





Video Club Designs in Improving Teachers' Noticing

Elif Nur TANIR GÜÇYETMEZ ^{*1} , Sibel YEŞİLDERE İMRE ² 

* Corresponding elifnurtanir@gmail.com

¹Ministry of National Education Kayseri, Türkiye

²Dokuz Eylül University, Türkiye

Abstract

This study examines studies on video club designs focusing on noticing skills of teachers and pre-service teachers. In this context, 18 articles published in the last twenty years on video club designs focusing on noticing skills in the field of mathematics education were systematically examined. As a result of the examination, differences in video club designs of the studies were determined. In addition, the results of the studies examined in terms of noticing skills as well as the results of the studies examining the differences in video club designs were evaluated. As a result of the analysis, it was determined that there were differences in video club designs in terms of the videos used, participants, facilitators' directions and frameworks used. It was determined that the participants were generally teachers and the videos were used in the form of video clips. In addition, it was determined that frameworks were used in some studies to help teachers focus their attention on certain teaching moments. Furthermore, it was determined that the facilitators directed the participants' attention to the mathematical thinking processes of the students, the teaching practices of the teachers and the student interactions. The results of the studies regarding noticing skills were determined to be on student knowledge and thoughts, social interactions and teaching processes. In addition, the results of some studies that different video club designs can create different effects were presented.

Keywords: Video Club, Noticing, Mathematics Education, Systematic Review

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Öğretmenlerin Fark Etme Becerilerini Geliştirmede Video Kulüp Tasarımları

Özet

Bu çalışmada öğretmenlerin ve öğretmen adaylarının fark etme becerilerine odaklanan video kulüp tasarımlarına ilişkin araştırmalar incelenmiştir. Bu doğrultuda son yirmi yılda matematik eğitimi alanında fark etme becerileri üzerine odaklanmış video kulüp tasarımlarına ilişkin yayımlanan 18 makale sistematik olarak incelenmiştir. İnceleme sonucunda çalışmaların video kulüp tasarımlarındaki farklılıkları belirlenmiştir. Ayrıca incelenen çalışmaların fark etme becerileri bağlamındaki sonuçlarının yanı sıra video kulüp tasarımlarındaki farklılıkları inceleyen çalışmaların da sonuçları değerlendirilmiştir. Yapılan analiz sonucunda video kulüp tasarımlarında; kullanılan videolar, katılımcılar, kolaylaştırıcıların yönlendirmeleri ve kullanılan çerçeveler açısından farklılıklar olduğu tespit edilmiştir. Genellikle katılımcıların öğretmen olduğu, videoların ise video klip şeklinde kullanıldığı tespit edilmiştir. Ayrıca bazı çalışmalarda öğretmenlerin dikkatlerini belirli öğretim anlarına yoğunlaştırmalarına yardımcı olması açısından çerçeveler kullanıldığı tespit edilmiştir. Bunun yanı sıra çalışmalarda kolaylaştırıcıların, katılımcıların dikkatini öğrencilerin matematiksel düşünme süreçlerine, öğretmenlerin öğretim uygulamalarına ve öğrenci etkileşimlerine yönlendirdiği belirlenmiştir. Çalışmaların fark etme becerilerine ilişkin sonuçları ise öğrenci bilgi ve düşünceleri, sosyal etkileşimler ve öğretim süreçleri üzerine olduğu tespit edilmiştir. Ayrıca bazı araştırmaların farklı video kulüp tasarımlarının farklı etkiler yaratabileceğine ilişkin sonuçları sunulmuştur.

Anahtar Kelimeler: Video Kulüp, Fark Etme Becerileri, Matematik Eğitimi, Sistematik Derleme

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1. Introduction

Video records social interactions and human behaviors in their natural environments and contexts, making them available for later and more convenient examination (Lemke, 2007). Sherin (2004), who examined the chronological history of the use of video in teacher education, suggested that the place of videos in education, which provided teachers with the opportunity to think about classroom interactions, dates back to the 1960s. In the 1960s, a video-based approach called "micro teaching" was developed, which included experiments with teaching at a micro level (Olivero, 1965). Sherin stated that in the 1970s, the lesson analysis method came to the fore as a different use of video in teacher education. With this method, unlike micro teaching, where participants had the opportunity to try and practice a specific skill, participants learned to identify specific teacher and student behaviors. In the 1980s, the idea of examining the actual teaching of experienced teachers through video in teacher education was developed. In this context, it was aimed to examine the teaching strategies and methods of experienced teachers so that teacher candidates can become more expert (Sherin, 2004). Sherin reported that in the 2000s, the use of video provided an opportunity to think about teaching practices. Sherin also stated that video would be beneficial for future studies and attributed this to three features of video: providing a permanent record of what happens in a classroom, being collectable and editable, and being able to be viewed multiple times for multiple purposes. Therefore, video is a tool that can present various real classroom environments, as well as being able to be slowed down, edited, and watched more than once. Video technology provides easy access to the classroom atmosphere and to observe of interactions between teachers and students inclusively (Sherin, 2004). It also offers teachers the opportunity to see remarkable situations and to gain different perspectives each time (van Es & Sherin, 2010). It can be said that with these opportunities offered by the video tool, the use of video has an important place in both professional development and pre-service education.

