Full research paper

PHYSICAL EDUCATION AND SPORTS TEACHERS' PERCEPTIONS OF BENEFITING FROM WEB 2.0 TOOLS IN FACE-TO-FACE EDUCATION AFTER THE EMERGENCY REMOTE TEACHING PROCESS: A MIXED METHOD RESEARCH

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ABSTRACT

This study aims to explore the perceptions of physical education and sports teachers regarding the use of Web 2.0 tools, which they employed during the COVID-19 emergency remote teaching process, in face-to-face education. A mixed-method approach was utilized, incorporating individual in-depth interviews and a survey administered to physical education and sports teachers working in public schools during the spring semester of the 2021-2022 academic year. The study revealed that teachers generally have a positive attitude toward integrating Web 2.0 tools into face-to-face education, leveraging competencies they developed during the emergency remote teaching process. The findings indicate that teachers' competencies in utilizing Web 2.0 tools in face-to-face education were at a moderate level. Furthermore, younger teachers, those with postgraduate education, and those who had received prior training on Web 2.0 tools exhibited higher levels of competence. Based on the results, recommendations are provided to further enhance teachers' competency levels and perceptions of Web 2.0 tools.

KEYWORDS

Distance education, mixed-method research, perceived usefulness of educational technology, physical education and sports teachers, Web 2.0 tools

HOW TO CITE

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Highlights

- *It is essential that teachers' technological pedagogical content knowledge is sufficient in crises that educational institutions may experience.*
- *Using innovative learning-teaching approaches diversified with technological tools rather than traditional learning-teaching methods will enable students to learn meaningfully.*
- *The technological pedagogical content knowledge levels of physical education and sports teachers and teacher candidates should be improved.*

INTRODUCTION

During the emergency remote teaching process, which lasted for three academic semesters in Turkey, physical education and sports lessons-comprising both theoretical and practical components were transferred from in-person classrooms to the Education Information Network (EIN), a Web 2.0 tool launched by the Turkish Ministry of National Education (MNE) in 2010. MNE implemented EIN in 2010 to incorporate distance education into formal schooling. EIN includes a wide range of educational resources such as courses, exams, live lessons, e-books, e-journals, worksheets, portfolios, and professional development videos (MNE, 2019), enabling both teachers and students to engage without restrictions on time and location (MNE, 2018). Prior to the COVID-19 pandemic, physical

education and sports teachers rarely utilized virtual classroom platforms (EIN, Edmodo, Google Classroom, etc.), which are examples of Web 2.0 tools (Özen et al., 2016). However, during the pandemic, these teachers actively employed Web 2.0 tools, following MNE directives, to ensure that students continued to engage in health-related physical activities and achieved movement competence. During this period, although some challenges were encountered in achieving the physical education and sports learning outcomes related to movement competence (Çetin et al., 2021; Valeriajeong Varea et al., 2020), it was observed that Web 2.0 tools were more effective in supporting knowledge-based gains. The utilization of Web 2.0 tools in physical education and sports lessons yielded two significant outcomes. Firstly, there was a notable enhancement in the technical knowledge of physical education and sports teachers (Çetin et al., 2021; Godoi et al., 2020; Esentürk Seçer & İlhan, 2021; Jeong & So, 2020). Secondly, these tools contributed to the long-term retention of students' knowledge gains (Keskin & Uğraş, 2022; Çetin et al., 2021; Yıldız & Bektaş, 2020). Although the emergency remote teaching period has concluded, there remains a need for research exploring whether the technical competencies acquired by physical education and sports teachers during the pandemic have been sustained in the post-pandemic era. The unique contribution of this study lies in its in-depth examination of the perceptions of physical education and sports teachers who employed Web 2.0 tools during the emergency remote teaching process, focusing on their continued use of these tools in face-to-face education. To address this, a mixed-methods approach was employed, centered on the competencies of physical education and sports teachers to integrate Web 2.0 tools into face-to-face instruction following the emergency remote teaching period. A scale measuring Web 2.0 tool usage competence was administered as part of the quantitative component, while a semi-structured interview form was utilized to qualitatively explore teachers' perceptions regarding the application of these tools in face-to-face education post-emergency remote teaching. This dual-method design provides a comprehensive understanding of the ongoing integration of Web 2.0 tools in physical education and sports instruction.

Education during the Emergency Remote Teaching Process Worldwide

On March 11, 2020, the World Health Organization (WHO) declared the COVID-19 outbreak a global pandemic. In response to the pandemic, numerous countries implemented social restrictions to safeguard public health (Weeden & Cornwell, 2020). As part of these measures, schools were closed in 194 countries, affecting all levels of education from preschool to higher education (Miks & McIlwaine, 2020; TEDMEM, 2020). In nations where schools were entirely shut down, educational institutions sought to identify appropriate technologies and methodologies to sustain teaching and learning activities. Consequently, many countries leveraged existing distance education infrastructures and adopted TV- and radio-based distance learning solutions. Additionally, innovative instructional approaches such as the blended learning model, hybrid learning model, and flipped classroom model began to gain traction in the literature, particularly in countries aiming to avoid complete school closures (Filiz & Gökmen, 2022; Uysal Toroman & Kısa, 2022).

