The Impact of Asynchronous Reflection and Discussion on Pre-Service Teachers' Evaluation of Arguments about the COVID-19 Pandemic

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Abstract

Pre-service teachers (PSTs) play a key role in creating future citizens who critically evaluate information. Therefore, this study investigated PSTs' ability to evaluate two controversial topics about COVID-19 before and after asynchronous reflection and discussion on the trustworthiness of evidence and credibility of sources of evidence. Eighteen sophomores who studied in the English Language Teacher Education Program in the Faculty of Education at a private university in Turkey participated in the study. Their pre- and post-assignments, in which they discussed arguments about COVID-19, were analyzed. The results of the study reveal the positive impact of asynchronous reflection and discussion to facilitate PSTs' critical evaluation. The results suggest further implications in teacher education programs and teacher education research for promoting argumentation skills.

Keywords: asynchronous reflection and discussion, pre-service teachers, critical evaluation, COVID-19

Introduction

In the post-truth era, digital misinformation has become pervasive in society via the internet and social media (Del Vicario et al., 2016). The spread of disinformation results in a lack of public confidence in facts and science (Kienhues, 2020). The information people get strongly impacts their decisions and behaviors (Cinelli et al., 2020), leading to science denial and anti-vaccination movements (Jamison et al., 2019). The denial of scientific evidence could potentially be a threat to democracy and society (Allcott et al., 2019). The main problem of science denial is a lack of understanding of uncertainty in science rather than scientific knowledge itself (Kampourakis, 2018). The dissemination of misinformation and unscientific views can be prevented by educating scientifically literate citizens with the ability to cope with uncertainty in science (Kampourakis &

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McCain, 2019) and make informed decisions by engaging in evidence-based reasoning and critical thinking processes (Erduran, 2020).

The circulation of misinformation about COVID-19 has been raising public concern, and the World Health Organization (WHO) labeled this situation as an infodemic (World Health Organization, 2020a). To fight this infodemic, WHO created a section on its website publishing daily reports to provide the population with reliable data (World Health Organization, 2020b). The argument of this paper is that it is necessary to improve learners' ability to evaluate alternative arguments on controversial topics about COVID-19 as well as provide them with reliable data and scientific knowledge in order to facilitate their evidence-based reasoning and critical thinking. It is especially important to investigate pre-service teachers' (PSTs') evaluation of arguments to educate future scientifically literate teachers who create future scientific citizens.

Arguments from evidence and obtaining, evaluating, and communicating information are among the science and engineering practices described in A Framework for K-12 Science Education (NRC, 2021) and the goals of the science curriculum of the Turkish Ministry of Education (MoNE, 2018). Discourse, argumentation, and evaluation of information require engaging in not only discourse-intensive scientific practices but also mastering language (Swanson et al., 2014). Setting the goal of argumentation in PST education will facilitate the use of argumentation as a long-term pedagogical strategy (Erduran et al., 2016). Argumentative writing skills are significant for language learners and, thus, for language teachers (Gill & Janjua, 2020). Therefore, examining pre-service language teachers' evaluation of arguments is essential for developing their argumentative skills. From this point of view, it is necessary to equip language teachers with the ability to engage in the evaluation of arguments as well as argumentation. However, studies about the argumentation of in-service or pre-service English language teachers (ELT) are rarely found. Recent studies about ELT teachers' argumentation have mainly focused on their moral decisions in teaching (e.g., Soleimani & Lovat, 2019) or investigated pre-service ELT teachers' critical thinking skills as one of the 21st-century skills (e.g., Bedir, 2019). These studies emphasized the necessity of developing in-service and pre-service ELT teachers' evaluation of arguments without clearly defining the criteria for developing argumentative skills.

The COVID-19 pandemic forced teachers to use online teaching (Bajaj et al., 2021). Therefore, examining the efficiency of online teaching settings is required. A previous study by Saribas and Çetinkaya (2021) revealed the positive impact of online courses implementing discussion and feedback on PSTs' analysis of claims about COVID-19. However, these researchers reported that PSTs were challenged to justify whether the claims were scientific or not and were rarely able to judge the credibility of sources critically, even after completing the course. To promote their ability to evaluate claims and the credibility of sources, it seems necessary to equip PSTs with the ability to evaluate information, data, and evidence, detect bias and misinformation on the internet and media, and ask critical questions to judge the trustworthiness of evidence and credibility of sources of information.