The increase in studies on the use of video along with the compatibility of video use with technological developments has enabled new and different types of activities to be carried out in mathematics education (van Es & Sherin, 2002; van Es & Sherin, 2006). In this direction, pre-service teachers were able to effectively adapt to the school culture by monitoring and analyzing teaching and learning activities in pre-service education (Koh, 2015). In addition to the importance of video in pre-service education, it also has an important place in the

professional development of teachers (Sherin & van Es, 2009; van Es & Sherin, 2002; van Es & Sherin, 2006; Walkoe, 2015). It has been put forward that watching instructional videos helps mathematics teachers learn to observe and make sense of complex teaching practices (Sherin & van Es, 2009; van Es & Sherin, 2010).

In mathematics education, videos, have become an ideal tool to examine and support the development of individuals' noticing skills. Noticing skills include the process of teachers paying attention to students' mathematical thinking, interpreting students' thoughts, and deciding on the next teaching action based on these thoughts (Jacobs et al., 2010). In other words, noticing is related to teachers' ability to identify important students' thoughts and use them in teaching. In addition, teachers' noticing skills have been associated with their ability to analyze the teaching process through video (Luna & Sherin, 2017). In other words, the process of analyzing the video is a way to develop one's noticing skills (Amador et al., 2020). Moreover, it has been shown that the development of noticing skills of both teachers and pre-service teachers can be achieved with video club designs, which are a video method mostly used in mathematics education and include discussion processes of teachers about certain lesson videos (van Es & Sherin, 2002; van Es & Sherin, 2008; Walkoe, 2015). Video clubs, which are based on video analysis of classroom interactions of a group of participants, contributed to teachers' learning to notice (van Es, 2011). In addition, it has been determined that teachers' ability to pay attention to students' mathematical thoughts and reason about these students' thoughts increased with video club designs (Sherin & van Es, 2009; van Es & Sherin, 2008; Walkoe, 2015). Therefore, the use of video club designs played a role in the development of teachers' ability to notice students' mathematical thinking.

Video Club Designs in Mathematics Education

In their study on noticing, Sherin and van Es (2002) defined “video club” as meetings held regularly to watch and discuss videos of lessons. The main purpose of video clubs is to enable teachers to develop “professional vision”, that is, to specialize in understanding classroom interactions with selective attention and reasoning (Sherin & van Es, 2002; Sherin & van Es, 2009). Therefore, this specialization process is related to teachers’ attention to important features of classroom interactions and their ability to interpret them. In this context, video clubs, namely video discussions held in group environments, have been seen as environments that

provide teachers with the opportunity to develop noticing (Sherin & van Es, 2009; van Es & Sherin, 2008; van Es & Sherin, 2006).

Video clubs, which were used as professional development meetings in which mathematics teachers watched and discussed video sections from their classes (van Es & Sherin, 2008; Sherin & van Es, 2009; van Es & Sherin, 2010), have become a method used in studies designed on video analysis in both pre-service education and professional development (Erbay, 2018; Mitchell & Marin, 2015; Walkoe, 2013; Charalambous et al., 2018; Sherin & Han, 2004). Therefore, video clubs allowed a group of teachers or pre-service teachers to analyze certain lesson videos and reflect on the teaching process. González (2018) put forward that the discussion environment provided by video clubs could help participants determine the teaching moves necessary to reveal and use students' prior knowledge. In this context, video clubs were used to support individuals' subsequent teaching practices and processes. Video club practices played a role in learning new ways of understanding both learning and teaching. Video clubs were generally conducted under the guidance of facilitators who showed video clips and then led the discussion about the student thoughts in the video clips and the teaching process (van Es & Sherin, 2008). It has been put forward that the gains gained during video clubs are related to the actions of the facilitators who led the discussion (Superfine et al., 2019). In other words, the role of the facilitator is important in terms of guiding the discussion at a predetermined target point in a video club meeting (van Es & Sherin, 2008). At the same time, it can be said that the content of the videos, which are an important part of the video club meetings, is also an important factor in the video analysis process.

Systematic reviews conducted to understand the effects of the video analysis process, which is the most important dimension of video club designs, on teachers' professional development constitute an important literature base in this field. Gaudin and Chaliès (2015), who conducted one of these studies, examined the studies on video viewing in the field of education and examined teachers' activity as they view a classroom video, the objectives of video viewing, the types of videos viewed, and the effects of video viewing on teacher education and professional development. Santagata et al. (2021) examined thirty-five refereed articles focusing on improving mathematics teachers' noticing skills through a video-based program. They revealed findings regarding the theoretical perspectives of the studies, the use of video technologies,

research questions, and methods. These reviews provided valuable information on how video technologies are an effective tool in teacher education and professional development. In addition, the various roles of the video tool in teacher education and professional development were examined and its connection with noticing skills was tried to be clarified. Moreover, the relationship between video clubs, which are a video-based design, and teachers' noticing skills has been examined in many studies. On the other hand, no studies have been found in the literature that systematically examine the differences in video club designs and the results of the studies in the context of noticing skills. In this context, the aim of the study is to examine video club designs in the context of noticing skills and to reveal the basic results of the studies. In this respect, it is thought that it will contribute to the literature on video-based studies and guide researchers.

The research problems are as follows:

1. What are the differences in the video club designs of the studies?
2. What are the results of the studies?
 - What are the key results of the studies regarding noticing?
 - What are the results of the studies examining the differences in video club designs?

In the light of these research problems, the method, findings and finally the results and discussion sections will be presented in the following sections of the article, respectively.

