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TEACHING IS INFLUENCED BY THE PECULIARITY OF USING VIDEO MATERIALS ON THE SUBJECT OF PHYSICS

Abstract. This study aimed to investigate the effectiveness of teaching methods utilizing video materials in enhancing student learning outcomes, particularly in the context of physics education. Recognizing the challenges students face in comprehending new topics and the discipline of physics, we endeavored to identify obstacles hindering effective learning. Drawing upon existing research and methodologies, we conducted tests designed to assess the suitability and efficacy of video-based instruction in facilitating student understanding.

Additionally, we administered a questionnaire to gauge student perceptions of the teaching methods employed. The questionnaire comprised 20 distinct inquiries aimed at elucidating the perceived effectiveness of the instructional approach. Forty-two students from the "Boarding Lyceum №3 'Bilim-innovation'" in the Ulytau region participated in the study. Through analysis of the collected data, we observed notable shifts in student attitudes towards the subject, enhanced comprehension of physics concepts, and increased engagement in classroom activities.

This research contributes to the ongoing discourse on innovative teaching methodologies and their impact on student learning outcomes, particularly in the realm of physics education. The findings offer valuable insights for educators seeking to optimize instructional strategies and foster a conducive learning environment for students.

Keywords: physics education, teaching methods, video materials, student learning outcomes, instructional strategies, educational effectiveness, student perceptions, classroom engagement, questionnaire survey, innovative pedagogy.

Introduction

It is impossible to overestimate the importance of the natural sciences— especiallyphysics—in the curriculum when it comes to educating future experts to meet the demands of a self-sufficient society (Masood, 2007). Since engineering and agriculture are required in more than 80% of the nation's jobs, prospective professionals must possess a strong grasp of physics. But the number of hours dedicated to physics instruction has decreased over time, which has limited opportunities for lab work and problem-solving (Etkina, 2010).This decrease incites a critical investigation into strategies to increase student engagement and improve the standard of physics instruction.

The relationship between the teacher and the student is crucial in modern educational models. The student must actively participate, aiming for understanding and mastery, even as the teacher acts as a mentor, encouraging independent inquiry and supporting beneficial contact with the subject matter (Jolly et al., n.d). Furthermore, education needs to provide students with knowledge that satisfies international standards in order to keep up with socioeconomic changes. It is the duty of educators to use creative pedagogies to develop students who are civic- minded and intellectually mature.

When it comes to learning new concepts in the field of physics education, students frequently face difficulties. Effective learning is hampered by things like dwindling student interest, short instructional times, and inadequate technical resources (Khan et al., 2020). Furthermore, as challenges faced during the learning process can have a major impact on a student's motivation to continue their education, the psychological aspect of learning deserves study. Therefore, in order to support kids'

holistic growth and resilience, educators must modify their teaching strategies. Building pupils' information literacy is essential in this era of rapidly developing information technologies. It is essential to smoothly incorporate contemporary technology into the educational environment in order to promote autonomous, active learning. The usage of educational videos in schools is one example of this increasingly common technology integration (Bao & Koenig). The educational benefits of these videos include increased student involvement, cognitive stimulation, and the development of a creative learning environment. Poquet et al.'s (2018) study highlights the effectiveness of audiovisual aids in improving learning retention, offering a convincing justification for their extensive implementation in educational environments (Poquet., 2018).

The objectives of this study are as follows:

1. To investigate the effectiveness of integrating video materials into classroom instruction compared to traditional teaching methods.
2. To assess the impact of video materials on student learning outcomes.
3. To explore the perceptions and experiences of students and teachers regarding the use of video materials in teaching.

The research questions guiding this study are as follows:

1. How does the integration of video materials into classroom instruction affect student learning outcomes compared to traditional teaching methods?
2. What are the perceptions and experiences of students and teachers regarding the use of video materials in teaching?
3. Are there any differences in student engagement and comprehension between classes using video materials and those following traditional teaching methods?

It is hypothesized that students exposed to video materials during classroom instruction will demonstrate higher levels of engagement, comprehension, and retention of material compared to students taught using traditional methods. Additionally, teachers utilizing video materials will perceive them as effective tools for enhancing student learning outcomes.

