



## ORIGINAL RESEARCH PAPER

## The effectiveness of blended learning with electronic concept maps on social studies learning

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## ABSTRACT

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## KEYWORDS:

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**Background and Objectives:** The integration of in-person teaching with digital education has given rise to a new approach to learning and teaching known as blended learning. When implemented effectively, blended learning can enhance the academic success and overall learning experience of students. Additionally, the use of modern theories of learning, such as constructivism, and learning strategies like concept mapping, can transform students from passive receivers of information to active participants in their academic journey. Concept maps created using computer-based tools have been integrated into many learning strategies, including blended learning. A recent study was conducted to explore the effectiveness of concept map-based blended learning on the social studies learning of male sixth-grade students.

**Materials and Methods:** The study followed a semi-experimental research method with a pre-test-post-test design and a control group. The participants were all male sixth-grade students from Birjand in 2023. The sample size consisted of 60 male students chosen through available sampling. The pre-test-post-test of the social studies researcher was used to collect data. The test questions' content validity was assessed using a two-dimensional table of objective-content, and the face validity was confirmed by experts and three sixth-grade colleagues. The test's reliability coefficient was calculated through Cronbach's alpha coefficient, which was 0.81. The test consisted of two parts, with the first part collecting demographic information and providing instructions for completing the questions. In addition to descriptive statistics, the analysis of covariance statistical test was used to analyze the data.

**Findings:** Based on the results of the study, it can be concluded that there is a notable difference in the average scores of the learning variables of the experimental and control groups. The application of combined training based on a conceptual map has proven to explain 19.2% of the variance of the learning post-test scores, which is a significant result ( $F_{(57,1)} = 60.13$ ,  $p < 0.005$ , partial  $\eta^2 = 2.19\%$ ).

**Conclusions:** According to research, blended learning based on concept maps has been found to be effective in enhancing students' social studies learning. The ongoing COVID-19 pandemic has forced many educational institutions to adopt virtual education as the only means of ensuring the safety of students and staff. However, with the end of the pandemic, there are concerns about the weaknesses in various educational fields that have come to light during this period. Therefore, the use of blended learning centered on the use of electronic concept maps is an effective approach to eliminate the weaknesses caused by virtual education during the pandemic and an effective measure to compensate and stabilize their learning in the post-coronavirus era. This approach will make a deeper connection between the main concepts of the new lesson and the students' previous learning, and the main role in this process will be the responsibility of the student. Among the limitations of the current research, we can mention experimental interventions by the researcher, which can influence the bias of the results. Not having a follow-up phase was another limitation of the above study. Therefore, it is suggested that other researchers, by removing the mentioned methodological limitations and also applying other variables affecting learning, should try to conduct new research with different societies and sample sizes, in other subjects and levels of study, and with different genders. This increases the accuracy of the results and increases the generalizability of the

results. Based on the results obtained from the present study, it is possible to hold workshops and training courses in order to enable colleagues to use electronic concept maps and use them in teaching. In addition to the above, electronic concept maps can be used in the teaching-learning process in the curriculum of the second elementary school. An effective method is to use a combination of work and technology courses, social studies and art. In addition to strengthening learning, this can also be effective in developing students' aesthetic sense. Finally, using technological literacy in the design of concept maps and encouraging students to use it during class presentations can be considered as other practical suggestions that strengthen the motivation of students to progress.



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## مقاله پژوهشی

## اثربخشی یادگیری ترکیبی مبتنی بر نقشه مفهومی الکترونیکی بر یادگیری مطالعات اجتماعی

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## چکیده

**پیشینه و اهداف:** ترکیب آموزش حضوری با آموزش الکترونیکی، منجر به ایجاد شیوه‌ای جدید در آموزش و یادگیری به نام یادگیری ترکیبی گردیده است که در صورت استفاده صحیح به بهبود یادگیری و موفقیت تحصیلی دانش‌آموزان منجر می‌شود. از سوی دیگر، تاکید بر نظریات جدید یادگیری چون ساختن‌گرایی و به کارگیری آن در راهبردهایی چون نقشه‌های مفهومی یادگیرنده را از منفعل بودن و دریافت کننده صرف اطلاعات دور کرده و درگیری تحصیلی او را به ارمغان می‌آورد. نقشه‌های مفهومی راینه محور در استراتژی‌های یادگیری متعددی از جمله یادگیری ترکیبی به خدمت گرفته شده‌اند. پژوهش حاضر باهدف بررسی اثربخشی آموزش ترکیبی مبتنی بر نقشه مفهومی بر یادگیری مطالعات اجتماعی دانش‌آموزان پسر پایه ششم انجام شد.