Recent literature indicates gains in online and virtual classes regarding argumentation (Fettahlıoğlu & Aydoğdu, 2020; Kapici et al., 2021; Ng, 2022; Saribas & Çetinkaya, 2021). Written reflections (Choi & Hand, 2020; Kim et al., 2021; Yaman, 2018) and asynchronous discussions are also shown to be effective regarding argumentative skills (Choi & Hand, 2020). Therefore, it seems necessary to include a detailed reflection in which PSTs discussed the trustworthiness of evidence and credibility of sources, as well as the discussions of claims, evidence, and argument in online classes as well as face-to-face instructions. PSTs need to discuss their ideas by comparing them to their peers' ideas as well as those written in the sources that they cited. Saribas and Bayram (2017) revealed the benefits of using reflection and discussion in the laboratory regarding their understanding of chemistry topics. The argument of this paper is that reflection and discussions are effective tools in not only laboratory courses, but also other courses, especially those requiring the evaluation of claims and evidence. From this background, examining PSTs' evaluation of claims and arguments throughout an online course in which asynchronous reflection and discussion are implemented may provide a detailed insight into their reasoning for the arguments about COVID-19.

Saribas and Çetinkaya (2021) investigated pre-service Arabic language teachers' analysis of claims and identified high, moderate, and low levels of analysis by depending on the following criteria: evaluating the relationship between claim and evidence, demarcating fallacies and conspiracy theories from scientific arguments, and judging the credibility of sources. However, analysis of PSTs' evaluation of arguments includes more than the three criteria listed above. The following criteria are necessary to evaluate PSTs' arguments: (a) expressing the required information; (b) distinguishing the concepts of claims, arguments, and evidence; (c) providing evidence; (d) distinguishing relevant from irrelevant evidence; (e) searching information not only for but also against their own position; (f) drawing conclusions based on facts and sound reasoning; (g) understanding the bias and propaganda in the given information; (h) recognizing whether the information is a result of investigation; (i) recognizing that facts and interpretations are blended in most of the sources of information; and (j) asking critical questions to judge the credibility of sources of information. PSTs' evaluation of arguments can be analyzed again at three levels, considering how effectively they achieved each of these criteria. Thus, the following research question was addressed in the current study:

1. Is there a significant effect of asynchronous reflection and discussion on PSTs' evaluation level of arguments about COVID-19?

Theoretical Framework

Evaluating arguments and evidence in personal, societal, and political contexts is among the goals of science education (e.g., Carey & Smith, 1983; Duggan & Gott, 2002; Roberts, 2007; Ruhrig & Höttecke, 2015). Allchin (2011) pointed out the necessity of understanding uncertainty in science to be an informed citizen. Uncertain scientific evidence plays an important role in public debate about socio-scientific issues such as climate change or electromagnetic pollution (Ruhrig & Höttecke, 2015). On the other hand, Lang et al. (2020) argued that uncertainty beliefs are beneficial when dealing with

competing scientific claims and evaluating scientific controversies. The spread of unscientific beliefs about controversial topics such as vaccines, the shape of the Earth, and climate change among the public has existed for a considerable amount of time. However, the spread of misinformation has been progressively rising today due to the COVID-19 pandemic (Mian & Khan, 2020).

Misinformation about COVID-19 Pandemic

Misinformation regarding COVID-19 not only prevents practices of health, such as hand washing and social distancing, but also increases erroneous practices like consuming hazardous substances and actions that lead to food insecurity and health problems (Tasnim et al., 2020). A tsunami of information, which spreads faster than a virus, is defined as an *infodemic* and creates fear and anxiety in the public, who finds it difficult to differentiate between evidence-based information and a broad range of unreliable misinformation (WHO, 2021). Combating the infodemic of COVID-19 requires people to become more critical of the information they are presented with and distinguish between facts and fake news (Naeem & Bhatti, 2020).

Many researchers and philosophers indicated the harmful effects of misinformation and the necessity of dealing with these problems via education (e.g., Nguyen & Catalan, 2020; Pennycook et al., 2020). Educating future citizens who participate in debates and make informed decisions in a democratic society is one of the goals of science education for all students. This kind of participation requires students to become aware of different positions and dilemmas about the issue in question (Ottander & Simon, 2021) and to be able to critically evaluate information based on its source and the methods it produces (Roberts, 2007). From this point of view, teacher education programs need to educate future teachers who educate such citizens for a democratic society. To achieve this aim, it is necessary to equip pre-service teachers with the ability to critically evaluate arguments about COVID-19.

