1	7,78	47,02	,00
Measurement * group	Sphericity Assumed	0,03	1	0,03	0,18	,67
	Greenhouse-Geisser	0,03	1	0,03	0,18	, 67
	Huynh-Feldt	0,03	1	0,03	0,18	, 67
	Lower-bound	0,03	1	0,03	0,18	, 67
Lapse (Measurement)	Sphericity Assumed	9,59	58	0,17		
	Greenhouse-Geisser	9,59	58	0,17		
	Huynh-Feldt	9,59	58	,17		
	Lower-bound	9,59	58	,17		

By considering the variable of years of computer use within a single cluster-experimental group, it is examined whether there was a significant difference in digital citizenship levels before and after a test among preservice teaching staff.. On account of findings in Tables 7 and 8, it has been discovered that there was no significant change amid the post-test numerical citizenry level averages of prior-service teaching staffs compared to pretest digital citizenship level averages [F(1.58) = 0.18, p > 0.05] when the variable of years of computer use was taken into account.

In terms of the fourth study inquiry of the research, digital citizenship level scores obtained from the single group pretest and posttest were examined. Taking into account, the years of internet use among potential teaching staff in their final term of primary school education were considered. For this sub-purpose, the average scores of before-service teaching staffs' numerical citizenry stages stand set forth below within Table 9.

Table 9. Descriptive statistics results of pretest and posttest digital citizenship levels considering the variable of terms for internet practicing by the single group-experimental group

Test	Internet Usage per Year	$\bar{X}$	SD	N
Pre-test	8-11 years range	4,64	,36	35
	12-15 years range	4,67	,34	25
	Total	4,65	,35	60
Post-test	8-11 years range	5,15	,40	35
	12-15 years range	5,19	,38	25
	Total	5,16	,39	60

At the beginning, it was observed that the pre-test numeracy citizenry stages of probable teaching staff working in the ending term of principal school instructing according to their post-test digital citizenship levels had higher average levels than their pretest digital citizenship levels, considering the years of internet use.

Testing the digital citizenship level scores from the pretest and posttest applied to each group before and after the experiment was added to the data derived from the internet usage years variable. In this study, the digital citizenship level scores obtained from a single group pretest and posttest were higher than those obtained from a 14-week program. A two-factor repeated measures ANOVA test was conducted.

Table 10. Two-factor repeated measurements ANOVA test results of pretest and posttest digital citizenship levels considering the variable of years of the Internet use of single group-experimental group

	Source	Sum of Squares	sd	Mean of Squares	F	p
Measurement	Sphericity Assumed	7,78	1	7,78	46,91	,00
	Greenhouse-Geisser	7,78	1	7,78	46,91	,00
	Huynh-Feldt	7,78	1	7,78	46,91	,00
	Lower-bound	7,78	1	7,78	46,91	,00
Measurement* group	Sphericity Assumed	0,00	1	0,00	0,01	,90
	Greenhouse-Geisser	0,00	1	0,00	0,01	,90
	Huynh-Feldt	0,00	1	0,00	0,01	,90
	Lower-bound	0,00	1	0,00	0,01	,90
Lapse (Measurement)	Sphericity Assumed	9,62	58	0,16		
	Greenhouse-Geisser	9,62	58	0,16		
	Huynh-Feldt	9,62	58	0,16		
	Lower-bound	9,62	58	0,16		

There is a noteworthy variance amid the before-test and after-test digital citizenship levels of pre-service teachers in single, experimental group based on the variable of years of internet usage using a two-factor repeated measures ANOVA test. In light of the findings in Tables 9 and 10, when the variable of years of internet use was taken into consideration, there was no substantial variance between pre-service teaching staffs' posttest numerical citizenship levels and their pretest digital citizenship levels [F(1.58) = 0.01; p > 0.05].

The fifth study inquiry examined the digital citizenship level scores gained as a result of a single group before and after test based on the variable of daily computer usage by likely teaching staff in the end term of principal school instruction.

For this specific purpose, the Table 11 displays the average scores of pre-service teaching staff's numerical citizenship levels, which are presented below. 11.