**روش‌ها:** روش پژوهش نیمه آزمایشی با طرح پیش‌آزمون - پس‌آزمون همراه با گروه کنترل بود. جامعه آماری پژوهش تمامی دانش‌آموزان پسر پایه ششم ابتدایی شهرستان بیرجند در سال تحصیلی ۱۴۰۲-۱۴۰۳ بودند. نمونه آماری پژوهش ۶۰ نفر از دانش‌آموزان پسر پایه ششم بودند که با شیوه نمونه‌گیری در دسترس انتخاب شدند. برای گردآوری داده‌ها از پیش‌آزمون - پس‌آزمون محقق ساخته مطالعات اجتماعی استفاده گردید. با استفاده از جدول دوتایی هدف-محتوا روایی محتوایی سوالات آزمون مورد بررسی قرار گرفت. همچنین، متخصصان و ۳ تن از همکاران پایه ششم روایی صوری آزمون را تایید کردند. همچنین، ضریب پایایی سوالات آزمون نیز با استفاده از ضریب آلفای کرونباخ محاسبه شد که میزان ۰/۸۱ به دست آمد. این آزمون دارای دو بخش بود. در بخش نخست، ضمن دریافت اطلاعات جمعیت شناختی مشارکت کنندگان، دستورالعمل تکمیل سوالات نیز گنجانده شده بود و بخش دوم نیز حاوی ۲۰ سوال چهارگزینه‌ای بود که از ۸ درس آخر کتاب مطالعات اجتماعی تهیه و طراحی شده بود. جهت تجزیه و تحلیل داده‌ها، علاوه بر آمار توصیفی از آزمون آماری تحلیل کوواریانس استفاده شد.

**یافته‌ها:** نتایج نشان داد که بین میانگین نمرات متغیر یادگیری مطالعات گروه‌های آزمایش و کنترل تفاوت معناداری وجود دارد. با در نظر گرفتن مجذور لتا می‌توان گفت کاربرد آموزش ترکیبی مبتنی بر نقشه مفهومی، ۱۹/۲ درصد واریانس نمرات پس‌آزمون یادگیری را تبیین می‌کند ( $F_{(57,1)}=13/60, p<0/005$  partial  $\eta^2=19/2\%$ ).

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## واژگان کلیدی:

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**نتیجه گیری:** یافته‌های پژوهش نشان می‌دهد که آموزش ترکیبی مبتنی بر نقشه‌های مفهومی بر یادگیری مطالعات اجتماعی دانش‌آموزان موثر بوده است. همانطور که مطالعات نشان می‌دهند در طی دوران همه‌گیری کرونا، آموزش مجازی تنها راه ممکن برای حفظ سلامتی یادگیرندگان و جلوگیری از بسته شدن طولانی مدت اماکن آموزشی قلمداد شد و اکنون پس از پایان دوران همه‌گیری کرونا، ضعف‌های جدی در زمینه‌های متعدد تحصیلی و تربیتی مشاهده می‌گردد. بنابراین، بهره‌گیری از یادگیری ترکیبی با محوریت استفاده از نقشه‌های مفهومی الکترونیکی، رویکردی اثربخش در رفع ضعف‌های ناشی از آموزش مجازی در دوران همه‌گیری و اقدامی مؤثر در جهت جبران و تثبیت یادگیری آنان در پسا کرونا است. این رویکرد سبب خواهد شد تا بین مفاهیم اصلی درس جدید و آموخته‌های قبلی دانش‌آموزان پیوند عمیق‌تر برقرار گردد و نقش اصلی در این فرآیند برعهده دانش‌آموز باشد. از محدودیت‌های پژوهش حاضر، می‌توان به مداخلات آزمایشی توسط پژوهشگر اشاره کرد که می‌تواند در سوگیری نتایج تاثیرگذار باشد. نداشتن مرحله پیگیری از دیگر محدودیت‌های مطالعه فوق بود. لذا، پیشنهاد می‌گردد سایر پژوهشگران با رفع محدودیت‌های روش شناختی ذکر شده و همچنین اعمال سایر متغیرهای موثر بر یادگیری نسبت به انجام پژوهش‌های جدید با جوامع و حجم نمونه متفاوت، در دروس و مقاطع تحصیلی دیگر و با جنسیت‌های متفاوت مبادرت ورزند. این امر دقت نتایج را بالا برده و بر قدرت تعمیم دهی نتایج می‌افزاید. بر اساس نتایج به دست آمده از مطالعه حاضر می‌توان نسبت به برگزاری کارگاه و دوره‌های آموزشی در جهت توانمندی همکاران در به کارگیری نقشه‌های مفهومی الکترونیکی و بهره‌گیری از آن در تدریس اقدام کرد. افزون بر موارد فوق، می‌توان در برنامه درسی و آموزشی دوره دوم ابتدایی از نقشه‌های مفهومی الکترونیکی در جای جای فرآیند یاددهی-یادگیری استفاده کرد. یک روش موثر، استفاده از تلفیق دروس کار و فناوری، مطالعات اجتماعی و هنر است. این امر می‌تواند علاوه بر تقویت یادگیری در پرورش حس زیبایی شناختی دانش‌آموزان نیز موثر باشد. در نهایت، بهره‌گیری از سواد فناورانه در طراحی نقشه‌های مفهومی و تشویق دانش‌آموزان به استفاده از آن به هنگام ارائه‌های کلاسی را می‌توان از دیگر پیشنهادهای کاربردی که انگیزه پیشرفت را در دانش‌آموزان تقویت می‌کند، دانست.