2. Method

Within the scope of this research, the differences in video club designs of the studies and the key results of the studies were examined. In this direction, systematic review method was preferred. Systematic review is a scientific research method in which the studies conducted on a subject are comprehensively reviewed, inclusion and exclusion criteria are applied, and the results obtained are brought together and evaluated (Aslan, 2018; Karaçam, 2013).

2.1. Screening and Analysis Process

Both national and international databases were used during the screening process of the studies. The titles, abstracts and keywords of the publications were searched through five online databases (ScienceDirect, Scopus, Web of Science, Dergipark, ERIC) by including the years 2005-2025. During the screening, the screening code containing the words ("video clubs"

OR "video club") AND mathematics AND (noticing OR notice) was used in both Turkish and English. The studies included in the research are shown in Figure 1, based on the PRISMA flow chart created by Moher et al. (2009). The inclusion and exclusion criteria in the screening process were as follows:

Inclusion criteria:

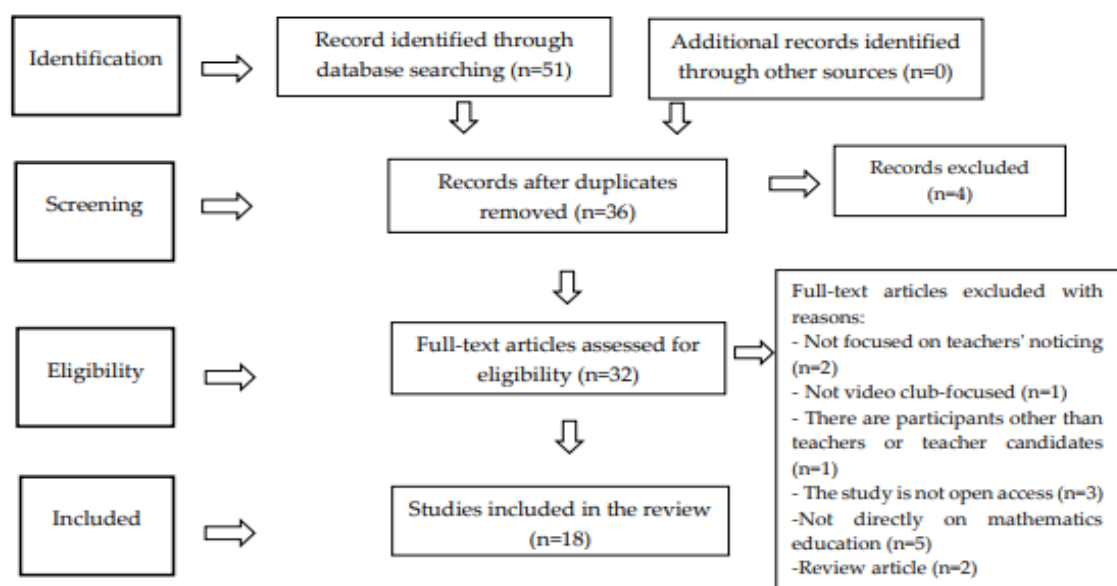
- Articles published in a peer-reviewed journal.
- Written in English or Turkish.
- Empirical studies that include qualitative, quantitative, or mixed methods.
- Related to the noticing skills of teachers or pre- service teachers.
- Full texts of the studies are accessible.
- Related to mathematics education.
- Video club-focused

Exclusion criteria:

- Involvement of participants other than teachers and pre-service teachers.
- The study is not open access.
- Including different fields other than mathematics education
- Being other than empirical studies (literature reviews were excluded).

Figure 1.

Literature Selection Process



As a result of the screening, 51 studies were identified. In the final stage, 18 articles were determined for the research according to the inclusion and exclusion criteria. 18 articles that met the criteria were included in the systematic review. The collected data were examined with content analysis. Codes were determined with the characteristics of the studies and then themes were created. The data were organized according to the themes and the findings were interpreted.

2.2. Ethics Committee Permission

Since this study was not conducted on humans or animals and is a compilation study, no application was made to the ethics committee and no approval was received.

3. Results

In this section, findings regarding the differences in video club designs and the results of the studies examined are included.

3.1. Findings Regarding the Differences in Video Club Designs

This section discusses the differences in video club designs of the studies examined within the scope of the systematic review. The participants of the studies, the types of videos used, the frameworks and the guidance of the facilitators were examined. The characteristics of the participants of the studies are given in Table 1.

Table 1.

Participants of the Studies

Participants	Studies (Author, Year)	Frequency (n)
Teachers	Amador et al., 2023; Gonzalez, 2018; Gonzalez & Skultety, 2018; Gonzalez & Vargas, 2020; Han et al., 2023; Mitchell et al., 2022; Osuna & Munson, 2024; Özdemir-Baki, 2020; Özdemir-Baki & Akgün, 2024; Özdemir-Baki & Kılıçoğlu, 2020, 2023; Sherin & van Es, 2009; Stovall et al., 2024; van Es & Sherin, 2006; van Es & Sherin, 2008; Wallin & Amador, 2019	16
Pre-service Teachers	Mitchell & Marin, 2015; Walkoe, 2015	2

It is shown in Table 1 how the examined studies are distributed according to participants. It was determined that the participants in 16 of the examined studies were teachers, while the participants in the other 2 studies were pre-service teachers. This shows that the studies were mostly carried out within the scope of professional development.