With the implementation of social restrictions to curb the spread of COVID-19, the introduction of vaccination programs, and the widespread availability of rapid antigen testing, the number of countries maintaining fully open schools rose significantly by March 2021 (TEDMEM, 2021). This shift marked a gradual transition from emergency remote teaching to more stable and hybrid educational practices, reflecting the global effort to balance public health concerns with the need for continuous education.

Education in Turkey during the Emergency Remote Teaching Process

As part of the social restrictions implemented in response to the COVID-19 pandemic, face-to-face education in Turkey was suspended on March 16, 2020, and the emergency remote teaching process officially commenced on March 23, 2020. This process spanned approximately one and a half years, lasting from March 23, 2020, to September 6, 2021. During this period, educational programs under the MNE, which were originally designed for face-to-face classroom settings, had to be rapidly adapted to asynchronous and synchronous online formats due to the pandemic.

In the emergency remote teaching process, courses in Turkey were delivered through the EIN and EIN TV, utilizing both asynchronous and synchronous methods. Although an attempt was made to transition back to face-to-face education on September 21, 2020, the subsequent rise in COVID-19 cases necessitated a return to emergency remote teaching just one month later. Finally, on September 6, 2021, face-to-face education resumed at all educational levels nationwide (MNE, 2021). This period highlighted the challenges and adaptability of Turkey's education system in responding to the unprecedented disruptions caused by the pandemic.

Differences between Emergency Remote Teaching and Distance Education

In literature, emergency remote teaching activities implemented during the pandemic have often been evaluated within the framework of pre-existing distance education (Akbana et al., 2021; Bozkurt & Sharma, 2020; Hodges et al., 2020; Toquero, 2020; Shim & Lee, 2020). However, it is crucial to distinguish between distance education and emergency remote teaching to establish a scientific and methodological foundation for addressing similar situations in the future.

Distance education has evolved parallel with technological advancements since the 1700s and represents a well-established educational practice. It incorporates various empirically supported learning models, such as the blended learning model, flipped classroom model, and hybrid learning model. The primary goal of distance education is to create a flexible structure that complements face-to-face education, considering student needs, the teacher's technological pedagogical content knowledge (Koehler & Mishra, 2009), and the available technological infrastructure.

In contrast, emergency remote teaching refers to teaching activities conducted using existing technological infrastructure

to ensure continuity in education when face-to-face instruction is not feasible. Unlike distance education, which is carefully planned and designed, emergency remote teaching is a temporary solution implemented in response to crises. Emergency remote teaching, which gained prominence during the COVID-19 pandemic, underscores the necessity of systematic preparation for future crises -such as natural disasters or pandemics- that may disrupt education. This distinction highlights the importance of developing robust frameworks and strategies to ensure educational resilience in facing unforeseen challenges.

Web 2.0 Tools

Web 2.0 tools, a subset of information and communication technologies, were pivotal in facilitating the emergency remote teaching process. These tools encompass various applications, including virtual classrooms, educational digital content, and various communication platforms that enable interaction between students and teachers. The effectiveness of Web 2.0 tools lies in their ability to foster collaboration, idea sharing, information exchange, and knowledge transformation among users through Internet-based platforms without requiring specialized software installation or advanced technical expertise (Jimoyiannis, 2015). Various and quite a large number of Web 2.0 tools according to their purpose of use: virtual classroom applications (EIN, Edmodo, etc.), test and puzzle creation tools (Kahoot!, etc.), board creation tools (Padlet, etc.), poster and cartoon creation tools (Make Beliefs Comix, etc.), story and book writing applications (Pixton etc.), interactive presentation tools (Prezi, etc.), information poster and infographic preparation tools (Visme, etc.), photo/video/film editing applications (ThingLink, Adobe, etc.). At the same time, Web 2.0 tools can be easily accessed from websites (Çelik, 2020).

Web 2.0 Tools in Physical Education and Sports Lessons

The literature offers various suggestions on the effects of using Web 2.0 tools in physical education and sports lessons on learning outcomes (Can & Kerkez, 2022b; Chen & Xia, 2012; Feng, 2009; Gustiawati & Agung Susilo Yuda Irawan, 2020; Isaqovich et al., 2024; Tan & Li, 2009). For instance, YouTube, one of the most widely used Web 2.0 tools, allows videos demonstrating sportive skills to be slowed down, paused, zoomed, or accelerated. This functionality aligns with the cognitive theory of multimedia learning (Mayer, 2002), enabling students to form lasting mental representations of movements through the combination of visuals and auditory explanations (Chen & Xia, 2012).

Additionally, teachers can use Web 2.0 tools to facilitate discussions on topics such as fair play behavior. By presenting students with a problem or scenario, teachers can encourage them to engage in debates and propose solutions using collaborative platforms. For example, a teacher might create a discussion forum using Web 2.0 tools where students can share their perspectives and argue for specific solutions. Gustiawati and Agung Susilo Yuda Irawan (2020) highlighted that tools like Kahoot! are particularly effective for assessing theoretical knowledge in physical education and sports, such as concepts, principles, strategies, tactics, and rules, engagingly and interactively.

Beyond the suggestions in the literature, numerous innovative ways exist to integrate Web 2.0 tools into physical education and sports lessons to enhance learning outcomes. For example, YouTube can be used to analyze sports skills and create instructional content. Teachers can upload videos demonstrating techniques, drills, or game strategies, adding annotations or voiceovers to explain key concepts. This allows students to revisit lessons at their own pace, reinforcing their understanding.