## Introduction

In today's world, the rapid and sudden changes that originate from advances in science and technology have affected all aspects of human life, including education [1,2]. Education is considered the basis of all development of the country, or is somehow tied to it [3]. Therefore, educational systems must adjust themselves step by step with these developments and try to improve and upgrade themselves [4]. This improvement in educational systems and the use of new approaches in education is a necessity. Today, there is a lot of emphasis placed on using technology to solve existing problems, reduce the gap between the current and desired conditions, and also improve the learning and academic success of students. It is undeniable that the role of information and communication technology in improving and creating a revolution in education and learning has been significant [5].

Before the coronavirus pandemic, there were various methods of education. Most countries relied on face-to-face and traditional training, while each educational system used different mobile learning approaches, blended learning, reverse learning, and more, based on their technical infrastructure and educational perspectives. However, the sudden outbreak of COVID-19 in 2019 changed everything [6,7]. Following the World Health Organization's announcement, educational centers from elementary schools to universities were shut down [8]. Statistics reveal that almost half of the world's student population (nearly 900 million people) was impacted by this phenomenon at the start. [9]. Furthermore, it was estimated that over a population of one and a half billion people followed virtual education [10]. Therefore, with social distance measures in place and schools and educational facilities closed, changing the educational system's traditional approach to virtual

education became a fundamental and significant challenge [11].

The shift from traditional face-to-face education to virtual learning was necessitated by a lack of infrastructure and planning, communication issues, and a lack of technical expertise among teachers [12,13]. Despite these challenges, virtual education was seen as the only viable solution to continue the education process during the pandemic. In other words, virtual education was a response to the COVID-19 epidemic, and the world was pregnant with conditions where, for the first time, all education and learning were done in a virtual way [12]. Over time, technical and communication problems were addressed and reduced. However, as the world returns to in-person learning, the challenges of virtual education are becoming more apparent. While some technical and infrastructure issues may be unique to the virtual learning era, any weaknesses in these areas can have long-term negative effects on student education [14].

It's important to recognize that there are many physical, social, and cultural challenges that can impact students in the post-corona era. Some of these challenges include obesity, diabetes, bad sitting habits, poor vision, and extreme fatigue [15], mental health problems like depression and isolation, aggression, and even cell phone addiction [16]. Students may also struggle with drowning in the Internet and virtual world, dropping out of school, and facing educational challenges, such as weakness in basic courses due to the lack of real and meaningful interaction in this type of education [17]. It's also worth noting that some students may lack technological literacy, while others may struggle with attention, concentration, and digital distraction [18]. Also, a lack of attention to individual differences [12,14], ignoring learning styles, lack of efficiency in practical and laboratory courses are some of the other

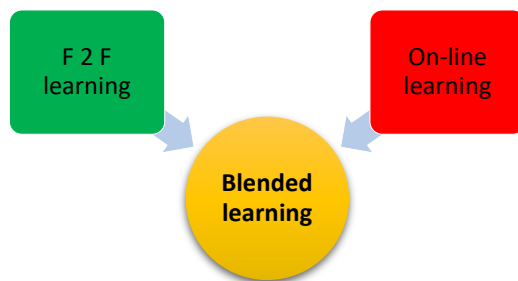
problems [7]. There may also be ethical issues such as cheating, abuse of virtual education in the classroom and monthly evaluations, problems with parental involvement, and poor upbringing. All of these factors can contribute to a fundamental weakness in students during this time. It's important to recognize and address these challenges in order to support students and help them succeed [19–21].

Considering the experiences gained during the virtual education era brought on by the coronavirus pandemic, it seems that incorporating new educational approaches could help improve the teaching process. This includes preparing necessary infrastructures, possessing technical knowledge, and reopening schools. These measures can help eliminate educational deficiencies and weaknesses caused by the pandemic, and also stabilize learning in the post-coronavirus era. One such approach is the use of blended learning methods, which emphasizes conceptual maps [22]. Human progress in educational technologies has shown that this method can improve the quality and richness of learning, as well as increase student participation in the teaching and learning process [23].