Table 2.*Types of Videos Used*

Category	Video Type	Studies (Author, Year)	Frequency (n)
Teachers	Full class videos	Özdemir-Baki, 2020; Özdemir-Baki & Akgün, 2024; Özdemir-Baki & Kılıçoğlu, 2020, 2023	4
	Video clips	Amador et al., 2023; Gonzalez, 2018; Gonzalez & Skultety, 2018; Gonzalez & Vargas, 2020; Han et al., 2023; Mitchell et al., 2022; Osuna & Munson, 2024; Sherin & van Es, 2009; Stovall et al., 2024; van Es & Sherin, 2006; van Es & Sherin, 2008; Wallin & Amador, 2019	12
Pre-service Teachers	Video clips	Mitchell & Marin, 2015; Walkoe, 2015	2

In Table 2, the types of videos used in the studies are examined in 2 categories as video clips and full lesson videos. While full lesson videos cover the entire course process, video clips are in the form of edited lesson videos. It was determined that video clips were mostly used in the studies (n=14). Full lesson videos were used in 4 of the studies. In addition, the types of videos used were categorized in terms of teachers and pre-service teachers. According to the table, in the studies where the participants were teachers, the number of studies using full lesson videos (n=4), which provide a holistic examination of the classroom teaching processes, is less than the number of studies using video clips (n=12). In the studies where pre-service teachers participated, it is seen that only video clips were used (n=2).

Frameworks Used in Video Club Designs

It has been found that in some studies, frameworks were used to help teachers focus their attention on specific teaching moments (Han et al., 2023; Mitchell & Marin, 2015; Mitchell et al., 2022; Walkoe, 2015).

In the studies by Mitchell and Marin (2015) and Mitchell et al. (2022), the Mathematical Quality of Instruction (MQI) framework was utilized to help teachers evaluate critical mathematical events during classes. In these studies, participants were asked to code lesson videos using this framework. The MQI framework was used to support teachers in deepening their understanding of student thinking.

Walkoe (2015) used the Algebraic Thinking Framework in his study. This framework was developed to enable teachers to observe students' algebraic thinking in more depth. The discussion process of the video club design was guided by the Algebraic Thinking Framework.

In the study by Han et al. (2023), framework of statistical reasoning was used when teachers analyzed students' thoughts. This framework was developed to ensure that teachers carefully select and understand students' thoughts.

Facilitators' Directions in the Video Club Process

The studies' video club designs include facilitators who direct video analysis meetings. In the examinations, it was determined that facilitators have important roles in providing guidance to video club meetings in line with certain goals. It was determined that facilitators directed discussions regarding the video analysis process to certain pedagogical focuses in the video club process. In the examined studies, it was determined that facilitators directed participants' attention to students' mathematical thinking processes, teachers' teaching practices, and student interactions.

In the majority of the studies, facilitators guided the discussions to ensure that the participants focused on the students' mathematical thinking and teaching practices (Amador et al., 2023; Özdemir-Baki, 2020; Özdemir-Baki & Akgün, 2024; Özdemir-Baki & Kılıçoğlu, 2020; Gonzalez, 2018; Gonzalez & Skultety, 2018; Gonzalez & Vargas, 2020; Han et al., 2023; Mitchell & Marin, 2015; Mitchell et al., 2022; Sherin & van Es, 2009; van Es & Sherin, 2006; van Es & Sherin, 2008; Walkoe, 2015; Wallin & Amador, 2019). In one of these studies, Walkoe's (2015) study, unlike the others, it was determined that the pre-service teachers were guided to focus on the students' algebraic thinking with the guidance of a framework (Algebraic Thinking Framework). In another study conducted with the framework, Han et al. (2023), the facilitator directed teachers to understand students' mathematical reasoning more deeply by focusing on students' statistical variability. Similarly, in the studies of Mitchell et al. (2022) and Mitchell and Marin (2015), the facilitator directed participants' focus to mathematical content and student thinking using the Mathematical Quality of Instruction (MQI) framework. In the reviews, it was determined that facilitators directed participants to student interactions in some studies. For example, in the study of Stovall et al. (2024), the facilitator encouraged teachers to analyze students' talk and think about how they could create more equitable discussion environments in the future. In the study of Osuna and Munson (2024), the facilitator directed discussions to ensure that teachers reflect on student interactions. Similarly, in the study of Özdemir-Baki and Kılıçoğlu (2023), the facilitator directed discussions in a way that enabled participants to reflect

on the classroom interactions they observed. In addition, in this study, the facilitator also encouraged teachers to think about their own practices.

3.2. Results of the Studies

The results of the studies reviewed were considered in two different ways: key results related noticing and results of studies examining differences in video club designs.

Tablo 3.