Platforms like Google Classroom or Edmodo can be utilized to create interactive assignments and discussions. After watching a tutorial on a specific sports skill, teachers can ask students to upload their own videos demonstrating the skill. These videos can then be reviewed and commented on by peers, fostering collaborative learning and peer feedback. Additionally, these platforms support the creation of quizzes, surveys, or polls, enabling students to reflect on their progress and receive instant feedback, thereby increasing engagement in the learning process.

Another innovative approach involves using blogging platforms such as WordPress or Blogger. Teachers can encourage students to write reflective blog posts about their learning experiences, challenges, and achievements in physical education. This helps students articulate their thoughts and allows them to share experiences and comment on their peers' reflections, creating a supportive and interactive learning community.

In summary, Web 2.0 tools offer many possibilities for enhancing physical education and sports lessons, from skill demonstration and theoretical assessment to collaborative learning and reflective practice. By leveraging these tools, educators can create more engaging, interactive, and effective learning experiences for their students.

By leveraging these tools, educators can create more engaging, interactive, and effective learning experiences for their students. This process encourages critical thinking and self-assessment, improving students' understanding of their physical fitness journey. For instance, teachers can use Google Earth or YouTube to take students on virtual field trips to famous sports stadiums or historical events in sports. Students can virtually visit iconic locations like the Olympic Stadium or watch documentaries on significant international sports events, fostering a broader understanding of sports culture and global teamwork.

Teachers can also organize fitness challenges where students track their steps, distance, or activities using apps like Strava, Fitbit, or Google Fit. These apps allow students to participate in challenges such as a "Run the World" event, where they collectively track their distance to simulate running a race around the globe. Such tools promote physical activity while fostering motivation and friendly competition among students.

Edpuzzle is another valuable tool that enables teachers to make video lessons interactive by embedding quizzes or reflection points within the video. For example, teachers can upload a video on sports techniques or game strategies

and include questions that students must answer as they watch. This feature encourages active learning and ensures students engage deeply with the content.

Web 2.0 tools like Padlet or Trello can organize and facilitate group projects. Students can create mood boards or mind maps about different sports or fitness topics, compiling videos, articles, and images to share with the class. Teachers can assign projects on topics such as sports strategies, history, or the importance of teamwork, promoting communication and collaboration among students.

In addition to using Kahoot! for assessing theoretical knowledge, teachers can utilize Quizlet to create flashcards or quizzes that help students memorize key terminology and concepts related to physical education, such as muscle groups, sports rules, or movement techniques. These tools provide an interactive, fun, and competitive way to engage students and reinforce learning.

Teachers can also encourage peer-to-peer feedback by having students upload videos of themselves performing sports skills (e.g., dribbling a basketball or executing a gymnastics move) to platforms like Flipgrid or Seesaw. Peers can then provide constructive feedback, which helps them develop critical thinking and communication skills while improving their own performance.

By integrating these Web 2.0 tools into physical education, teachers can enhance students' technical and theoretical knowledge and foster engagement, collaboration, and self-reflection. This approach creates a well-rounded and dynamic learning experience that prepares students for physical and intellectual growth in sports and fitness.

MATERIAL AND METHODS

This study employed a mixed method utilizing both quantitative and qualitative data collection tools and techniques. The aim was to address the limitations inherent in using only one method and to strengthen the interpretation of the results (Creswell & Plano Clark, 2011). In mixed methods design, quantitative and qualitative data can be collected simultaneously or sequentially (Johnson and Onwuegbuzie, 2004). The simultaneous mixed method design allows for integrating data obtained from quantitative and qualitative tools within a single study, enabling the verification, support, or cross-validation of findings (Creswell et al., 2003; Baki & Gökçek, 2012). In line with this approach, the study adopted the simultaneous triangulation pattern introduced by Creswell (2003). This design facilitated the concurrent collection of quantitative and qualitative data, which were then analyzed separately. During the interpretation phase, the findings from both datasets were combined to provide a comprehensive understanding of the research problem. This integration of methods ensured a more robust and nuanced analysis, enhancing the validity and reliability of the study's conclusions.

Main Goals

The primary goal of this study was to explore the perceptions of physical education and sports teachers who utilized Web 2.0 tools during the emergency remote teaching process and to examine how these tools could be integrated into face-to-face teaching.

From this overarching goal, the following specific objectives were derived:

- To investigate whether proficiency in using Web 2.0 tools differs among physical education and sports teachers based on variables such as gender, age, years of professional experience, educational background, and prior Web 2.0 training, using a scale study.
- To examine the importance attributed to Web 2.0 tools by physical education and sports teachers after the emergency remote teaching process through individual in-depth interviews.
- To explore whether teachers' subjective perceptions of using Web 2.0 tools, as revealed in in-depth interviews, vary according to factors such as gender, age, educational level, and type of school.
- To assess the consistency between the data obtained from the analysis of scale results and the findings from individual in-depth interviews.

These objectives aim to provide a comprehensive understanding of how Web 2.0 tools are perceived and utilized by physical education and sports teachers, both during and after the emergency remote teaching period, while also identifying potential variations and consistencies in their experiences and attitudes.