Upon doing some research on blended learning, it was found that there is much debate on a single definition of it. As a result, different definitions have been presented [24]; but two definitions seem to be more commonly used. The first one defines blended learning as 'the integration of face-to-face training and computer training [25]. The second definition refers to it as 'the thoughtful combination of face-to-face classroom learning experiences with online learning experiences' [26]. What the two definitions have in common is that the key elements of blended learning are face-to-face and e-learning [27,28].

Blended learning refers to a course that combines online and face-to-face methods of

content delivery. The main emphasis is on online presentations and discussions rather than face-to-face practices. The ratio of online to face-to-face can range from 30 to 79 percent [1]. Blended learning involves a combination of learning methods, content, and experiences. This can include integrating electronic learning with traditional learning, combining online learning with face-to-face learning, or using a blended pedagogy (Figure 1) [22]. It's worth noting that when discussing blended learning research, it's not common to focus solely on teaching or learning, as they are two sides of the same coin [27].



**Fig. 1: the definition of blended learning**

As the world of education shifts towards new perspectives and approaches to learning, such as the constructivist approach, the methods of teaching and presenting content have also undergone tremendous changes [29]. This approach emphasizes the active and dynamic presence of the student as the main focus of teaching and learning. By combining this approach with the latest technologies, we can effectively organize, repeat, and review the contents. One such technique is the use of map tools, which come in various software for drawing and presenting content. These map tools can visually display information, concepts, and connections between ideas [30], and have been called by various names, such as mental maps, concept maps, and proof maps [31]. By incorporating these tools in teaching, we can enhance students' learning experience and

overcome the challenges posed by virtual education during the time of COVID-19. Both teachers and students can benefit from the use of these map tools, which can stabilize learning and improve its efficacy [5].

Concept maps are a powerful tool for organizing information and improving learning outcomes. They are a visual representation of the relationships between concepts, arranged in a hierarchical format that facilitates understanding and retention of knowledge [30,32]. The use of concept maps is supported by the fact that they closely resemble the way our minds naturally function [33], making them an effective strategy for learning; it is defined as an active learning method to record ideas on a horizontal level [34]., making them an effective strategy for learning. Concept maps can be created using either pencil and paper or electronic formats, with the latter being increasingly popular due to their flexibility and multimedia capabilities. By incorporating colors, audio, video, and photos, electronic concept maps offer a dynamic and engaging way to connect knowledge in seamless scenarios [5]. This feature is particularly effective for enhancing learning, memorization [35], motivation, and attention to content [35,36]. Whether created manually or electronically, concept maps are a valuable tool for anyone seeking to improve their understanding and recall of complex information [5].

In this way, learning becomes effective through the use of images, colors, and connections between concepts. This approach aims to stimulate the mind to seek meaningful learning [33]. According to this theory, comprehensive information in a field of knowledge is displayed in a systematic and hierarchical manner, creating the cognitive structure of the individual [5,29]. Teachers can benefit from using mind maps in all stages of

teaching, from curriculum content design to student learning evaluation. At the beginning of teaching, mental maps can act as pre-organizers, while at the end, the teaching-learning process can create a continuum of content in the student's mind. As a result, the student considers the new material as part of the more general material already learned [37]. This approach integrates and harmonizes the learner's mind, leading to meaningful learning and the development of new ideas [33].

It's interesting how the current research looks at various variables, including social studies learning, which is considered to be one of the fundamental courses in elementary school. Social studies cover topics such as history, geography, and social (civil) concepts, which help students learn about values, social environments, and human interactions. The ultimate goal is to train students to become good citizens. It's crucial to recognize the significance of this academic course, particularly social studies, in nurturing talents, developing learners' personalities, and shaping their professional and academic lives. That's why it's important to explore new teaching and learning methods [38].

Studies have shown that teaching with the help of concept maps using a blended approach has several benefits. Although several studies have mentioned the improvement of learning as one of the most fundamental advantages of using concept maps in the teaching-learning process, several studies also show the useful results of these graphic structures in evaluation, linking the content to the learner's cognitive construction [39] and improving new experiences [37]. With the change of teaching and learning approaches from being teacher-centered to student-centered approaches and theories, the use of mind maps as an active approach to use students' lateral thinking has been emphasized. Therefore, mind maps are a

popular tool for structuring and visualizing information and helping students generate new and better ideas [34,37]. Using this technique can improve the problem-solving process in students while improving thinking skills [33]. Improving the level of motivation [40], increasing attention, and self-confidence are also other benefits of this type of learning [22].