Due to the COVID-19 pandemic, the universities were forced to shift from face-to-face in-class teaching to online classes in 2020. Therefore, there are a considerable number of studies that examine the effectiveness of online teaching compared to face-to-face classes (e.g., Almanar, 2020; Daumiller et al., 2021; Kemp, 2020; Moorehouse, 2020; Paudel, 2021; Serhan, 2020). Depending on the duration and impact of the pandemic on society and education, synchronous and asynchronous online learning experiences seem to continue to be employed in education. From this point of view, teaching science in general and specifically scientific knowledge about the COVID-19 pandemic requires incorporating discussions in online environments.

In a previous study, Saribas and Çetinkaya (2021) found that synchronous discussions and the instructor's feedback during an online course had a positive impact on PSTs' evaluation of arguments, demarcation of fallacies and conspiracy theories from scientific arguments, and judgment of the credibility of sources. On the other hand, they concluded that there are still deficiencies in evaluating the credibility of sources of

evidence. It is, therefore, necessary to promote PSTs' ability to evaluate sources and evidence as well as arguments.

Asynchronous Reflection and Discussion

Writing in science helps to activate cognitive attributes such as critical thinking (Lamb & Etopio, 2019). Bagheri (2015) suggested that language learners have higher critical thinking skills. Saleh (2019) also argued the necessity of the development of critical thinking skills as a 21st century skill for language learners and suggested engaging students in tasks that involve reflection to promote their critical thinking skills. Galikyan and Admiraal (2019) highlighted the significance of asynchronous online discussion in teacher education courses. Thus, it is beneficial to provide learners with opportunities to reflect and discuss their ideas in writing. Providing frequent opportunities for reflection and discussion is the core element of inquiry about and in science (Murphy et al., 2021). Research studies pointed out the benefits of reflection in evidence use (e.g., Iordanou & Constantinou, 2015) and finding reliable sources (e.g., Yaman, 2018). Burns et al. (2020) indicated that including interactive online lessons in the first-year general biology course facilitated students' taking responsibility for their own learning. Furthermore, Farina and Bodzin (2018) stressed positive student perceptions of asynchronous learning experiences. Asynchronous discussions are also effective to encourage learners to construct and critique arguments (Choi & Hand, 2020) and provide opportunities for productive argumentation and the growth of scientific knowledge (Callis-Duehl et al., 2018; Huang et al., 2015).

The COVID-19 pandemic can continue for an extended period, and it will likely have impacts on society for a long time. Therefore, investigations should include different approaches to teaching and learning science through online resources and the quality of online learning environments (Erduran, 2020). Based on this background, examining PSTs' level of evaluating arguments in an online course may bring insight to teacher education courses to promote PSTs' argumentation. In order to assess their level of evaluation, it is also necessary to determine criteria to assess PSTs' evaluation level of arguments about the COVID-19 pandemic.

Method

A pre- and post-test design was used in this study. The study was conducted in the Critical and Analytical Thinking course, which aims at improving PSTs' analysis and evaluations of information and demarcating scientific knowledge from unscientific claims and misinformation. The course was carried out online due to the pandemic in the fall semester of 2020–2021. PSTs were introduced to the concepts of analysis, claim, evidence, arguments, and fallacies during online classes. Researchers identify the following types of evidence during the discussions to support or refute views: the trustworthiness of evidence considering the types of evidence, including research findings and statistical data, expert judgment, personal and secondhand experience, specific cases and examples, and laws and policies (Asen et al., 2013). Therefore, they were informed about the
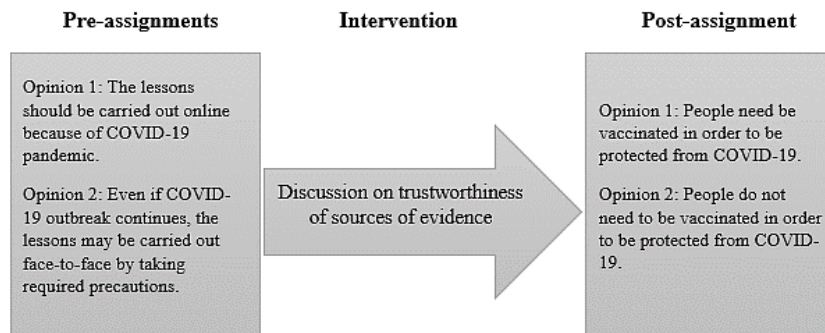
trustworthiness of evidence considering these types of evidence. However, laws and policies were not emphasized frequently during the discussions because the scope of this course did not include them. The credibility of sources was also discussed, considering the following questions (Warrington et al., 2020):

(1) Who is the author?
(2) How do I know that he/she is knowledgeable about the subject?
(3) Is the author using emotional appeals/manipulation in his or her argument?
(4) Does the author use "loaded" language to distract readers from relevant reasons and evidence?
(5) Is the support for the argument appropriate to the claim?
(6) Are all the statements believable?
(7) Is the argument consistent and complete?