Key Results Related to Noticing

Theme	Category	Studies (Author, Year)	Frequency (n)
<i>Key Results Related to Noticing</i>	Student Knowledge and Thoughts	Amador et al., 2023; Gonzalez, 2018; Gonzalez & Skultety, 2018; Gonzalez & Vargas, 2020; Han et al., 2023; Mitchell & Marin, 2015; Mitchell et al., 2022; Özdemir-Baki, 2020; Özdemir-Baki & Akgün, 2024; Özdemir-Baki & Kılıçoğlu, 2020, 2023; Sherin & van Es, 2009; van Es & Sherin, 2006; van Es & Sherin, 2008; Walkoe, 2015; Wallin & Amador, 2019	16
	Social Interactions	Osuna & Munson, 2024; Özdemir-Baki & Kılıçoğlu, 2023; Stovall et al., 2024	3
	Teaching Processes	Amador et al., 2023; Gonzalez, 2018; Gonzalez & Vargas, 2020; Han et al., 2023; Mitchell & Marin, 2015; Osuna & Munson, 2024; Özdemir-Baki, 2020; Özdemir-Baki & Akgün, 2024; Özdemir-Baki & Kılıçoğlu, 2020, 2023; Sherin & van Es, 2009; Stovall et al., 2024; van Es & Sherin, 2006; Walkoe, 2015; Wallin & Amador, 2019	15

According to the examinations, the results of the studies on noticing skills were categorized as student knowledge and thinking, social interactions and teaching processes. It was determined that the results of the studies on noticing were mostly in the context of student knowledge and thinking (n=16). Studies on this subject show how the skills of teachers or pre-service teachers to notice students' thinking are strengthened through video clubs. Some studies have limited the context of student thoughts to certain topics. For example, there are studies focused on statistical variability reasoning (Han et al., 2023), algebraic thinking (Walkoe, 2015), problem-solving processes (Amador et al., 2023; Gonzalez, 2018; Gonzalez & Skultety, 2018; Gonzalez & Vargas, 2020; Han et al., 2023; Mitchell & Marin, 2015; Osuna & Munson, 2024; Özdemir-Baki & Akgün, 2024; Özdemir-Baki & Kılıçoğlu, 2020, 2023; van Es & Sherin, 2008).

Another category where the results on noticing skills are dominant is the 'teaching processes' category (n=15). This category includes studies that address the reflections of the participants' development in noticing skills on teaching processes. Another category, "social interactions",

includes 3 studies on the results of noticing skills. One of these studies, Özdemir-Baki and Kılıçoğlu's (2023) study, examined the effect of the development of noticing skills on social and socio-mathematical norms. Osuna and Munson (2024) determined the results of the process of teachers' in-depth analysis of student interactions using video clubs. Another study in the same category is Stovall et al.'s (2024) study. In this study, the ability of high school mathematics teachers to notice inequitable talk was examined.

Results of Studies Examining Differences in Video Club Designs

Some of the studies examined show that video clubs can be designed in different ways and can have different effects on teachers' learning processes (Gonzalez & Skultety, 2018; Han et al., 2023; Mitchell et al., 2022; Stovall et al., 2024; van Es & Sherin, 2006). For example; van Es and Sherin (2006) examined how different video club designs improved teachers' ability to notice classroom interactions. The findings showed that a structured and guided video club environment allowed teachers to focus more deeply but narrowly on students' mathematical thinking. In contrast, a more flexible and teacher-led video club model allowed teachers to consider classroom interactions from a broader perspective and focus on different topics. The results revealed that teachers' noticing skills varied depending on the video club design, with more guided structures supporting in-depth focus on specific points, while freer structures supported the development of multifaceted awareness.

Stovall et al. (2024), who examined the differences in terms of participants, examined how high school mathematics teachers noticed inequitable talk situations and how the awareness of teachers in different groups changed on this issue. Two different groups were selected in the study and their awareness of inequitable talk and student status was compared. The study revealed that different video club participants showed significant differences in their levels of noticing inequitable talk in the classroom. As a result, factors such as teacher identities, pedagogical approaches, and coaching support significantly affected the levels of noticing and taking action on inequitable talk in the classroom among different video club participants.

Gonzalez and Skultety (2018), who studied the effect of the facilitator, found that facilitators enabled teachers to focus on student thoughts, but teachers addressed student prior knowledge in a more in-depth and meaningful way in the discussions they initiated. Teachers' independent analysis in video clubs increased their noticing. Similarly, Mitchell et al. (2022) compared the

effects of different types of facilitation in video clubs. The study revealed that externally facilitated and teacher-led participant-facilitated groups produced similar results in terms of learning processes. Both expert-led and teacher-led groups contributed to the professional development of teachers and raised their noticing.

Han et al.(2023) investigated how different video club designs affect the process of developing teachers' skills in noticing students' thoughts. Video club designs were used in which teachers went through different stages such as individual video watching, group discussions, and use of analytical frameworks. As a result of the study, it was observed that the awareness levels of teachers who initiated the discussions improved more. In addition, it was determined that teachers' interaction with colleagues at similar levels contributed positively to the analysis processes, but the effect of participants at very different levels on each other was more limited. In addition, it was emphasized that presenting analytical frameworks to teachers deepened the analysis processes, but sufficient guidance should be provided in advance for the effective use of these frameworks.

4. Discussion and Conclusion

With the developments in video technology, the use of video has become much easier and the ability to capture the richness and complexity of classes, so the video analysis process has gained importance in pre-service education and teacher professional development (Gaudin & Chalties, 2015). The video analysis processes of video-based studies in mathematics education are guided by elements such as the content of the videos, facilitating actions, and the use of a framework that directs the analysis process. It is thought that these elements are also reflected in video club applications, which are video-based studies implemented in line with the examination of noticing skills through video analysis. In this study, first of all, the differences in video club designs of the systematically examined studies were determined. Then, the results of the examined studies regarding noticing skills and the results of the studies examining different video club designs were presented.