Table 11. Descriptive statistics results of pretest and posttest digital citizenship levels considering the daily computer usage time variable of the single group-experimental group

Test	Daily Computer Usage Time	$\bar{X}$	SD	N
Pre-test	less than 1 hour per day	4,54	,44	15
	1-3 hours a day	4,59	,28	25
	4-6 hours a day	4,82	,28	20
	Total	4,65	,34	60
Post-test	less than 1 hour per day	5,10	,42	15
	1-3 hours a day	5,23	,33	25
	4-6 hours a day	5,13	,43	20
	Total	5,17	,39	60

Based on the post-test digital citizenship levels, it was observed that, when the daily computer usage time variable was taken into account, the pre-test numerical citizenry stages in terms of prospective teaching staff that stand within the ending term of tutorial room instructing were higher than the pretest digital citizenship levels. In order to demonstrate that the digital citizenship level scores obtained from a single group pre-test and post-test were higher than those obtained from a sole cluster before-test and after-test subsequently fourteen weeks of application, daily computer usage time, the data obtained from the before-test and after-test remained practiced on each group beforehand as well as afterwards the experiment. The variable was tested by benefiting from two-factor repetitive procedures ANOVA testing system.

Table 12. Two-factor recurrent measurements of pre-test and post-test digital citizenship levels ANOVA test results considering the daily computer use time variable of the single group experimental group

	Source	Sum of Squares	sd	Mean of Squares	F	p
Measurement	Sphericity Assumed	7,40	1	7,40	46,91	,00
	Greenhouse-Geisser	7,40	1	7,40	46,91	,00
	Huynh-Feldt	7,40	1	7,40	46,91	,00
	Lower-bound	7,40	1	7,40	46,91	,00
Measurement * group	Sphericity Assumed	0,62	2	0,31	1,97	,14
	Greenhouse-Geisser	0,62	2	0,31	1,97	,14
	Huynh-Feldt	0,62	2	0,31	1,97	,14
	Lower-bound	0,62	2	0,31	1,97	,14
Lapse (Measurement)	Sphericity Assumed	8,99	57	0,15		
	Greenhouse-Geisser	8,99	57	0,15		
	Huynh-Feldt	8,99	57	0,15		
	Lower-bound	8,99	57	0,15		

To determine if there is a significant difference in the numerical citizenship levels among pre-service teaching staff in the single-group experimental group, based on their daily computer usage, a two-factor repeated measures ANOVA test was carried out. Tables 11 and 12 show that there is a significant difference between alphanumeric citizenship levels of before-service teaching staff and digital citizenship levels conducted before the test. [$F(1.57) = 1.97$; $p > 0.05$].

The sixth study inquiry of the research, the digital citizenship level scores gained as a result of single group before-test and after-test were examined, considering daily smart device usage time variable for before-service teaching staff working within the ending term of principal school teaching. For this sub-purpose, the average scores of before-service teaching staffs' numerical citizenry stages stand set forth below within the Table 13.

Table 13. Descriptive statistics results of pre-test and post-test digital citizenship levels considering the daily smart device usage time variable of the single group-experimental group

Test	Daily Smart Device Usage Time	$\bar{X}$	SD	N
Pre-test	1-3 hours a day	4,71	,43	17
	4-6 hours a day	4,59	,28	28
	7-9 hours a day	4,71	,34	15
	Total	4,65	,34	60
Post-test	1-3 hours a day	5,20	,39	17
	4-6 hours a day	5,14	,36	28
	7-9 hours a day	5,19	,45	15
	Total	5,17	,39	60

It was observed at the beginning of the study that, when the daily smart device usage time variable was taken into account, the pre-test numerical citizenry stages of probable teaching staffs that are within their ending term of tutorial room instructing were higher than the pretest digital citizenship levels. The data obtained from the test of the pretest and posttest digital citizenship level scores were applied to each group before and after the experiment, in order to demonstrate that the digital citizenship levels obtained from the single group pretest and posttest were higher than those obtained from the same test after 14 weeks of application, daily smart device usage. The time variable was considered in a dual-factor recurring procedures ANOVA testing system.