According to the research literature, blended learning and concept maps have many benefits for students, and with the challenges posed by virtual education during the COVID-19 pandemic, there is a need for effective solutions. The use of electronic concept maps in blended learning environments is a promising approach to address these challenges and improve student learning outcomes. Interestingly, despite the potential benefits of this approach, there have been no studies conducted in this field to date, making this research both innovative and important. The main research question is whether blended learning based on concept maps is effective in enhancing the social studies learning of sixth-grade male students in the post-corona era.

## Review of the Related Literature

The review of the studies conducted in this field shows the effectiveness of this educational method in the teaching-learning process and its results. According to a study conducted by Slovi and Chandramohan, using mind maps can be effective in helping students remember concepts. The study found that there is a correlation between academic progress and students' attitudes towards using concept maps. Furthermore, the results showed a positive and significant impact on learning when using this technique [40]. Also, according to research conducted by Nouri Shirazi et al., which focused on the effect of Azobel's theory concept maps on the prevention of academic



failure and learning deterioration in the Corona era, it was found that concept maps have a positive impact on reducing academic failure among third-grade primary school students. The study, which involved two experimental groups with 30 students in each group, demonstrated that concept maps helped to improve students' reasoning in academic achievement tests and also promoted their self-regulated learning [17].

Also, it's interesting to note that Bardel and Mahmoudabadi conducted a study on the effectiveness of two teaching methods in teaching sixth-grade experimental sciences. Their research found that the teaching method based on conceptual maps had a significant impact on the academic progress of male students in sixth grade. It was able to achieve the expected goals in experimental science classrooms in a favorable manner compared to traditional teaching methods [41]. In addition, Prestia et al.'s research found that concept maps designed with Scratch software can improve meaningful learning. Additionally, the study showed that these concept maps had a positive impact on students' understanding of knowledge, as evidenced by the results of the paired t-test on pre-test and post-test scores [37]. Pandey and Tyagi say concept maps can be a valuable resource for education. According to their research, concept maps have been shown to enhance the overall learning experience by providing a graphical representation of information that can help students better organize and integrate what they're learning. It's great to see that there are innovative teaching tools out there that can make learning more engaging and meaningful for students [42].

Romero and his colleagues highlighted the importance of learners understanding the principles behind creating concept maps in their study titled "Meaningful learning using concept

maps as a learning strategy". In fact, the research found that the learners who received training for designing concept maps as a learning strategy were highly satisfied with the training and found it to be useful in learning science lessons [43]. The study conducted by Yarmohammadi Vasil et al. aimed to compare the effectiveness of teaching with individual and group concept maps on the motivation and academic progress of learners in the social studies course. Based on the results, it was found that teaching with the help of concept maps was more effective in teaching the lesson, and group concept maps were found to be more effective than individual concept maps. This study highlights the importance of incorporating visual aids such as concept maps in teaching to enhance learning outcomes [44].

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## Method

### Participants

The statistical population consisted of all male sixth-grade students in 2023. The statistical sample included 60 male sixth-grade students from Birjand city, who were selected through available sampling in the form of two classes with 30 students in each one. Class "A" was the experimental group, which was taught using the combined method (f 2 f + E-learning), while class "B" was taught in the usual way(f 2 f). The participants were selected based on similar demographic characteristics, such as age, gender, and educational status. All participants were 12 years old.

### Instruments

To collect research data, the teacher of the social studies course used educational progress tests in the form of a pre-test-post-test of learning. The test questions were based on the last 8 lessons of the sixth-grade social studies textbook. The validity of the test was ensured

through face validity, which involved examining the test items for their appearance, simplicity, clarity, question proportionality, and more. Additionally, the two-dimensional goal-content table was used to design the questions, which helped ensure content validity. As a result, the teacher-made tests were valid in terms of both form and content. Apart from the above, the opinions of sixth-grade experts and teachers with at least three years of teaching experience in this grade were also taken into consideration for the content validity of the test. They provided their feedback after carefully examining the teaching topic, test questions, and the two-dimensional table of goal-content. In the next step, the researcher applied the necessary feedback and corrected any incomplete items. As a result, the teacher-made test with 20 multiple-choice questions was finalized and used in the pre-test and post-test of learning. The reliability coefficient of the test questions was also calculated using Cronbach's alpha coefficient, which was found to be 0.81, indicating high reliability. The test was divided into two parts. The first part included receiving demographic information from the participants, along with instructions for completing the questions. The second part included questions and options related to each, and participants had to choose the correct option.

### Design

This study aimed to investigate the effectiveness of blended learning based on electronic concept maps on students' social studies learning using a semi-experimental method. The research used a pre-test-post-test design with two experimental and control groups.