It can be said that different video club designs are applied according to the goals and needs in mathematics education studies. In the current study, it was determined that there were differences in the video club designs of the studies examined according to the participants. The studies were examined as teacher participants and pre-service teacher participants and it was

seen that the majority of the studies were aimed at teachers. In this context, it can be said that video clubs are generally used in the studies to support the professional development of teachers. It is thought that teachers are included in video club studies more frequently because they have the opportunity to analyze student interactions in the classroom and develop teaching strategies. Besides that, there are two studies in the current review that show that teacher candidates can develop their noticing skills through video clubs. The low number of studies aimed at teacher candidates indicates that video club studies specific to this group are less common.

In the research, the videos used in the video club designs of the examined studies were examined in two categories as video clips and full lesson videos. It was determined that video clips were mostly used in the studies. In addition, the types of videos used were categorized in terms of teachers and teacher candidates. It was determined that the videos most commonly used in the studies where the participants were teachers were in the form of video clips. In the studies where teacher candidates participated, it was determined that video clips were used in order to provide an opportunity to focus on critical components in mathematics teaching (Walkoe, 2015; Mitchell & Marin, 2015).

In video-based studies on noticing skills, where the videos used are an important factor, it has been shown that the use of a framework as a guide facilitates reaching the determined goal (Mitchell & Marin, 2015; Pascoe, 2016; Santagata et al., 2007; Tripp & Rich, 2012; Walkoe, 2015). In addition, in video-based studies, the use of frameworks in addition to video tools has also been reflected in video club designs. It has been determined that frameworks are used to help teachers focus their attention on specific teaching moments (Han et al., 2023; Mitchell & Marin, 2015; Mitchell et al., 2022; Walkoe, 2015). For example, in his study on noticing skills, Walkoe (2015) suggested that preparing facilitation questions with the guidance of a framework in line with a specific goal can better direct discussions on student thoughts. Therefore, a framework used in video club applications can direct the focus of video analysis discussions to students' mathematical thoughts. Similarly, in the studies of Mitchell and Marin (2015) and Mitchell et al. (2022), the Mathematical Quality of Teaching (MQI) framework was used for teachers to examine important mathematical moments in lessons. In the study by Han et al. (2023), a statistical reasoning framework was used during the phase of analyzing student thoughts.

In the examinations, it was observed that another factor that created differences in video club designs was the facilitators' guidance. It was determined that facilitators directed the discussions to certain pedagogical focuses during the video club process. In the examined studies, it was determined that facilitators directed the participants' attention to students' mathematical thinking processes and teachers' teaching practices and student interactions.

In the analysis of the results related to noticing skills, categories were obtained as student knowledge and thoughts, social interactions and teaching processes. It was determined that the results of the studies related to noticing skills were mostly in the context of student knowledge and thoughts (n=16). Another category in which the results related to noticing skills were predominant was the 'teaching processes' category (n=15). In addition, there were 3 studies on the results related to noticing skills in the "social interactions" category.

According to the results of the reviewed studies, it was determined that there are studies showing that video clubs can be designed in different ways and that they can have different effects on teachers' learning processes (Gonzalez & Skultety, 2018; Han et al., 2023; Mitchell et al., 2022; Stovall et al., 2024; van Es & Sherin, 2006). For example, in the study of van Es and Sherin (2006), it was revealed that teachers' noticing changed depending on the video club design, with guided structures supporting in-depth focus on specific points, while free structures supported the development of multi-faceted awareness. In the study of Stovall et al. (2024), different video club participants significantly affected the levels of noticing and taking action on unequal talk in the classroom.

There are also studies on the effect of facilitators on video club designs. For example, Gonzalez and Skultety (2018) found that teachers addressed student prior knowledge in more in-depth and meaningful ways in their self-initiated discussions. Similarly, Han et al. (2023) concluded that structured video clubs in which participants took an active role could positively affect teachers' professional awareness and pedagogical decision-making processes. In addition, Mitchell et al. (2022) compared the effects of different types of facilitation (externally facilitated groups and participant-facilitated) on teacher learning in video clubs. Both externally facilitated groups and participant-facilitated groups contributed to teachers' professional development and raised awareness.

4.1. Implications of Research

Studies that include video club designs in the context of noticing skills have been systematically examined. As a result of the examination, differences in video club designs have been addressed. In addition, the results of the studies conducted have been examined within the scope of noticing skills. In addition, the results of studies examining differences in video club designs have been determined.

It is thought that this study may contribute to the understanding of the roles of the videos to be selected and watched in video club designs, the participants, the issues related to the facilitator, and the frameworks that may be necessary to guide the video analysis in terms of the development of noticing skills of teachers or teacher candidates, and may provide a different direction to the studies on noticing skills to be conducted in professional development and teacher education.

4.2. Limitations and Suggestion

This research is limited to articles on video club designs focused only on mathematics education and noticing skills. In addition, the focus was on studies that preferred teachers and pre-service teachers as participants. Furthermore, the differences in video club designs were presented in terms of participants, the role of facilitators, videos and frames used.

In the current research, it is seen that the number of video club studies conducted on pre-service teachers is limited. Therefore, conducting more research on pre-service teachers is of great importance to understand how video club designs can be effective in this group. In addition, a limited number of studies have been reached that reveal what kind of results the differences in video club designs will produce. In this direction, the suggestion to further investigate the elements that make up the structure of video-based activities (Santagata et al., 2021) can be taken into consideration and the effects of these elements on video club designs can be examined further. In this context, video club designs can be created with different structural approaches and teachers' noticing skills can be examined in this direction.