Following these discussions of these concepts, they submitted their pre-assignments, in which they discussed whether the lessons should be carried out online or face-to-face. Asynchronous discussions of the trustworthiness of evidence and credibility of sources of evidence followed the submissions of pre-assignments and lasted for three weeks. Finally, they submitted their post-assignments, including alternative ideas about whether vaccination protects people from COVID-19. Figure 1 illustrates the design of the study.

Figure 1

The Design of the Study

Pre-assignments

Opinion 1: The lessons should be carried out online because of COVID-19 pandemic.

Opinion 2: Even if COVID-19 outbreak continues, the lessons may be carried out face-to-face by taking required precautions.

Intervention

Discussion on trustworthiness of sources of evidence

Post-assignment

Opinion 1: People need be vaccinated in order to be protected from COVID-19.

Opinion 2: People do not need to be vaccinated in order to be protected from COVID-19.

Data Sources

The participants' pre- and post-reflections on an argument and counterargument about a controversial topic in public regarding COVID-19 were analyzed in this study. The participants reflected on their evaluations of two alternative claims about online and face-to-face instruction on their pre-assignments, while they evaluated two alternative claims either in favor of or against vaccination. In their pre- and post-assignments PSTs answered the following questions:

(1) Write claims and arguments for each of the opinions.
(2) Provide set of evidence for each of the claims.

(3) Do you think each of the set of evidence are trustworthy? Why/why not?
(4) List each source that you obtained each evidence.
(5) Do you think each of these sources are credible? Why/why not?
(6) Construct a strong argument for the claim that you support. Justify your reason.

Expert judgment was used during the construction of the questions. The author was the instructor for the course. Therefore, in order to assure ethical considerations, two independent researchers on science education who work on scientific practices and argumentation checked the content validity of the questions.

Determining Criteria for Critical Evaluation

The current study examined PSTs' evaluations of arguments, evidence, and sources of evidence. According to Paul and Elder (2005), students who think critically search for information relevant to the questions to be answered or issues to be resolved. They routinely check information for accuracy. They also question information for bias and propaganda. From this point of view, they identified the following criteria:

- Students express in their own words (clearly and precisely) the most important information (in a discussion, chapter, assignment, etc.).
- Students distinguish the following related but different concepts: facts, information, experience, research, data, and evidence.
- Students state their evidence for a view clearly and fairly.
- Students distinguish relevant from irrelevant information when reasoning through a problem. They consider only relevant information, disregarding what is irrelevant.
- Students actively search for information against, not just for, their own position.
- Students draw conclusions only to the extent that those conclusions are supported by facts and sound reasoning. They demonstrate the ability to objectively analyze and assess information by coming to conclusions based on the information.
- Students understand the nature and function of bias and propaganda.
- Students recognize that most news stories are not a result of investigative journalism (but are taken from news conferences and press releases designed to influence the news).
- Students recognize that facts and interpretations are blended in most news stories.
- Students ask key questions when coming to conclusions about any given news story: What is the intended audience of this story? What point of view is being privileged? What points of view are being dismissed or played down? How can I gain access to viewpoints not covered? What stories are highlighted and why? What stories are buried and why.

Among the 25 standards and the indicators and dispositions that Paul and Elder (2005) identified, the aforementioned list is chosen to be used in this study as the criteria to evaluate arguments, evidence, and sources of evidence, as well as detect bias in various

kinds of information requires the list of these indicators. Paul and Elder (2005) classified their standards into six main sections. The first section includes competencies that focus on reasoning and intellectual standards. The six standards (from 1 to 6) in the third subsection of this section, namely information, data, evidence, and experience, were directly related to the aim of the current study and used as criteria in the study. Understanding bias and propaganda standards in Section 21 and three standards about news stories in Section 25 to detect media bias are also included among the criteria to evaluate arguments about the COVID-19 pandemic. The rest of the standards were excluded from the study since they mainly dealt with the information within particular subjects or required a more sophisticated understanding and elaborating of information about a topic, or traits, virtues, and dispositions were out of the scope of this study. The second section deals with intellectual standards. Therefore, the standards that are not directly related to the aim of the current study were excluded from the criteria used to evaluate the participants' arguments.