Table 14. Two-factor recurrent measurements ANOVA test scores of before-test and after-test digital citizenship levels considering the daily smart device usage time variable of the single group-experimental group

	Source	Sum of Squares	sd	Mean of Squares	F	p
Measurement	Sphericity Assumed	7,40	1	7,40	46,91	,00
	Greenhouse-Geisser	7,40	1	7,40	46,91	,00
	Huynh-Feldt	7,40	1	7,40	46,91	,00
	Lower-bound	7,40	1	7,40	46,91	,00
Measurement * group	Sphericity Assumed	0,62	2	0,31	1,97	,14
	Greenhouse-Geisser	0,62	2	0,31	1,97	,14
	Huynh-Feldt	0,62	2	0,31	1,97	,14
	Lower-bound	0,62	2	0,31	1,97	,14
Lapse (Measurement)	Sphericity Assumed	8,99	57	0,31		
	Greenhouse-Geisser	8,99	57	0,15		
	Huynh-Feldt	8,99	57	0,15		
	Lower-bound	8,99	57	0,15		

Considering the variable of daily use of smart devices, a dual-factor recurring procedures ANOVA testing system remained conducted for fixing whether it stands a momentous variance amid pre-service teachers' digital citizenship levels before and after the single -experimental group. According to the findings in Tables 13 and 14 when the daily smart device usage time variable is considered, it does not exist any substantial variance amid the before-service teaching staffs' numerical citizenship stages after the posttest compared to those during the pretest [$F(1.57) = 0.07$; $p > 0.05$].

Considering the variable of daily internet usage time midst before service teaching staff joined up in the last year of primary school teaching, digital citizenship level scores obtained from the single group before-test and after-test are examined for the seventh research question in terms of research. Table 15 presents the average scores of pre-service teachers' digital citizenship levels for this sub-purpose.

Table 15. Descriptive statistics results of pre-test and post-test digital citizenship levels considering the daily internet usage time variable of the single group-experimental group

Test	Daily Internet Usage Time	$\bar{X}$	SD	N
Pre-test	1-3 Hours a day	4,64	,37	39
	7-9 Hours a day	4,67	,30	21
	Total	4,65	,34	60
Post-test	1-3 Hours a day	5,19	,39	39
	7-9 Hours a day	5,13	,39	21
	Total	5,17	,39	60

In comparison to their pretest digital citizenship levels, pre-service teachers studying for tutorial room instruction at the end of their term had higher average levels of digital citizenship. Prior to and after the experiment, the data obtained from the pretest and posttest digital citizenship tests were applied to each group with the intention of determining whether or not digital citizenship level results gained as a result of the pretest and posttest were higher than those obtained from the single group pretest and posttest after 14 weeks of daily internet usage. The variable was subjected to a dual-factor recurrent procedures ANOVA testing system.

Table 16. Two-factor repeated measurements ANOVA test results of pre-test and post-test digital citizenship levels considering the daily internet usage time variable of the single --experimental group

	Source	Sum of Squares	sd	Mean of Squares	F	p
Measurement	Sphericity Assumed	6,88	1	6,88	41,73	,00
	Greenhouse-Geisser	6,88	1	6,88	41,73	,00
	Huynh-Feldt	6,88	1	6,88	41,73	,00
	Lower-bound	6,88	1	6,88	41,73	,00
Measurement * group	Sphericity Assumed	0,05	1	0,05	0,29	,59
	Greenhouse-Geisser	0,05	1	0,05	0,29	,59
	Huynh-Feldt	0,05	1	0,05	0,29	,59
	Lower-bound	0,05	1	0,05	0,29	,59
Lapse (Measurement)	Sphericity Assumed	9,57	58	0,17		
	Greenhouse-Geisser	9,57	58	0,17		
	Huynh-Feldt	9,57	58	0,17		
	Lower-bound	9,57	58	0,17		

For fixing whether or not it existed, a momentous variance amid the before-test and after-testing levels of digital citizenship of pre-service teachers in the single group-experimental group, a dual-factor recurring procedures ANOVA testing system remained benefited, taking into account the variable of day-to-day internet practice. As a consequence of the findings in Tables 15 and 16 when the daily internet usage time variable is considered, there existed a substantial variance between the post-test numerical citizenry stages of before-service teaching staff compared to the pre-test digital citizenship levels [$F(1.57) = 0.59$; $p > 0.05$].