Participants

The data and characteristics of the sample participating in the study are presented below. The sample for this study was selected from secondary and high school physical education and sports teachers working in public schools in Muğla province, affiliated with MNE, during the spring semester of the 2021-2022 academic year. The simultaneous mixed-method sampling approach was adopted to create the sampling framework, commonly used in mixed-method designs. This approach combines probabilistic and purposive sampling strategies (Baki & Gökçek, 2012).

The scale was distributed to the entire target population (universe) of participants in this study. After excluding incompletely answered scales, a valid sample of 173 physical education and sports teachers was obtained. Participation in the study was voluntary. In terms of gender distribution, 73 women (42.2%) and 100 men (57.8%) completed the scale. The mean age of the participants was 44 years (SD = 8.4), with ages ranging from 22 to 65 years.

Individual In-depth Interview Participants

To collect qualitative data, seven physical education and sports teachers (3 female, 4 male) who were actively involved in the emergency remote teaching process and did not participate in the scale survey were interviewed. Convenience sampling was also utilized in this phase. The sample size for the qualitative portion of the study was determined based on reaching the data saturation point, where no new information emerged from the interviews (n = 7) (Guest et al., 2006).

	Descriptive information	Groups	*n*	%
Characteristics of quantitative section participants	Sex	Female	73	42.2
		Male	100	57.8
	Age	22-30	10	5.8
		31-35	14	8.1
		36-40	25	14.5
		41-45	40	23.1
		46-50	48	27.7
		51 and above	36	20.8
	Years of professional service	0-5 years	15	8.7
		6-10 years	22	12.7
		11-15 years	27	15.6
		16-20 years	31	17.9
		More than 20 years	78	45.1
	Education level	Bachelor's degree	143	82.7
		Postgraduate	30	16.8
	Web 2.0 education	Yes	124	71.7
		No	49	28.3
	Total		173	100.0

Table 1: Descriptive information of the quantitative section participants, 2021-2022 (source: own elaboration)

		Sex	Age	Educational level	Type of school
Characteristics of qualitative section participants	P1	Female	46	Bachelor's degree	Secondary school
	P2	Female	49	Master	High school
	P3	Male	33	Master	Secondary school
	P4	Male	48	Bachelor's degree	Secondary school
	P5	Female	52	Bachelor's degree	Secondary school
	P6	Male	45	Doctorate	High school
	P7	Male	43	Bachelor's degree	Secondary school

Table 2: Descriptive information of the qualitative section participants, 2021-2022 (source: own elaboration)

The mean age of the female physical education and sports teachers (3 female) participating in the research was 49 (SD = 3.0), while the mean age of the male physical education and sports teachers (4 male) was 42 (SD = 6.5). The mean age of the total participants was 45 (SD = 6.09).

Techniques and Instruments

In this study, ethical approval was obtained from the Muğla Sıtkı Koçman University, Medical and Health Sciences Ethics Committee-2 (Sports and Health) on May 9, 2022, with decision number 61, prior to data collection. Additionally, the study adhered to all ethical guidelines and principles throughout the research process.

Scale

In the quantitative part of the research, the descriptive information form (5 questions) and the "Web 2.0 Tools Usage Competency Scale" (WTUCS) developed by Çelik (2020) were used. The descriptive information form, created based on the literature, includes five questions (gender, age, years of professional experience, education level, and Web 2.0 training). The WTUCS is a single-dimensional, 5-point Likert-type scale consisting of 39 items. Participants responded to the scale items using the following options: "1 = Never, 2 = Rarely, 3 = Occasionally, 4 = Often, 5 = Always." the scores obtained from the measurement tool range between 39 and 195, with scores interpreted as "low" (39–91), "medium" (92–144), and "high" (145 and above). The Cronbach's Alpha coefficient for the WTUCS was determined to be.98, and the same reliability coefficient (.98) was observed for the scale applied in this study. The electronic data collection tool and consent form were prepared using Google Drive Forms and distributed to physical education and sports teachers via email through the Provincial Directorate of National Education.

Individual In-depth Interview

The qualitative part of the study utilized individual in-depth interview techniques. In this approach, in addition to the questions prepared in advance by the researcher, follow-up sub-questions were also asked to explore responses in greater detail (Hatch, 2002). The interviews were conducted in a room provided by the school administration deemed suitable for face-to-face meetings. After contacting the physical education and sports teachers, they were informed about the purpose of the research and the data collection process. They were then asked to complete a consent form and a voluntary participation form for participation in the qualitative study. After completing the descriptive information form by the physical education and sports teachers, in-depth individual interviews were conducted with seven teachers using a semi-structured question form

(5 questions). They were then asked to complete a consent form and a voluntary participation form for participation in the qualitative study. After completing the descriptive information form by the physical education and sports teachers, in-depth individual interviews were conducted with seven teachers using a semi-structured question form (5 questions).

1. What are the impacts of using Web 2.0 tools during the emergency remote teaching process on your professional development and teaching methods?
2. How would you describe your competency in using Web 2.0 tools during the emergency remote teaching process, and what challenges did you encounter during this period?
3. In your opinion, how did the use of Web 2.0 tools in emergency remote teaching affect the attainment of physical education and sports lesson objectives?
4. How do you think the experience of using Web 2.0 tools during the emergency remote teaching process influenced your ability to use these tools in face-to-face education?
5. What are your thoughts and suggestions regarding the continued use of Web 2.0 tools in education in the future?

These questions aimed to explore teachers' experiences, challenges, and perceptions regarding using Web 2.0 tools during and after the emergency remote teaching process, as well as their views on the future integration of these tools in education.