Procedure

After PSTs submitted their pre-assignments, they discussed the trustworthiness of evidence and credibility of the sources of evidence they utilized to prepare their assignments for three weeks asynchronously in the forums on Moodle. All the PSTs who participated in these discussions received feedback from the instructor. The instructor informed them about the trustworthiness of evidence and credibility of sources in an online course. The asynchronous discussion began with the question of whether their evidence and sources meet the criteria of trustworthiness and credibility, and why. The discussion continued with the trustworthiness and credibility of the sources of evidence provided for counterargument. During this discussion, the author suggested the participants not to evaluate the trustworthiness and credibility of evidence and sources of evidence by just reading the arguments. She pointed out that reasoning about claims and arguments is different from evaluating trustworthiness and credibility. The discussions are carried out to help the PSTs understand that trustworthiness and credibility are ensured by data- and evidence-based conclusions, the expertise of the author, and the quality of publication.

Participants

The participants of this study were 18 (8 male, 10 female) sophomores of the English Language Teaching Department who were enrolled in the Critical and Analytical Thinking course of a private university in Turkey. One male PST withdrew from the study before the submission of pre-assignments. The rest of the PSTs volunteered to participate in this study. The language of this course was English. All of these participants had the proficiency in reading, writing, and speaking English to participate in the oral and written discussions that were carried out in the course. Three of these participants are international students (1 from Libya, 1 from Lebanon, and 1 from Japan). The rest of them were Turkish citizens. None of these participants took any courses about argumentation or research. Therefore, they have no or limited knowledge of what counts as evidence, a claim, or an argument.

Data Analysis

The chosen indicators of critical thinking that Paul and Elder (2005) listed were adapted for this study, and the rubric was created after receiving an expert judgment on each criterion. PSTs' assignments were analyzed for each category by using the rubric presented in Table 1. Table 1 shows an example of the rubric. The rest of the rubric is shown in Appendix 1.

Table 1

The Rubric to Assess PSTs' Evaluation Levels

Criterion	Critical	Moderate	Low
Expressing information	PST expressed clearly and precisely the most important information.	PST expressed some aspects of the important information; however, some of the required information was missing or his/her explanation was not clear and precise.	PST's expression was superficial and weak, which made hard to make sense of the topic.
Distinguishing the concepts	PST distinguished the following related but different concepts: claim, argument, and evidence in the information.	PST distinguished two of the following related but different concepts: claim, argument, and evidence in the information.	PST could not distinguish any of the following related but different concepts: claim, argument, and evidence.

The current study includes qualitative data but is transformed into a quantitative one by scoring the participants' responses in each category and comparing their total scores in the pre- and post-assignments by using a paired samples t-test. In each criterion, PSTs' evaluations for critical, moderate, and low levels were scored as 3, 2, and 1, respectively. One of the researchers who checked the validity of the questions also checked the scoring of the PSTs' responses. The following equation was used to calculate the percentage agreement:

(Number of ratings in agreement / Total number of ratings) × 100 = 132 / 180 × 100 = 0.73. The initial percentage agreement between the researchers was 73%. They discussed their conflicts until they reached complete agreement on their coding.

Results

Paired-samples t-test was used in this study to identify the PSTs' evaluation level of arguments about COVID-19 before and after asynchronous reflection and discussion and investigate whether asynchronous reflection and discussion have an influence on the PSTs' evaluation level of arguments about COVID-19. However, in order to utilize the t-

test, a goodness-of-fitness test needs to be applied to the distribution of the scores. The Kolmogorov-Smirnov test indicated that the scores in each criterion as well as in total were normally distributed ($p > 0.05$). Table 2 illustrates descriptive statistics of PSTs' scores, while Table 3 reveals t-test scores of PSTs' evaluation level of arguments about COVID-19 before and after asynchronous reflection and discussion in each criterion as well as in total.

Table 2

Descriptive Statistics of PSTs' Pre- and Post-Assignment Scores

		Mean	*N*	Std. Deviation	Std. Error Mean
Expressing information	Pre	2.89	18	0.32	0.08
	Post	3.00	18	0.00	0.00
Distinguishing the concepts	Pre	2.17	18	0.86	0.20
	Post	2.5	18	0.51	0.12
Stating evidence	Pre	2.33	18	1.03	0.24
	Post	2.89	18	0.32	0.08
Distinguishing relevant information	Pre	2.56	18	0.70	0.16
	Post	2.89	18	0.32	0.08
Searching information	Pre	2.56	18	0.62	0.15
	Post	2.83	18	0.38	0.09
Drawing conclusions	Pre	2.06	18	0.64	0.15
	Post	2.78	18	0.43	0.10
Understanding bias and propaganda	Pre	2.50	18	0.79	0.19
	Post	3.00	18	0.00	0.00
Recognizing investigation	Pre	2.33	18	0.97	0.23
	Post	3.00	18	0.00	0.00
Recognizing facts and interpretations	Pre	2.50	18	0.79	0.19
	Post	3.00	18	0.00	0.00
Asking critical questions	Pre	2.11	18	0.83	0.20
	Post	2.78	18	0.55	0.13
Total	Pre	2.40	18	0.50	0.12
	Post	2.87	18	0.14	0.03