Using audio-visual materials in the classroom is nothing new. Since films were first explored as a training aid for soldiers during World War II, educators have recognized the power of audiovisual materials to capture students' attention, increase motivation, and enrich the learning experience (Hovland, Lumsdaine, & Sheffield, 1949)(Wang, 2020). Since then, there have been significant advancements in both content and technology, increasing the usefulness and accessibility of audio/video resources in the classroom. In order to comply with educational requirements, educational television (ETV) in the 1950s and 1960s allowed taped lectures to be aired. ETV was intended to supplement classroom instruction rather than to replace it (Corporation for Public Broadcasting, 2004). Videos made specifically to be used as extra resources in the classroom. Delivery techniques have advanced along with movies, cable television, video recorders, DVDs, and laser disks. Finally, this industry is growing toward new and progressively wide alternatives for delivery adaptability due to the expansion of digital technology.

Research conducted by the Corporation for Public Broadcasting indicates that over the past 20–30 years, the use of educational television and video in classrooms has expanded consistently. These studies examined teacher attitudes and expectations in addition to usage patterns. A recent study found that this technology is both widely utilized and highly valued as a means of enhancing creativity and learning efficiency (CPB, 1997)(Brame, 2016).

Perhaps the most important survey finding demonstrating the effectiveness of these multimedia tools is the correlation that exists between the frequency of use and students' motivation and projected outcomes. Teachers who report viewing television or videos for two hours or more a week are considered regular users, and two thirds of them feel that their students learn more from them, and nearly seventy percent of them think that watching videos or television increases students' motivation. According to over 50% of frequent users, watching videos has helped kids pick up new vocabulary.

Educational television and video, according to a summary of recent research and teacher surveys, improves reading and lesson content, helps students build a common knowledge base, enhances comprehension and discussion, allows for greater placement of various learning styles, boosts student

motivation and enthusiasm, and increases teacher effectiveness (PBC, 2004)(Xu & Durgunoglu, 2019).The rationale and supporting data for using video in the classroom will be examined in this article, along with any practical ramifications for teaching methods. Unless otherwise noted, the term "video" refers to the vast array of audio/visual materials utilized in educational institutions, whether they are distributed via VHS, DVD, or other digital forms.

The notion that watching TV and videos is a passive pastime is called into question by recent study. According to research, watching is an active process that fosters learning and requires cognitive connection. According to Marshall (2002) and (Moriguchi & Hiraki, 2014), watching is a sophisticated cognitive activity that grows with a child and aids in learning. According to Mayer (2001), well-crafted multimedia messages can encourage active cognitive processing even among pupils who seem inactive, which lends more credence to this theory. When it comes to getting students interested in active learning, content and viewing context are essential. Age- and skill-appropriate content is essential since it can have a greater impact on academic achievement than the amount of time spent watching (Stanovich & Cunningham, as referenced in CPB, 2004). Furthermore, it has been demonstrated that videos that appeal to a variety of intelligences, employ a variety of material delivery methods, and arouse strong emotions boost students' participation in active learning.

According to Pruitt (2005) and Miller (2001), there are three widely recognized categories of learning styles: ability-based, which is based on Gardner's theory of multiple intelligences; personality-based, which is assessed using the Meyers-Briggs test; and sensory, which examines the ways in which students receive information. The necessity to broaden learning beyond individualized methods of learning is expressed by all of these theories of learning styles.

Information can be obtained primarily through three senses: touch, hearing, and vision. By connecting these three methods to the ways in which students absorb information, Silverman (2006) distinguishes between three primary learning styles: tactile-kinesthetic, auditory-sequential, and visual- spatial. Visual-spatial learners think in holistic, frequently three-dimensional representations and process new information by visualizing the subject as a whole. Conversely, students who listen regularly think in terms, process information auditorily, and typically follow a methodical, step-by-step learning process. Lastly, tactile kinesthetics pupils learn best through hands-on experiences and tactile perception; they derive greater value from hands-on instruction than from spoken explanations.

For visually oriented students, the benefits of video are instantly apparent since the majority of the content is presented visually (CPB, 1997; Denning, undated)(Anuradha & Tai, 2010). However, video also helps listeners who can hear speech and sound. It can also give tactile students access to demonstrations that are not available in conventional classroom settings.

In actuality, video-enabled learning is beneficial to all students, regardless of whether they have significantly dominant preferences or not. Marshall (2002) and Dwyer (2010) expands on Dale's "Cone of Experience" by citing the findings of Wieman and Mierhenry (1969): "People, on average, will remember: 10% of what they read 20% of what they hear 30% of what they see 50% of what they hear and see."