Analysis of Data

The data analysis was divided into two parts, as the research was conducted using a simultaneous triangulation design. This study analyzed quantitative and qualitative data sets separately, and the findings were interpreted together. For the quantitative data analysis, the Kolmogorov-Smirnov test was first applied to determine the normality of the distribution. In addition to descriptive statistics, parametric tests such as the t-test and one-way analysis of variance (ANOVA) were applied to independent groups, depending on the normality of the distribution.

Content analysis was used for the qualitative data analysis. By combining the quantitative and qualitative findings, which were analyzed separately, the perceptions of physical education and sports teachers regarding using Web 2.0 tools in face-to-face teaching, based on their experience and knowledge gained during the emergency remote teaching process, were interpreted. This integrated approach provided a comprehensive understanding of the research problem.

RESULTS

The findings of the research are presented below in the quantitative and qualitative sections.

Results of the scale on competence in using Web 2.0 tools

The findings indicate that physical education and sports teachers have a medium level of competence in using Web 2.0 tools, with a mean WTUCS score of 93.19 (±27.40). The skewness and kurtosis values for the total score of the scale fell within the range of +1.50 to -1.50, as suggested in the literature. This indicates that the total scores obtained from the scale follow a normal distribution (Tabachnick & Fidell, 2013).

It was found that the mean WTUCS scores of physical education and sports teachers did not differ statistically significantly based on the gender variable [$t(171) = 1.043$; $p > .05$]. However, it is noteworthy that female teachers had slightly higher competency scores than male teachers (see Table 3).

	Df	*F*	*p*	The difference
WTUCS score averages	5	3.872	.002*	21-30 > 46-50 41-45 > 46-50
	167			
	172			

Table 3: Examination of the research group's WTUCS scores according to age variable, 2021-2022 (source: own elaboration)

It was found that the mean WTUCS scores of physical education and sports teachers differed statistically significantly based on the age variable [$F(5\text{-}167) = 3.872$, $p < 0.05$]. To identify the source of the differences between groups, the Gabriel test, one of the post-hoc analyses, was applied (see Table 4). The results of this test revealed two significant differences: first, between the 21–30 and 46–50 age groups, with the 21–30 age group showing higher WTUCS scores, and second, between the 41–45 and 46–50 age groups, with the 41–45 age group demonstrating higher scores.

	Df	F	p
WTUCS score averages	4	.467	.760
	168		
	172		

Table 4: Examination of the WTUCS scores of the research group according to the years of professional service variable, 2021-2022 (source: own elaboration)

No statistically significant difference was found in the mean WTUCS scores of physical education and sports teachers based on the variable of years of professional service [$F(4\text{-}168) = .467$, $p > 0.05$] (see Table 4).

A statistically significant difference was found in the mean WTUCS scores of physical education and sports teachers based on the variable of education level [$t(170) = 1.043$; $p < 0.05$] (see Table 5).

A significant difference was found in the mean WTUCS scores of physical education and sports teachers based on the variable of participation in Web 2.0 training [$t(171) = 2.246$; $p < 0.05$] (see Table 6).

Education level	n	$\bar{X}$	Ss	t	Df	p
Bachelor's degree	144	89.20	22.91	-4.534	170	.000*
Postgraduate	29	113.24	38.07			

Table 5: Examination of the WTUCS scores of the research group according to the level of education variable, 2021-2022 (source: own elaboration)

Web 2.0 education	n	$\bar{X}$	Ss	t	Df	p
Yes	124	96.10	28.43	2.246	171	.026*
No	49	85.83	23.28			

Table 6: Examination of the research group's WTUCS scores according to the variable of Web 2.0 education status, 2021-2022 (source: own elaboration)

Individual In-depth Interview Results

The coding of the data and the grouping by themes allowed us to explore the content expressed about the aspects of the topic discussed. Textual quotations support the key ideas of the discourse. In this case, the three themes previously described were used.

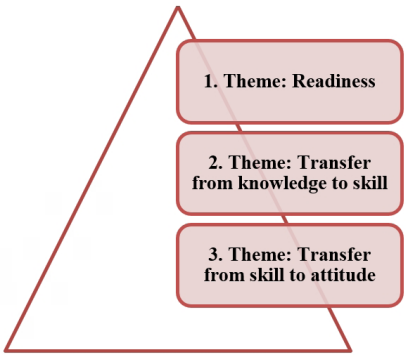

Figure 1: Qualitative data analysis themes, 2021-2022 (source: own elaboration)

The theme of readiness reflects the extent to which physical education and sports teachers were prepared to use Web 2.0 tools during the emergency remote teaching process and the measures taken by MNE to support this transition.

The theme of transfer from knowledge to skill examines whether teachers successfully applied the Web 2.0 tool competencies they acquired during remote teaching to their face-to-face instruction.

Finally, the theme of transfer from skill to attitude captures teachers' willingness and motivation to continue using Web 2.0 tools in face-to-face education, demonstrating their long-term commitment to integrating technology into their teaching practices.

Theme 1: Readiness

Within this theme, participants discussed two key aspects of readiness for using Web 2.0 tools during the emergency remote teaching process: individual readiness and MNE readiness.