### Procedure

The content of the electronic concept maps was designed using the content of the textbook

"Social Studies of the sixth-grade," written by the Ministry of Education and the Educational Research and Planning Organization with code 607. First, conceptual maps were handwritten on paper. In the next step, qualitative content analysis was used and the sixth-grade teachers were asked to express their opinions regarding the degree of appropriateness and conformity of the content of the concept maps with the objectives of each lesson in a range from 1, the most appropriate, to 4 the least appropriate. After receiving the necessary feedback, some parts of the maps were changed and the necessary corrections were applied and again presented to the teachers to confirm the content. After experts' approval, the maps were designed using PowerPoint software and prepared for use in teaching. In this study, after selecting the sample, the participants were divided into two groups of 30 people. The intervention program was then conducted on the experimental group for 20 sessions that lasted 45 minutes each. Before the intervention, a pre-test was administered for both the experimental and control groups to compare their social studies learning. During the intervention sessions, the students in the experimental group were encouraged to ask questions and actively participate in discussions to ensure their full understanding of the subject and related concepts. The teacher also asked questions to test the students' knowledge and make sure they had learned the content. After each session, the images of the concept maps were re-uploaded in the students' class groups on the "Shad" student network so that the students could refer to them if needed. At the end of the intervention, a learning post-test was conducted, and the results were recorded. The data was analyzed using SPSS version 24 software, where descriptive analysis and covariance analysis tests were performed. A summary of the intervention sessions is presented in Table 1.



Ethical considerations were observed in the research, and all participants, including teachers and students, were given necessary explanations regarding the goals and process of the research. The students were assured that their participation was optional, and all pre-test-post-test results and information would be kept confidential. It should be noted that a few students from both classes were excluded from the research process due to various reasons, such as illness, unwillingness, or being under medical treatment.

## Results and Findings

The demographic information of the research is presented before starting the statistical analysis and checking the research hypothesis. It is noted that all participants in the research were boys who were in elementary school and were between 11 and 12 years old. The study had 30 participants in the experimental group, which amounts to 50%, and 30 participants in the control group, also equal to 50%. In addition to descriptive statistics, inferential statistics were used to analyze the data. Analysis of covariance was used in the context of the learning variable, taking into account the pre-test used before the implementation of the experimental plan, the assumption of the homogeneity of the variance of the groups, and the normality of the investigated data.

The research hypothesis was: The application of blended learning based on concept maps is effective for students' learning of social studies. Below, the descriptive indices (mean and standard deviation) of the social studies learning variable for both the experimental groups and the control group are shown. The experimental group received a

combined learning approach based on concept maps, while the control group was trained in the usual way. This information will help us understand the impact of the different training methods on social studies learning.

As can be observed from Table 2, there has been a noticeable improvement in the average scores of the social studies learning variable in the experimental group during the post-test phase when compared with the pre-test phase. This improvement can be attributed to the investigation of the effectiveness of combined training using conceptual maps through covariance analysis. To provide a comprehensive understanding of the test's reliability, the assumptions and results of the covariance analysis test are presented in the following tables.

- Examining the assumption of normality of data distribution related to learning variable scores: After conducting the Shapiro-Wilk test to check the normality of the distribution of scores for the dependent variables, the results were analyzed and are now displayed in Table 3. It's important to ensure that the data is normally distributed in order for accurate analysis and interpretation of the results.

The analysis in Table 3 indicates that the learning variable has a normal distribution, as the significance level is greater than 0.05. This confirms the assumption of normality of the data, which is further supported by the Shapiro-Wilk test.

- Examining the presumption of equality of variances related to the learning variable: Levine's test was used in order to check the assumption of homogeneity of variance of social studies learning variable scores. The results of this test are shown in Table 4:

**Table 1: The main themes, objectives, and concepts discussed in each session [45]**

Main Theme	Objectives	Session	The corresponding actions
Research plan	Introduction of the study plan	1	Getting to know the teachers and students, explaining the generalities, objectives, and research process for them, creating motivation, and necessary explanations.
Clothing	Types of Clothing	2,3	The role of clothing in representing social and occupational groups was mentioned. The impact of climate on clothing types was discussed. The history of Iranian clothing and traditional local attire was also considered.
	Clothing: Production Stages	4,5	The production of clothing in the past and present was compared. The concept of mass production was introduced, and important points in choosing work attire were discussed.
Seas	Iranian seas	6,7	The seas of the country, such as the Persian Gulf, the Caspian Sea, and the Sea of Oman, were introduced.
	The importance of the seas	8,9	The importance of the sea in terms of commerce, tourism, food sources, and energy sources was discussed, and concept maps were created with the help of students.
Adjacent Countries	our neighbors	10,11	The concepts of borders and how they are determined, the types of relationships with our neighbors, and the similarities between us and our neighbors were discussed and examined.
	Case study	12	The characteristics of two of the country's neighbors, such as Turkey and Afghanistan, were comprehensively studied (preparation of concept maps by students in groups and criticism and evaluation by students and feedback by the teacher).
Foreigners	colonialism	13,14	The phenomenon of colonialism, the reasons for Europe's advancement, and the influence of colonialism in Iran were examined.
	Anti-Colonial Struggle	15,16	Important figures in the fight against colonialism and the timeline of their efforts were discussed.
Khorramshahr	Occupation of Khorramshahr	17,18	A concept map related to the causes of Iraq's invasion of Iran and the occupation of Khorramshahr was prepared and discussed in class.
	Liberation of Khorramshahr	19,20	The liberation of Khorramshahr and the forces involved in its liberation were discussed.