Table 2 indicates that the scores of PSTs' pre-assignments regarding expressing information, distinguishing relevant information, and searching information were mostly at the critical level. On the other hand, PSTs' abilities to distinguish the concepts of claim, argument, and evidence; provide evidence to support arguments; distinguish relevant information from irrelevant information; search information not only for but also against their own position; draw conclusions based on facts and sound reasoning; detect bias and

propaganda; recognize that not every piece of information is based on investigation; differentiate facts and interpretations; and ask critical questions seem to have been at a moderate level before intervention.

Table 3

T-test Scores of PSTs' Evaluation Levels of Arguments

Pre-post	Mean	SD	SE	95% CI Lower	95% CI Upper	t	df	Sig. (2-tailed)
Expressing information	-0.11	0.32	0.08	-0.27	0.05	-1.46	17	0.16
Distinguishing the concepts	-0.33	0.69	0.16	-0.67	0.01	-2.06	17	0.06
Stating evidence	-0.56	1.10	0.26	-1.10	-0.01	-2.15	17	0.04
Distinguishing relevant information	-0.33	0.84	0.20	-0.75	0.08	-1.69	17	0.11
Searching information	-0.28	0.83	0.19	-0.69	0.13	-1.43	17	0.17
Drawing conclusions	-0.72	0.75	0.18	-1.10	-0.35	-4.08	17	<0.01
Understanding bias and propaganda	-0.50	0.79	0.19	-0.89	-0.11	-2.70	17	0.02
Recognizing investigation	-0.67	0.97	0.23	-1.15	-0.18	-2.92	17	0.01
Recognizing facts and interpretations	-0.50	0.79	0.19	-0.89	-0.11	-2.70	17	0.02
Asking critical questions	-0.67	0.97	0.23	-1.15	-0.18	-2.92	17	0.01
Total	-0.47	0.53	0.12	-0.73	-0.20	-3.75	17	<0.01

It is evident from Table 3 that PSTs benefited from asynchronous reflection and discussion in terms of evaluating arguments about COVID-19 in general. After three weeks of implementation, they improved their evaluation of arguments, especially regarding stating evidence, drawing conclusions, understanding bias and propaganda, recognizing investigations, recognizing facts and interpretations, and asking critical questions. However, PSTs' ability to distinguish the concepts of claim, argument, and evidence did not increase significantly throughout the intervention. PSTs' pre-assignments regarding expressing information, distinguishing relevant information, and searching information were mostly at the critical level. Therefore, the influence of the intervention cannot be observed in these categories either.

Cohen's *d* value is calculated in this study as the difference between the mean scores of PSTs' pre- and post-test scores, which are then all divided by the standard

deviation of the data (d = Mean / Std. deviation). Table 4 shows Cohen's d value of PSTs' scores in each criterion and in total.

Table 4

Cohen's d Value of PSTs Scores

Criterion	Cohen's d Value
Stating evidence	0.51
Drawing conclusions	0.96
Understanding bias and propaganda	0.63
Recognizing investigation	0.69
Recognizing facts and interpretations	0.63
Asking critical questions	0.69
Total	0.88

It is evident from Table 4 that the effect of asynchronous reflection and discussion on PSTs' stating evidence, understanding bias and propaganda, recognizing investigation, facts and interpretations, and asking questions was medium, while this method has large effect on their ability to draw conclusions based on evidence and evaluating arguments in total scores (Howell, 2009).

Discussion and Conclusion

The COVID-19 pandemic prompted a sudden shift to remote instruction in 2020 (Gerard et al., 2021) and thus the necessity of finding effective ways to teach in online environments. The study presented here is one of these attempts to promote PSTs' evaluation of arguments through asynchronous reflection and discussion in an online course. Asynchronous reflection and discussion on the trustworthiness of evidence and credibility of sources of evidence that PSTs utilized during preparing their assignments for three weeks seemed to have positive impacts on their evaluation of arguments.