Participants noted that personal effort and collaboration with colleagues improved their individual readiness. They emphasized how their ability to use Web 2.0 tools developed as a necessity rather than a pre-existing skill. Meanwhile, at the institutional level, the readiness of MNE was questioned, as teachers reported challenges in accessing technological devices, stable internet connections, and adequate resources. To address these issues, they highlighted the need for structured training programs, increased access to technological tools, and broader internet coverage.

Individual Readiness

The following participant statements illustrate the experiences of teachers in developing their individual readiness for Web 2.0 tools:

"Before the pandemic, I rarely used technology in physical education and sports classes. However, through research and exchanging information with other teachers, we adapted our lessons for distance education. I realized many of my colleagues also lacked technological proficiency, but we all had to learn quickly. My main focus was finding ways to make learning fun and physically engaging for students using Web 2.0 tools. It was a great learning experience." (P1)

"Initially, I thought I couldn't use technology at all. But I had to learn—there was no other choice. Our generation was introduced to technology much later in life, making learning it more challenging than younger generations. However, I see teaching as a responsibility and felt obligated to improve my skills. One of my main motivations was reducing students' inactivity, so I researched better ways to integrate technology into my lessons." (P2)

"Because of my age, I have always been familiar with phones and computers, making using Web 2.0 tools easier. During the remote teaching process, I watched YouTube tutorials on how to effectively use Web 2.0 tools and tried to integrate the materials I created into my lessons." (P3)

"When the pandemic began, my colleagues and I exchanged ideas frequently. We constantly shared how we managed our lessons and which platforms we found useful. One of our

friends discovered a website with excellent information on distance education, and we all benefited significantly from its resources." (P5)

Readiness of the Ministry of National Education

Participants also expressed concerns regarding MNE's preparedness for emergency remote teaching. The following statements highlight the institutional challenges they faced:

"…Even though all education had to be conducted online during the emergency remote teaching period, we received no formal training on using these technologies, Web 2.0 tools, or creating digital course content…" (P1)

"…The Ministry of National Education provided 8 GB of internet data to access the Education Information Network (EIN) for all courses, but this was not sufficient during the pandemic. Since I found EIN's content inadequate for high school students, I supplemented my lessons with professional sports videos from YouTube…" (P2)

"…I work in a rural area, and many of my students do not have computers. Even those who had computers often lacked a stable internet connection. A significant number of students had neither a computer nor internet access at home, which made online education extremely challenging…" (P3)

"…Providing in-service training on Web 2.0 tools during the pandemic would have been highly beneficial…" (P6)

These findings highlight that while individual teachers made efforts to improve their technological skills, systemic limitations -such as inadequate infrastructure, lack of training, and insufficient internet access- posed significant obstacles to effective remote teaching.

Theme 2: Transfer from Knowledge to Skill

Within this theme, physical education and sports teachers stated that they continue to use the Web 2.0 tools they adopted during emergency remote teaching in face-to-face education as well.

"…During the pandemic, I started recording exercise videos on my phone, demonstrating the correct movements, and sharing them with my students via WhatsApp. I have continued this practice in face-to-face teaching because I don't want my students to be physically active for only two hours a week. I assign homework through these videos, such as practicing a specific exercise once a day. During the pandemic, I also encouraged my students to download a pedometer app on their smartphones. Even after returning to in-person classes, I ask them to send me their daily step counts via WhatsApp, and I include this data in their course performance evaluation…" (P2)

Another teacher emphasized the benefits of digital tools when outdoor activities were not possible:

"…For four weeks, due to rainy weather, we couldn't conduct lessons outside in the schoolyard, so we had to hold classes indoors. I used the smartboard to present content I had prepared on platforms like Popplet, Wordwall, Kahoot!, and PowerPoint, which I learned to use during the pandemic. This way, I was able to introduce students to a variety of sports disciplines, even in a classroom setting…" (P4)

Similarly, a teacher highlighted how video-based learning continues to enhance students' understanding of sports skills:

"…During the pandemic, I noticed that students enjoyed watching videos of athletes. I decided to carry this approach into face-to-face teaching. When bad weather forces us indoors, we watch YouTube videos of professional athletes demonstrating the skill I am teaching. When we are outside in the garden, I reference these videos while demonstrating the movements myself…" (P5)

These statements illustrate how physical education and sports teachers have successfully integrated Web 2.0 tools into their in-person instruction, enhancing engagement and continuity in learning.

Theme 3: Transfer from Skill to Attitude

The participants expressed a positive attitude toward the increased use of Web 2.0 tools in physical education and sports lessons. One teacher emphasized the need for professional development in this area:

"…I think we are significantly lacking in the use of technology in physical education and sports lessons. Especially when we transitioned back to face-to-face teaching, I requested in-service training on Web 2.0 tools for my school's physical education and sports program. I want to reach students as a teacher who follows and applies technology rather than falling behind in knowledge and innovation…" (P1)

Another participant highlighted the practical benefits of Web 2.0 tools for skill development:

"…I think using Web 2.0 tools is effective in physical education and sports lessons. When my students struggle to perform a skill correctly, I send them instructional videos via WhatsApp so they can watch and practice at home. I want to learn and use platforms that will further enhance this type of education…" (P2)

Similarly, a teacher pointed out the necessity of integrating technology to align with students' digital habits:

"…Children today are constantly exposed to screens in their daily lives. As physical education and sports teachers, we need to expand our knowledge to incorporate technological applications and make our lessons more engaging…" (P3)

Another participant emphasized the role of Web 2.0 tools in teaching theoretical aspects of sports:

"…Using Web 2.0 tools is essential for explaining game rules, sports equipment, and extreme sports. These tools allow students to visualize key details -such as field dimensions, pole heights, or ball weights- that they might never encounter otherwise…" (P7)

These statements collectively underscore the participants' recognition of Web 2.0 tools as valuable resources for enhancing physical education and sports instruction.