**Table 2: Descriptive indices of two experimental and control groups in the pre-test and post-test of the learning variable**

Variable	Test	Experiment		Control	
		Mean	S. D	Mean	S. D
learning	Pre-test	6.13	2.17	6.87	2.48
	Post-test	14.70	3.62	12.67	2.80

**Table 3: Shapiro-Wilk test for normality of data**

Variable	group	Test statistics	df	sig
learning	Experiment	0.974	60	0.222
	Control	0.973	60	0.211

**Table 4: The results of Levin's test to examine the homogeneity of variances of the learning variable**

Variable	group	Levine's Test	df <sub>1</sub>	df <sub>2</sub>	sig
learning	Pre-test	0.738	1	58	0.394
	Post-test	2.5	1	58	0.119

Based on the above table, it can be concluded that the learning variable did not have a significant impact on the experimental and control groups. The p-value was greater than 0.05 ( $p\text{-value} > 0.05$ ), indicating that the null hypothesis cannot be rejected at the significance level of 0.05. Therefore, it can be established that there is homogeneity of the variance of the scores in the mentioned variable. This means that the pre-test had the same effect on both groups. The statistical test of covariance analysis was implemented by considering all the necessary assumptions, and the results are presented in Table 5.

The analysis of covariance revealed that the experimental and control groups had a significant difference in their average scores ( $F_{(57,1)} = 60.13$ ,  $p < 0.005$ , partial  $\eta^2 = 19.2\%$ ). After adjusting for the pre-test scores, the use of blended learning based on conceptual maps explained 19.2% of the variance in the post-test scores. Additionally, the group variable showed that there was a significant difference between the average scores of the experimental and control groups after removing the pre-test effect. This suggests that blended learning focusing on conceptual maps has a positive impact on social studies learning among students.

## Discussion

In this study, the effectiveness of blended learning centered on conceptual maps on the learning of social studies in the sixth grade was

investigated, and the results indicated the effectiveness of this method. It seems that the research hypothesis has produced some positive results. The study suggests that using blended learning and conceptual maps has a significant impact on the learning outcomes of sixth-grade elementary students, specifically in the field of social studies. It's important to note that learning is a complex process that requires continuous improvement of teaching methods to keep learners engaged and motivated. This approach can lead to better academic progress and more sustainable changes in learners over time [15] [35,36]. The pandemic has definitely highlighted the limitations of online education. It has become clear that online education alone is not sufficient to meet the needs of students. It is important to address these gaps and work towards a more balanced approach to education that incorporates both online and offline learning [6,19]. While online education has its limitations, it's also apparent that traditional face-to-face education is not sufficient for today's digital-native students. Teachers are expected to incorporate technology in their teaching methods in order to enhance the learning experience. This is where blended learning comes into play. By combining both face-to-face and online education, blended learning aims to improve the effectiveness of teaching and learning while also catering to individual differences, different learning styles, and making it more accessible for students. Additionally, it can help reduce costs and provide more flexibility [1].

**Table 5: The results of the covariance analysis to compare the average of two groups**

Source of changes	square of squares	df	mean square	F	sig	$\eta^2$
Corrected model	254.307	2	127.153	17.394	0.000	0.379
Fixed effect	495.482	1	495.482	67.780	0.000	0.543
pre-exam	192.290	1	192.290	26.305	0.000	0.316
group	99.229	1	99.229	13.574	0.001	0.192
error	416.677	57	7.310	17.394		
Total	11905	60				

Blended learning offers a great way to combine the benefits of face-to-face education with the advantages of educational technology. It strengthens the effectiveness of teaching and learning by integrating constructive interactions in physical environments with the capabilities of educational technologies. This method provides a more effective approach to cover the disadvantages of both traditional and online education [24,25]. The research conducted by Rostaminezad et al. [35,36], Ma and Lee [22], Islam et al. [46], Ibrahim and Nat [28], Hrastinski et al. [27], and Salehinejad et al. [5] have all shown consistent results that support the effectiveness of blended learning.