PSTs' ability to express information, distinguish relevant information, and search information was mostly at a critical level even before intervention. Therefore, the influence of the intervention cannot be observed in this study. The reason behind this outcome may be PSTs' prior learning experiences. Pre-service ELTs are used to search for information, distinguish relevant information from irrelevant information, and express their inferences from this information when writing essays in other courses. On the other hand, they increased their evaluation of evidence and arguments, drawing conclusions based on evidence, understanding bias and the importance of investigation, recognizing facts and interpretations, and asking questions throughout the intervention. The medium effect of asynchronous reflection and discussion on PSTs' statements of evidence, understanding bias and propaganda, recognizing investigations, facts, and interpretations,

and asking questions is a promising result since the intervention lasted for only three weeks. This result indicates the necessity of reflection and discussion, especially on the trustworthiness of evidence and credibility of arguments, in the whole class. Previous research pointed out the necessity of integrating the use of evidence in science classes to promote argumentation (Bravo-Torija & Jiménez-Aleixandre, 2018). This result also supports the argument that not only science classes but also language classes should incorporate the use of evidence.

Despite the aforementioned gains in PSTs' evaluations of arguments, this method did not seem to have an impact on PSTs' ability to distinguish the concepts of claim, argument, and evidence. This finding indicates the necessity of further efforts to improve their understanding of what counts as evidence as well as claims and arguments. Solli (2021) also suggested addressing the disjuncture between the claims in a scientific journal and the interpretations of such claims in a scientific setting. Further studies examining PSTs' evaluation of scientific reports may shed new light on this issue.

Kuhn and Lerman (2021) stressed the importance of coordinating evidence with claims, yet pointed out the different forms of evidence that pose different interpretational challenges. They suggested challenging students by using different forms of evidence with respect to not only their strengths but also their weaknesses in supporting or weakening claims by using the "Yes-But" prompt that requires students to explain in what respect this evidence falls short. The findings of the current study are consistent with this suggestion by pointing out the benefits of challenging the learners on the strengths and weaknesses of evidence by using asynchronous reflection and discussion on lines of evidence. Further studies investigating PSTs' evaluations of arguments and evidence about COVID-19 with respect to the type of evidence and its strengths and weaknesses in online teaching settings may shed new light on argumentation in teacher education literature.

Teachers' active participation in research may help teachers to not only fill the gap between research and teaching language (Leow et al., 2022), but also acquire the skills of providing evidence for their inferences during teaching practices. Nguyen et al. (2022) suggested that inquiry-based teacher education fosters teachers' research mindsets. From this perspective, restructuring teaching practice courses during undergraduate years to include providing evidence, reflective practice, and discussion with peers may be beneficial to promote their research and argumentation skills. Future research, including the components of evidence, reflection, and discussion in teacher practice courses, may bring new insight into specifically ELT education research and teacher education research in general.

Sato and Leowen (2022) suggested the support of universities and schools for researcher and practitioner collaboration and a productive research-practice dialogue in the future. The results of the present study suggest that asynchronous reflection and discussion may be helpful for such collaboration and dialogue. The implications of various forms of reflection and discussion among researchers and teachers might also be

beneficial for creating future scientifically literate teachers who construct arguments for teaching practices by providing sufficient evidence.

The main limitation of the current study is the sample size. On the one hand, the results gathered from eighteen participants are hardly generalizable to the PST argumentation literature. On the other hand, the results of this study are still remarkable for pointing out the impact of asynchronous reflection and discussion on pre-service ELTs' evaluation of arguments. Considering the scarcity of research studies conducted on pre-service and in-service language teachers' argumentative skills, the results of this study bring new insight into the development of ELTs' argumentative skills. Further investigations on a larger group of pre-service and in-service language teachers' evaluation of arguments and development of arguments may broaden our perspective in this manner.

Another limitation may be the only use of PSTs' assignments as a data source. Although these assignments depicted the participants' evaluation of arguments in a detailed manner, further investigation utilizing observations of classroom discussions on controversial issues, such as the COVID-19 pandemic, may shed new light on in-service and pre-service language teachers' understanding of arguments and evidence.

Code of Ethics

This study met the ethics requirements for human subjects' research. Educational Sciences Ethics Committee reviewed the study, and its approval number is E- 42048860-020-57730. Furthermore, the details (names, dates of birth, identity numbers, and other information) of the participants that were studied are not published in written descriptions, photographs, and genetic profiles.