Triangulation of Data

Physical education and sports teachers generally stated that they lacked sufficient competence in using Web 2.0 tools before the emergency remote teaching process. One teacher reflected, *"I was very far from using technology in physical education and sports classes before the pandemic."* However, during the emergency remote teaching period, teachers reported developing their competence through personal efforts and collaboration with colleagues. As one teacher noted, *"As a result of my research and sharing information with other teachers, we*

tried to transfer our lessons to students in distance education." These statements suggest that physical education and sports teachers successfully transferred their knowledge and skills acquired during the emergency remote teaching process to face-to-face instruction.

The results of the post-pandemic survey further support this finding. One teacher described their evolving practice: *"I took exercise videos with the camera during the distance education process. I started sharing them in class groups via WhatsApp. I continue to share my exercise videos in face-to-face education to increase my students' movement time."* As revealed by the scale, the medium level of competence in using Web 2.0 tools among physical education and sports teachers aligns with these qualitative findings. Despite the increase in their competence, teachers reported familiarity with only a limited number of Web 2.0 tools.

Teachers also acknowledged the benefits of Web 2.0 tools in achieving course objectives during emergency remote teaching. Consequently, many expressed a need for in-service training to further develop their skills in face-to-face education. One teacher stated, *"When we switched to face-to-face education, I requested in-service training on using Web 2.0 tools at my school. I want to reach students as teachers who can follow and apply technology instead of falling behind it."* This indicates that teachers who gained experience with Web 2.0 tools during the remote teaching period developed a positive attitude toward their use in face-to-face education. Another teacher affirmed this perspective: *"I think that the use of Web 2.0 tools is effective in face-to-face education."* This finding reinforces the idea that knowledge and skill acquisition are key precursors to attitude development.

Quantitative data further revealed that teachers with postgraduate education demonstrated higher competence in using Web 2.0 tools compared to those with only a bachelor's degree. This was also supported by qualitative findings, as one teacher explained: *"Graduate education allowed us to closely follow technological developments and benefit from computers. Therefore, I learned to use Web 2.0 tools more easily than my colleagues."*

Additionally, younger physical education and sports teachers reported using a wider variety of Web 2.0 tools than their older counterparts, both during and after the emergency remote teaching process. One younger teacher observed: *"I've seen middle-aged and older teachers struggle to adapt to technology. We even have teachers who still use touch-tone phones. I could use Web 2.0 tools because, at my age, I was more engaged with phones and computers."* This qualitative finding is consistent with the scale results.

Furthermore, teachers who had received prior training on Web 2.0 tools before the pandemic highlighted the benefits of such training during the emergency remote teaching process. One teacher shared: *"I learned how to prepare digital content related to many sports branches from a magazine prepared by an expert physical education and sports teacher, as well as from the accompanying CDs. Following this magazine during the pandemic was very useful."*

In conclusion, the quantitative results were found to be consistent with the qualitative themes, reinforcing the alignment between teachers' self-reported experiences and measured competencies.

DISCUSSION

This study examined physical education and sports teachers' perceptions of using Web 2.0 tools in face-to-face education following the emergency remote teaching process. The quantitative findings indicate significant differences in teachers' proficiency in using Web 2.0 tools based on various independent variables.

Overall, the study found that physical education and sports teachers demonstrated a moderate level of competence in using Web 2.0 tools. Eyüp (2022), using the WTUCS, reported that Turkish teachers' proficiency scores were below the medium level (78.78±39.96). In contrast to this study's findings, Wallace et al. (2022) evaluated physical education and sports teachers' competencies in Web 2.0 tools as low, attributing this to their general perception of digital technology proficiency. Similarly, Kovalevskaya et al. (2021) found that teachers faced challenges in producing content with Web 2.0 tools in face-to-face teaching. The moderate WTUCS scores in this study may be attributed to teachers' self-improvement during the pandemic. Supporting this, Godoi et al. (2020) noted that the emergency remote teaching process provided learning opportunities for physical education teachers regarding educational technologies, including Web 2.0 tools.

Gender and Web 2.0 Competence

The study found that gender influences teachers' competencies in Web 2.0 tools, though the statistical difference was insignificant. Findings indicate that female physical education and sports teachers scored higher in competency. Yaman (2008) similarly noted that female teachers used educational technologies, including Web 2.0 tools, more than their male counterparts. Consistently, Eyüp (2022) and Atalmış & Şimşek (2022), using WTUCS, found no statistically significant difference in gender, aligning with this study. However, some studies indicate that male teachers use technological tools more frequently (Tou et al., 2019). The higher Web 2.0 competence among female teachers in this study may be linked to their greater engagement with information technologies for professional development (TÜİK, 2022).