Multimedia in the form of video conveys information simultaneously through two sense channels: visual and audio. He frequently employs a variety of presenting techniques, including graphic and spoken representation for screen printing and subtitles (Mayer, 2001). Due to its multiplicity, students can access the material from "multiple entry points" (Gardner, 2006) and receive the same information from the movie through simultaneous teaching methods:

Students benefit from the richness of these information forms—images, motion, sound, and occasionally text—because they can "... learn by both oral and visual means, view real objects and realistic scenes, see sequences in motion, and to view perspectives that are difficult or impossible to observe in real life" (Wetzel, 1994).It is generally acknowledged by scholars that "... when viewed together, each source provides additional additional information," which raises the likelihood that an understanding will occur (Kozma, 1991). (CPB, 2004, page 5)

Video can be used "to raise awareness of the relationship between modes (image, motion, sound, captions)" (Aiex, 1999, p. 2), quoting Wood (1995)(Kucan et al., 2009). According to Kozma (1991) and Salomon (2012), learning results are higher in television and video when spoken language, text,

still images, and moving images are combined than in media that primarily uses one of these character systems. Wetzel et al.'s 1994 study, reviewed in CPB, 2004, demonstrated that adding motion to still images does not increase learning as much as mixing sound with still or moving images.

Methods and materials

A suitable sample of ninth-grade students from two classrooms, "9A" and "9B," was used to choose participants for the study. The goal of the study was to compare traditional teaching methods with video materials to see which was more effective. While "9B" class was taught without video materials, "9A" class was taught with them. The average number of pupils in each class was appropriate for a ninth-grade classroom.

A quasi-experimental methodology was used in this study to examine the effects of using video content in lesson plans with more conventional teaching techniques. Two groups participated in the study: Class 9B, which served as the control group, and Class 9A, which was exposed to the therapy (video materials). The control group got traditional instruction without the use of instructional films, whereas the treatment group concentrated on integrating instructional videos into the lesson plans.

Both groups completed a pre-test before to the intervention to determine their baseline comprehension of the subject matter. After that, the treatment and control groups received instruction according to the designated teaching methodologies in a different way. While Class 9B got traditional instruction devoid of these tools, Class 9A participated in classes enhanced by video resources.

Over the course of multiple lessons, the experiment provided ample opportunity to experience the various teaching modalities. Both groups took a follow-up test after the classes ended to gauge their understanding and memory of the content that had been presented. The performance of the two groups was then compared using the test results, which shed light on how successful it is to use video resources in the classroom.

A number of criteria were established to assess the classes' efficacy:

- The degree of student participation in the class.
- How well pupils are assimilating new information.
- The degree to which instructors and students expressed satisfaction with the lessons.

Especially in the context of e-learning, instructional videos have become a modern and efficient means of delivering content. These resources include a carefully chosen collection of movies designed to enhance lectures and hands- on learning, allowing for a variety of interactive learning experiences.

Benefits of Using Video

1. The pedagogical process can benefit from educational movies in a number of ways, including:

2. Visualization: Videos enable the visualization of intricate phenomena and processes, bringing educational content to life.

3. Dynamism: Videos' dynamic quality draws viewers in and broadens the scope of the educational process.

4. Immersion in Space and Time: Videos take students to new places and eras, deepening their comprehension.

5. Enhanced Engagement: The utilization of video resources encourages student activation by making learning more stimulating and engaging.

Effective Integration of Video Materials

It is imperative to uphold methodological rigor when including video tutorials into instructional materials. Instructors should carefully select which movies to show their students, explaining the intended learning objectives and promoting critical thinking.

There are various methods for categorizing instructional films. A crucial differentiation exists between instructional videos and video lectures. Videos lectures usually have a speaker as the main subject, whereas instructional movies prioritize showing examples of procedures or events.

To summarize, the study's design employed a systematic methodology to assess the efficacy of

incorporating video resources into instructional strategies. Using a quasi-experimental methodology and taking into account multiple efficacy factors, the study sought to offer important insights into how video resources can improve student learning results.

A key component of high school physics classes are experiments, which provide a variety of methods that physics professors employ. Experiments that demonstrate the technical applications of physical laws, explain research methodology, and refute preconceived notions about new physical occurrences. Without visual help, however, some phenomena—particularly microcosmic events—can be difficult for pupils to comprehend.

Although financial limitations prevent many schools from purchasing demonstration equipment, incorporating video demonstrations into lectures offers an effective workaround. Videos include advantages including enlarging small details, adjusting time to speed up procedures, and showing off natural occurrences that are difficult to see in person. Additionally, live experiments are supplemented with video demonstrations to help students better understand complex phenomena.