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Asenkron Yansıtma ve Tartışmanın Öğretmen Adaylarının COVID-19 Salgını Hakkındaki Argümanları Değerlendirmesine Etkisi

Öz

Öğretmen adayları, bilgiyi eleştirel olarak değerlendiren geleceğin vatandaşlarının yaratılmasında kilit rol oynamaktadır. Bu nedenle, bu çalışma, COVID-19 ile ilgili iki tartışmalı konuyu öğretmen adaylarının kanıtların ve kanıt kaynaklarının güvenilirliği üzerine asenkron yansıtma ve tartışma öncesi ve sonrasında değerlendirme yeteneklerini araştırmıştır. Çalışmaya, Türkiye'de özel bir üniversitenin Eğitim Fakültesi İngilizce Öğretmenliği Programında öğrenim gören on sekiz ikinci sınıf öğrencisi katılmıştır. COVID-19 ile ilgili argümanları tartıştıkları ön ve son ödevleri analiz edilmiştir. Çalışmanın sonuçları, asenkron yansıtma ve tartışmanın, öğretmen adaylarının eleştirel değerlendirmeleri açısından olumlu etkilerini ortaya koymaktadır. Sonuçlar, argümantasyon becerilerinin geliştirilmesi açısından öğretmen eğitimi programlarında ve öğretmen eğitim araştırmalarında daha fazla uygulama önerileri sunmaktadır.

Anahtar Kelimeler: asenkron yansıtma ve tartışma, öğretmen adayları, eleştirel değerlendirme, COVID-19

Appendix 1

The Rubric to Assess PSTs' Evaluation Levels

Criterion	Critical	Moderate	Low
Expressing information	PST expressed clearly and precisely the most important information.	PST expressed some aspects of the important information; however, some of the required information was missing or his/her explanation was not clear and precise.	PST's expression was superficial and weak, which made hard to make sense of the topic.
Distinguishing the concepts	PST distinguished the following related but different concepts: claim, argument, and evidence in the information.	PST distinguished two of the following related but different concepts: claim, argument, and evidence in the information.	PST could not distinguish any of the following related but different concepts: claim, argument, and evidence.
Stating evidence	PST provided pieces of evidence for both arguments by correctly indicating the strength of each piece of evidence due to the connection between the evidence and argument.	PST stated some pieces of evidence clearly but seem to have overlooked some other or could not indicate the connection between the evidence and argument.	PST could not state evidence for a view clearly and fairly.
Distinguishing relevant information	PST distinguished relevant from irrelevant information; considered only relevant information during evaluating arguments and evidence, disregarding what is irrelevant.	PST distinguished some relevant from irrelevant information. However, he/she seemed to have overlooked some relevant information or missed some irrelevant information during evaluating arguments and evidence.	PST seem to have been confused about relevant and irrelevant information.
Searching information	PST seemed to have actively searched for information against, not just for, their own position.	PST seemed to have searched for information in limited number of sources without elaboration or it is unclear which sources he/she utilized.	PST did not seem to have searched the information. He/She just expressed his/her own opinion.
Drawing conclusions	PST drew conclusions only to the extent that those conclusions are supported by the facts and sound reasoning. He/She demonstrated the ability to objectively analyze and evaluate arguments and evidence.	PST seemed to have considered facts, but he/she seemed to have been challenged during evaluating both supporting and contradictory evidence and relating it to the arguments.	PST's conclusions seemed to have been biased.
Understanding bias and propaganda	PST seemed to have understood the nature and function of bias and propaganda since he/she evaluated the trustworthiness of evidence accurately.	PST seemed to have overlooked bias and propaganda since he/she provided accurate and trustworthy evidence; however, evaluated its trustworthiness based on the plausibility of the claim that it supports.	PST seemed to have overlooked bias and propaganda since he/she utilized sources of evidence that includes biased information.
Recognizing investigation	The PST's evaluation of trustworthiness of evidence revealed his/her recognition that most information is not a result of investigation.	PST seemed to have understood the significance of utilizing credible sources; however, did not seem to have recognized the importance of investigation regarding trustworthiness.	PST did not seem to have totally understood the relationship between trustworthiness and investigation.
Recognizing facts and interpretations	PST seemed to have recognized that facts and interpretations are blended in most of the sources of information.	PST sometimes seemed to have been confused about distinguishing facts and interpretations.	PST did not seem to have distinguished facts and interpretations at all.
Asking critical questions	PST discussed all the required critical questions to judge the credibility of sources of information.	PST discussed some of the critical questions to evaluate the credibility of sources.	PST did not discuss any of the critical questions to judge the credibility of sources.