3. Discussion

The digital citizenship levels of the senior students of the classroom teaching department remained scrutinized as stated by the numerical citizenry sub-dimensions. The purpose of this section is to review relevant studies from the literature that share a similar objective to ours, analyzing both their similarities and differences from our study. According to the literature review, it is safe to mention that the outcomes of the researches are almost similar to each other. Accordingly, it is able to mention that the evaluations made about the numerical citizenry stages of prospective teaching staffs as well as the recommendations to be given as a result are important. Kaya and Kaya [15] sought to determine the digital citizenship levels of prospective teaching staff that study in the Department of Computer and Instructional Technologies Education (CEIT). Participants within the study were 3rd and 4th grade prospective teaching staff candidates enrolled within CEIT department. In terms of the conclusion of the research, it is discovered that undergraduates defined numerical citizenry as "using digital technologies to make people's lives easier". To achieve this goal, it was suggested that providing students with digital citizenry education in schools and enhancing their digital citizenship skills should be made mandatory before they become pre-service teachers. In his research, Bakır [4] indicated that the levels of numerical citizenry midst principal school teaching staffs are high when numerical citizenry education is delivered. According to Berardi [6], in a study that he conducted with primary and secondary school teachers, teachers demonstrated low levels of digital citizenship, and it remained recommended that qualified numerical citizenry education should be provided to them in order to resolve this issue.

Additionally, it has been recommended that new generation teacher candidates take digital citizenship training before entering the teaching profession in order to avoid experiencing these problems.

Tatlı [19] found a substantial change amid the age of teachers and stages of numerical citizenry, which supports our findings. In Tatlı's study [19], it was stated that teachers' age ranges and digital citizenship levels were greatly affected. The study concluded that teachers under the age of 25 have higher levels of digital citizenship skills than other teachers. Since they were born into the digital age, they refer to themselves as digital natives. In the study conducted by Kocadağ [16], another supportive study, it was concluded that there stands a noteworthy variance amid the numerary citizenry stages as well age ranges of prospective teaching staff.

Their study found a significant positive difference in digital citizenship levels between pre-service teachers with longer computer practice compared to those with shorter practice durations. This finding supports the importance of long-term computer use for pre-service teachers. As a result of this study, similar results were obtained. As Kozan [17] reported in his study, pre-service teachers who have been using computers for at least nine years or more demonstrate significantly higher levels of numerary citizenry than before-service teaching staff with fewer years of computer use besides it is favor pre-service teachers whom have practiced the internet for a lengthier term.

Considering the duration of everyday internet and computer practice, it is found that there remained a momentous alteration amid numerical citizenry stages of teacher candidates as well as the frequency of daily computer and internet use, and it remained decided that the numerical citizenship levels of pre-service teaching staffs increased significantly as they spent time on the computer and the Internet [8]. Hatlevik [12], in contrast, specified in his research accompanied by the participation of 9th grade students that there stands a substantial as well as the constructive relationship amid undergraduates' digital citizenship levels and the use of computers and the internet at home. In their study, Gundüz and Ozdinc [11] concluded that people who spend more time on the Internet are more successful in digital environments and can solve problems more easily and quickly.

4. Conclusion

In the direction of determining the stages of before-service teaching staff before and after fourteen weeks of training, a scale was filled out.

In line with the pre-test and post-test data gained as the results of the measure, it remained revealed that the before-service teaching staff was successful in education at the expected and desired level in all sub-dimensions.