Age and Web 2.0 Competence

Age was found to be a significant factor in teachers' use of Web 2.0 tools. Teachers aged 21-30 exhibited higher competence compared to those aged 41 and above. Similar findings regarding younger teachers' positive attitudes toward educational technologies exist in the literature (Barahona et al., 2020; İpekli & Titrek, 2022; Keleş, 2022; Özcan & Saraç, 2020). However, contrary findings suggest that teachers over 41 use Web 2.0 tools more effectively in their lessons (Korkmaz, 2021; Tou et al., 2019). The higher competence among younger teachers in this study may be due to their exposure to up-to-date educational technologies during their undergraduate education.

Education Level and Web 2.0 Competence

The study observed differences in Web 2.0 tool competence based on teachers' education levels. Those with postgraduate education demonstrated higher proficiency than those with

only a bachelor's degree. This aligns with research showing that postgraduate physical education teachers use Web 2.0 tools more effectively (Can & Kerkez, 2022a; Keleş, 2022; Yaman, 2008). Higher education levels may encourage more frequent and effective use of technology.

Web 2.0 Training and Competence

Quantitative findings show that teachers who received Web 2.0 training had higher competence than those who did not. Yaman (2008) similarly noted that teachers benefiting from in-service training used Web 2.0 tools more effectively. These findings suggest that such training is valuable for improving teachers' ability to integrate Web 2.0 tools into their teaching practices.

Readiness for Web 2.0 Tools

The qualitative analysis identified "readiness" as a key theme. Under the sub-theme "individual readiness," it was found that teachers initially lacked sufficient knowledge and skills in Web 2.0 tools during the emergency remote teaching process. However, they improved through personal efforts and consultations with colleagues, consistent with findings from Godoi, Kawashima, & Gomes (2020). Despite this, teachers mentioned only a few well-known Web 2.0 tools, a pattern also noted by Keskin & Uğraş (2022). Their study found that teachers' self-efficacy beliefs about Web 2.0 content development were high in quantitative measures, but qualitative findings showed they had extensive knowledge of only a few tools. Similarly, Ünlü & Süel (2014) reported high self-efficacy among pre-service physical education teachers in computer use.

Regarding the "readiness of the Ministry of National Education," teachers working in rural areas reported difficulties in accessing technological devices, the internet, and educational resources. Similar studies confirm that rural teachers face challenges using distance education applications due to insufficient technological infrastructure (Hernandez & Dearcos, 2022; Mercier et al., 2021).

Transfer of Knowledge to Skill

The study found that teachers successfully transferred their knowledge of Web 2.0 tools acquired during the pandemic to face-to-face education. This aligns with the quantitative finding that teachers use Web 2.0 tools at a moderate level. However, a literature review revealed a lack of studies explicitly addressing this knowledge-to-skill transfer. Since developing beliefs is an essential step in shaping attitudes, this transfer process may serve as a foundation for attitude development. Keskin & Uğraş (2022) found that physical education teachers had high self-efficacy beliefs about Web 2.0 tools, though their knowledge was limited to a few frequently used tools. Similarly, Uğraş & Aslan (2022) associated teachers' ability to create educational content with Web 2.0 tools with their strong professional belief levels.

Transfer from Skill to Attitude

The final theme of the research was the transfer from skill to attitude. The analysis showed that teachers' knowledge and skills significantly influenced their attitudes toward using Web 2.0 tools in face-to-face education. While qualitative studies on this topic are scarce, quantitative findings indicate that teachers have a positive attitude toward Web 2.0 tools (Keskin & Uğraş, 2022; Keleş, 2022; Korkmaz, 2021; Osmanovic et al., 2020).

Limitations

The use of a mixed-methods approach in this study is considered one of its strengths. However, the research also has certain limitations. The sample consisted of physical education and sports teachers working in public schools in Muğla province, making it geographically restricted and reflective only of teachers from this specific region. As a result, the findings may have limited generalizability beyond this area.

Additionally, data collection was conducted solely during the spring semester of the 2021-2022 academic year, meaning that teachers' experiences with Web 2.0 tools are tied to a specific and limited time frame. Furthermore, the challenges and educational needs teachers encounter during the emergency remote teaching process may be unique to that period, and future needs could differ.

These limitations may affect the generalizability and accuracy of the study's findings. Therefore, future research should test the results with a larger and more diverse sample and under different conditions to enhance their applicability.

CONCLUSION

This study has shown that physical education and sports teachers have a positive attitude toward applying the competencies they developed in using Web 2.0 tools -gained through their efforts and consultations with colleagues during the emergency remote teaching process- to face-to-face education. It was observed that their competence in using Web 2.0 tools during face-to-face education following the emergency remote teaching period was at a moderate level. Furthermore, teachers with postgraduate education, younger teachers, and those who had previously trained on Web 2.0 tools demonstrated higher levels of competence in utilizing these tools.

Suggestions

Although the emergency remote teaching process has enhanced physical education and sports teachers' competence in using Web 2.0 tools, they still need to familiarize themselves with a wider variety of these tools. Therefore, it is recommended that in-service training programs incorporate comprehensive instruction on various Web 2.0 tools. Additionally, course materials designed by experts in accordance with MNE's regulations and enriched with Web 2.0 tools can be made available to physical education and sports teachers.

However, obtaining qualitative findings proved to be challenging for researchers. For this reason, further qualitative research is recommended to explore teachers' readiness and Web 2.0 tool usage transferability. Field studies can also be conducted to assess how physical education and sports teachers integrate Web 2.0 tools into their classes.

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