The blended learning model used in this research seems to be a great way to enhance traditional education. It combines face-to-face classroom learning with electronic learning, which can provide students with a more comprehensive learning experience [24]. Blended learning is a teaching method that can be tailored to suit the learning styles of individual learners. This approach involves redesigning the teaching-learning process with the use of technology, to create a more effective and personalized learning experience for students [1]. It is an effective teaching method that uses modern educational technologies to make learning more engaging and interactive. By creating attractive content and improving students' attention and motivation, blended learning can help students achieve academic success more effectively [35,36,43]. These results are in line with the findings of Rostaminezad et al. [1] [35,36], Graham [24,25], Jabraili et al. [33], and Ma and Lee [22].

Also, the social studies course is indeed a crucial subject in elementary school, and it plays a significant role in shaping an individual's personality and understanding of human interactions. It not only provides knowledge

about society and culture but also teaches important life skills like empathy, communication, and critical thinking. Overall, the importance of the social studies course cannot be overstated, and it should be given due attention in the curriculum [38]. The study findings suggest that using a combination of conceptual maps and blended learning can lead to more effective learning outcomes. This approach helps learners expand their understanding of social interactions with peers by re-conceptualizing learning patterns, which is in line with Wenger's "scientific societies" theory. It's fascinating to see how innovative teaching methods can enhance the learning experience. According to Wenger's theory, learners and teachers are seen as members of a group who collaborate and construct knowledge together through continuous interaction. This approach places a strong emphasis on learning rather than simply providing content. To facilitate this collaborative learning process, technology is often utilized to bring together the three key elements of cognition, education, and community, thereby enhancing the richness of the learning experience. Additionally, the constructivist approach can also be used to increase human interactions among learners, including group discussions and interactions. This approach can be especially beneficial for shy students, as it can help them become more involved in class discussions and engage more actively in the learning process. In these approaches, students are encouraged to take more responsibility for their own learning and to construct knowledge through meaningful and active engagement. This finding is consistent with the results of several other studies, including those conducted by samiee zafarkandi [29], Romero et al. [43], and Yar Mohammadi Vassel [44].

Studies have shown that teaching with the help of concept maps using a blended approach leads to the improvement of learners' learning [37]. The graphic view of information that concept maps provide can be a great way for students to organize, communicate and combine information. It's amazing to see how effective these tools can be in the teaching process and in promoting meaningful learning [42]. Concept maps are a great way to stimulate the mind and promote meaningful learning by using colors, images, and connections between concepts. These graphic structures are also very useful in evaluating students' understanding and linking the content to their cognitive development [39]. As the teaching and learning approaches have shifted from being teacher-centered to student-centered, there has been an increasing emphasis on using concept maps as an active approach to engage students' lateral thinking. It's amazing to see how effective these tools can be in promoting student-centered learning and encouraging students to think outside the box [34]. These results are also consistent with the results of Samiee Zafarkandi [29], Bardel and Mahmoudi [41], Owais [2], Selvi and Chandramohan [34], Pandey and Tyagi [42] and Rafiola et al. [40] is aligned.

## Conclusions

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The study aimed to analyze the effectiveness of blended learning with electronic concept maps for sixth-grade male students' social studies learning. The results of the covariance analysis indicated a significant difference between the experimental and control groups' average scores after adjusting for pre-test scores. In other words, blended learning, especially with a focus on conceptual maps, has a meaningful impact on student learning, as confirmed by the results of the analysis.

Among the limitations of the current research, we can mention experimental interventions by the researcher, which can influence the bias of the results. Not having a follow-up phase was another limitation of the above study. Therefore, it is suggested that other researchers, by removing the mentioned methodological limitations and also applying other variables affecting learning, should try to conduct new research with different societies and sample sizes, in other subjects and levels of study, and with different genders. This increases the accuracy of the results and increases the generalizability of the results. Based on the results obtained from the present study, it is possible to hold workshops and training courses in order to enable colleagues to use electronic concept maps and use them in teaching. In addition to the above, electronic concept maps can be used in the teaching-learning process in the curriculum of the second elementary school. An effective method is to use a combination of work and technology courses, social studies, and art. In addition to strengthening learning, this can also be effective in developing students' aesthetic sense. Finally, using technological literacy in the design of concept maps and encouraging students to use it during class presentations can be considered as other practical suggestions that strengthen the motivation of students to progress.

## Authors' Contribution

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In the present study, Mr. Zabet contributed his expertise in report writing, data collection, and statistical analysis. Mrs. Asadzade also played a vital role in the study with her proficiency in writing and data collection, report writing, and teaching. Additionally, Dr. Rostaminezhad's skills in statistical analysis and report review were crucial in conducting the reforms. Their cooperative efforts ensured the success of the study.



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## Conflict of Interest

The authors have no conflicts of interest

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