Another issue that should be taken into consideration is the use of frames in video clubs so that participants can create a language that they can discuss (Walkoe, 2015). At this point, it is thought that additional studies are needed on how different designs of video club applications

in mathematics education affect and support the noticing skills of teachers and pre-service teachers.

5. References

- Amador, J. M., Keehr, J., Wallin, A., & Chilton, C. (2020). Video complexity: Describing videos used for teacher learning. *Eurasia Journal of Mathematics, Science and Technology Education*, 16(4), em1834. <https://doi.org/10.29333/ejmste/113288>
- Amador, J. M., Wallin, A., Keehr, J., & Chilton, C. (2023). Collective noticing: Teachers' experiences and reflection on a mathematics video club. *Mathematics Education Research Journal*, 35(3), 557-582. <https://doi.org/10.1007/s13394-021-00403-9>
- Aslan, A. (2018). Sistematiik derleme ve meta-analizi. *Acta Medica Alanya*, 2(2), 62-63. <https://doi.org/10.30565/medalanya.439541>
- Charalambous, C. Y., Philippou, S., & Olympiou, G. (2018). Reconsidering the use of video clubs for student-teachers' learning during field placement: Lessons drawn from a longitudinal multiple case study. *Teaching and Teacher Education*, 74, 49-61. <https://doi.org/10.1016/j.tate.2018.04.002>
- Erbay, H. N. (2018). *Matematik öğretmenleri adaylarının fark etme becerilerinin video-kulüp uygulamalarıyla gelişim sürecinin incelenmesi* [Doktora tezi, Marmara Üniversitesi]. YÖK Tez Merkezi.
- Gaudin, C., & Chaliès, S. (2015). Video viewing in teacher education and professional development: a literature review. *Educational Research Review*, 16, 41-67. <https://doi.org/10.1016/j.edurev.2015.06.001>
- Gonzalez, G. (2018). Understanding teacher noticing of students' prior knowledge: Challenges and possibilities. *The Mathematics Enthusiast*, 15(3), 483-528. <https://doi.org/10.54870/1551-3440.1442>
- Gonzalez, G., & Skultety, L. (2018). Teacher learning in a combined professional development intervention. *Teaching and Teacher Education*, 71, 341-354. <https://doi.org/10.1016/j.tate.2018.02.003>
- González, G., & Vargas, G. E. (2020). Teacher noticing and reasoning about student thinking in classrooms as a result of participating in a combined professional development intervention. *Mathematics Teacher Education and Development*, 22(1), 5-32.
- Han, C., Kim, H.-J., Kwon, O. N., & Lim, W. (2023). Exploring changes of mathematics teachers' noticing in a video club: Identifying turning points. *International Journal of Science and Mathematics Education*, 21(3), 835-861. <https://doi.org/10.1007/s10763-022-10251-z>
- Jacobs, V. R., Lamb, L. L., & Philipp, R. A. (2010). Professional noticing of children's mathematical thinking. *Journal for Research in Mathematics Education*, 41(2), 169-202. <https://doi.org/10.5951/jresmetheduc.41.2.0169>
- Karaçam, Z. (2013). Sistematiik derleme metodolojisi: Sistematiik derleme hazırlamak için bir rehber. *Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi*, 6(1), 26-33.

- Koh, K. (2015). The use of video technology in pre-service teacher education and in-service teacher professional development. In S. Ng (Ed.), *Cases of mathematics professional development in East Asian countries* (Vol. 10, pp. 229–247). Springer. https://doi.org/10.1007/978-981-287-405-4_14
- Lemke, J. L. (2007). Video epistemology in and outside the box: Traversing attentional spaces. In R. Goldman, R. D. Pea, B. Barron, & S. J. Derry (Eds.), *Video research in the learning sciences* (pp. 39–51). Lawrence Erlbaum Associates.
- Luna, M. J., & Sherin, M. G. (2017). Using a video club design to promote teacher attention to students' ideas in science. *Teaching and Teacher Education*, 66, 282-294. <https://doi.org/10.1016/j.tate.2017.04.019>
- Mitchell, R., Beisiegel, M., & Barmore, J. (2022). How much does facilitation matter? Comparing externally and participant-facilitated, MQI-based video clubs. *Mathematics Education Research Journal*, 34, 369–392. <https://doi.org/10.1007/s13394-020-00348-5>
- Mitchell, R. N., & Marin, K. A. (2015). Examining the use of a structured analysis framework to support prospective teacher noticing. *Journal of Mathematics Teacher Education*, 18(6), 551-575. <https://doi.org/10.1007/s10857-014-9294-3>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine*, 6(7), e1000097. <https://doi.org/10.1371/journal.pmed.1000097>
- Olivero, J. L. (1965). *The use of video recordings in teacher education*. (ERIC Document Reproduction Service No. ED 011 074). Stanford University
- Osuna, J. M., & Munson, J. (2024). Exploring what teachers notice about students' interactional dynamics during collaborative mathematics problem-solving and their connections to instructional practice. *Teaching and Teacher Education*, 137, Article 104380. <https://doi.org/10.1016/j.tate.2023.104380>
- Pascoe, A. E. (2016). *Learning to notice and use student thinking in undergraduate mathematics courses* [Doctoral dissertation]. Michigan Technological University.
- Santagata, R., König, J., Scheiner, T., Nguyen, H., Adleff, A. K., Yang, X., & Kaiser, G. (2021). Mathematics teacher learning to notice: A systematic review of studies of video-based programs. *ZDM–Mathematics Education*, 53(1), 119-134. <https://doi.org/10.1007/s11858-020-01216-z>
- Santagata, R., Zannoni, C., & Stigler, J. W. (2007). The role of lesson analysis in pre-service teacher education: An empirical investigation of teacher learning from a virtual video-based field experience. *Journal of Mathematics Teacher Education*, 10(2), 123-140. <https://doi.org/10.1007/s10857-007-9029-9>
- Sherin, M.G. (2004). New perspectives on the role of video in teacher education. In J. Brophy (Ed.), *Using video in teacher education* (pp.1–28). Elsevier. [https://doi.org/10.1016/S1479-3687\(03\)10001-6](https://doi.org/10.1016/S1479-3687(03)10001-6)
- Sherin, M. G., & Han, S. Y. (2004). Teacher learning in the context of a video club. *Teaching and Teacher Education*, 20(2), 163–183. <https://doi.org/10.1016/j.tate.2003.08.001>