According to the study findings, when the demographic information of the before-service teaching staffs was examined, it was seen that the majority of the last term prospective teaching staff within the tutorial room instructing department were between the ages of 32-37. While 33 of the before-service teaching staff used computers for 12-15 years, the remaining 27 used computers for 8-11 years. Again, 35 of the before-service teaching staff detailed that they used the Internet for 8-11 years. 25 of the pre-service teachers used the Internet for 1-3 hours a day, 20 of them said that they used the Internet between 4-6 hours and 15 of them said that they used it less than 1 hour a day. While 28 people stated that they use smart devices for an average of 4-6 hours a day, it was concluded that 39 people use the Internet for an average of 1-3 hours a day.

In terms of the conclusion of the research, the average value of the pretest total scores on the numerical citizenry levels of principal school prospective teaching staffs stood 4.65, as well as before the education program, the numerical citizenry stages of last year's principal school teaching staff was at the medium level, albeit slightly compared to the 6-point Likert. The before-service teaching staff showed higher stages of numerical citizenry following training, with a posttest total score of 5.17, and again, it increased to the level of "mostly agree" on a 6-point Likert scale.

As stated by the descriptive statistical outcomes of pretest - posttest numerical citizenry levels, posttest numerical citizenry levels were higher than the pretest digital citizenship levels, taking into account the age variable of the single - experimental group. As stated by the consequences of the two-factor repeated measurements ANOVA testing system made based on the age variable of the pre-service teachers, it did not have any momentous variance amid them.

When the evocative figures of before-testing and after-testing digital citizenship levels for single cluster experimental group are studied, it becomes evident that the digital citizenship levels of all teacher candidates stand the same at the pretest. Upon examining the after-test results of the before-service teachers based on their development after training, it was concluded that their pre-test scores augmented as compared to their before-testing results, and the pre-service teachers who had used computers for 12-15 years also had higher scores than those who had used computers for 8-11 years.

Teachers who have used computers for a longer time are more likely to be successful in the classroom. Furthermore, according to the repeated measurements of ANOVA results based on the variable of years of computer use, there remained a noteworthy variance amid variables.

Considering the variable of years of internet use of the single - experimental group, when the descriptive statistics consequences of the pre-test and post-test digital citizenship levels remain scrutinized, it stands perceived that the average value of the before-test teaching staff who are practicing the Internet in 12-15 years in the pretest is higher than the pre-service teachers who use it for 8-11 years. According to the post-test data, the post-test averages showed an increase compared to the pretest averages. As a result, teacher candidates benefit from the training. Before-service teaching staff whom have practiced the Internet use for many years have advanced stages of numerical citizenship than other pre-service teachers, based on the results obtained. Data obtained from repeated measurements with two factors, ANOVA based on the variable of years of the Internet use, showed a significant increase between the variables of years of Internet use, but no significant difference was found between the variables.

As stated by the expressive figures of the before-testing as well as after-testing digital citizenship levels of the single - experimental group, although the pre-test average of 4-6 hours per day using a computer is the highest, the highest posttest score has been recorded by pre-service teachers who use a computer between 1-3 hours every day. According to the data obtained, however, the after-testing results significantly augmented in comparison with before-testing results accompanied by expected result of the training was achieved. Based on the data obtained as a result of the two-factor repeated measurements of ANOVA, based on the variable of daily computer use time, a significant increase between the variables of years of the Internet practice remained discovered, nevertheless any kind discovered amid them.

Following the descriptive statistical results of before-testing as well as after-testing digital citizenship levels for single-experimental cluster, after-testing mean results stayed pointedly greater than the before-testing mean results based on the daily smart device usage time variable. According to repeated measurements with two factors, ANOVA, there existed type of momentous variance amid the variables based on the significant difference for these variable quantities.

Based on the analyses of the last sub-goal, considering the daily Internet usage time of the single - experimental group, it was concluded that the posttest mean scores remained exceeding the pretest mean consequences centered on descriptive statistics of before-testing as well as after-testing digital citizenship levels, and all variables showed a significant increase. Based on the data obtained through repeated measurements with two factors, ANOVA, there was no significant difference between the variables.

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