- Sherin, M. G., & van Es, E. A. (2002). Using video to support teachers' ability to interpret classroom interactions. *Journal of Technology and Teacher Education*, 10(4), 571-596.
- Sherin, M. G., & van Es, E. (2009). Effects of video club participation on teachers' professional vision. *Journal of Teacher Education*, 60(1), 20-37. <https://doi.org/10.1177/0022487108328155>
- Stovall, J. L., Pimentel, D. R., Carlson, J., & Levine, S. R. (2024). High school mathematics teachers' noticing of inequitable talk. *Journal of Mathematics Teacher Education*, 27(3), 551-578. <https://doi.org/10.1007/s10857-023-09572-9>
- Superfine, A. C., Amador, J., & Bragelman, J. (2019). Facilitating video-based discussions to support prospective teacher noticing. *The Journal of Mathematical Behavior*, 54, 100681. <https://doi.org/10.1016/j.jmathb.2018.11.002>
- Tripp, T., & Rich, P. (2012). Using video to analyze one's own teaching. *British Journal of Educational Technology*, 43(4), 678-704. <https://doi.org/10.1111/j.1467-8535.2011.01234.x>
- Özdemir-Baki, G. (2020). Video kulüp sürecine katılan öğretmenlerin deneyimlerini yansıtan bir fenomenografi araştırması. *Necatibey Eğitim Fakültesi Elektronik Fen ve Matematik Eğitimi Dergisi*, 14(2), 1142-1188. <https://doi.org/10.17522/balikesirnef.793164>
- Özdemir-Baki, G., & Akgün, L. (2024). Supporting teacher noticing based on student mathematical thinking through video club. *Turkish Journal of Education*, 13(1), 1-23. <https://doi.org/10.19128/turje.1289734>
- Özdemir-Baki, G., & Kılıçoğlu, E. (2020). Examination of teachers' classroom practices through a video club process in terms of students' mathematical thinking. *Turkish Journal of Computer and Mathematics Education*, 11(3), 619-645. <https://doi.org/10.16949/turkbilmat.704596>
- Özdemir-Baki, G., & Kılıçoğlu, E. (2023). Social and socio-mathematical norms constructed by teachers in classes through the development of noticing skills. *International Electronic Journal of Mathematics Education*, 18(1), em0723. <https://doi.org/10.29333/iejme/12649>
- van Es, E. A. (2011). A framework for learning to notice student thinking. In M. G. Sherin, V. R. Jacobs, & R. A. Philipp (Eds.), *Mathematics teacher noticing: Seeing through teachers' eyes* (pp. 117-133). Routledge.
- van Es, E. A., & Sherin, M. G. (2002). Learning to notice: Scaffolding new teachers' interpretations of classroom interactions. *Journal of Technology and Teacher Education*, 10(4), 571-596.
- van Es, E. A., & Sherin, M. G. (2006). How different video club designs support teachers in "learning to notice". *Journal of Computing in Teacher Education*, 22(4), 125-135. <https://doi.org/10.1080/10402454.2006.10784548>
- van Es, E. A., & Sherin, M. G. (2008). Mathematics teachers' "learning to notice" in the context of a video club. *Teaching and Teacher Education*, 24(2), 244-276. <https://doi.org/10.1016/j.tate.2006.11.005>
- van Es, E. A., & Sherin, M. G. (2010). The influence of video clubs on teachers' thinking and practice. *Journal of Mathematics Teacher Education*, 13(2), 155-176. <https://doi.org/10.1007/s10857-009-9130-3>

- Wallin, A. J., & Amador, J. M. (2019). Supporting secondary rural teachers' development of noticing and pedagogical design capacity through video clubs. *Journal of Mathematics Teacher Education*, 22(6), 515–540. <https://doi.org/10.1007/s10857-018-9397-3>
- Walkoe, J. D. K. (2013). *Investigating teacher noticing of student algebraic thinking* [Doctoral dissertation]. Northwestern University.
- Walkoe, J. (2015). Exploring teacher noticing of student algebraic thinking in a video club. *Journal of Mathematics Teacher Education*, 18, 523-550. <https://doi.org/10.1007/s10857-014-9289-0>