However, careful assessment of how well video demonstrations connect with learning objectives and contextual relevance is necessary for their effective incorporation. A deeper knowledge can be attained by repeating trials with varied demonstrations; however, for complicated phenomena, repetition may be required. Video resources make it simple to repeat frames, which helps students create stable visual representations and improves their understanding and memory of what they have seen.

Results and Discussion

The effects of employing video materials on students' learning outcomes were assessed by analysis of the data gathered from the pre-test and follow-up test. To find out if there were any notable variations in the comprehension of the subject matter between the class 9A (treatment group) and class 9B (control group), a comparative analysis was carried out. The instructor also looked at the test results to have a better understanding of how well the strategies they had used for instruction worked.

This study aims to evaluate the efficacy of incorporating video resources

into classroom instruction by comparing the performance of two classes taught using various techniques. The study's conclusions add to the current conversation on cutting-edge teaching strategies and how they affect students' learning outcomes.

Table 1

Pre-test result

Points out of 15	Average	Class	Points out of 15	Average	Class
8	6,85	9A	5	7,2	9B
6			6		
5			5		
4			6		
8			7		
5			8		
9			6		
5			9		
6			6		

7	7
9	7
8	7
8	7
6	9
7	8
8	8
7	8
7	8
6	8
8	8
7	8

This table presents the pre-test results for two classes, 9A and 9B, based on points scored out of 15.

Class 9A:

The pre-test scores for Class 9A range from 4 to 9, with the majority falling between 5 and 8. The average score for Class 9A is calculated to be 6.85, suggesting a moderately consistent performance across the class.

Class 9B:

In contrast, Class 9B exhibits a slightly higher average pre-test score of 7.2, with scores ranging from 5 to 9. There is a noticeable concentration of scores around 6 to 8 points, indicating a relatively uniform performance level within the class.

Table 2
Post-test result

Points out of 15	Average	Class	Points out of 15	Average	Class
10	11,7	9A	7	9,2	9B
10			6		
10			8		
10			9		
11			9		
11			8		
11			9		

11	12
12	9
12	9
12	9
12	9
12	10
12	10
12	11
12	10
13	10
13	10
13	8
14	10
12	10

Note. This table illustrates the post-test results for two classes, 9A and 9B, based on points scored out of 15.

Class 9A:

The post-test scores for Class 9A demonstrate a notable improvement from the pre-test, with scores ranging from 10 to 14. The majority of students achieved scores between 11 and 13. The average post-test score for Class 9A is calculated to be 11.7, indicating a substantial overall enhancement in performance following the instructional period.

Class 9B:

Similarly, Class 9B also shows improvement from the pre-test, with post- test scores ranging from 6 to 12. The average post-test score for Class 9B is slightly lower than Class 9A, at 9.1. Nonetheless, the majority of students attained scores between 8 and 11, showcasing significant progress compared to the initial assessment.

This table displays the results of an independent samples t-test conducted to assess the significance of differences between two groups, labeled "Pre Test" and "Post Test.

Table 3

Independent Samples T-Test

		Statistic	df	p		Effect Size
Pre Test	Student's t	0.842	40.0	0.405	Cohen's d	0.260

Post Test	Student's t	-6.557	40.0	< .001	Cohen's d	-2.023

These results suggest a significant improvement in performance from the pre-test to the post-test, as evidenced by the negative t-value and the very low p- value (< .001) for the post-test.

The table 4 presents the results of the normality test (Shapiro-Wilk) conducted to assess the assumption of normality for both the pre-test and post- test data.

Table 4

Assumptions

Normality Test (Shapiro-Wilk)		
	W	p
Pre Test	0.957	0.113
Post Test	0.974	0.459

The normality test results indicate that both the pre-test and post-test data distributions do not significantly deviate from normality ($p > 0.05$), thereby meeting the assumption of normality for conducting the independent samples t- test.

The table 5 provides descriptive statistics for the two groups ("1" and "2") at both the pre-test and post-test stages.

Table 5

Group Descriptives

	Group	N	Mean	Median	SD	SE
Pre Test	1	21	7.19	7.00	1.17	0.255
	2	21	6.86	7.00	1.39	0.303
Post Test	1	21	9.19	9.00	1.33	0.290
	2	21	11.67	12.00	1.11	0.242

Note. The t-test for one sample allows you to check the probability that the sample average incidence is equal to a given disease.

The results show that both groups experienced an increase in mean scores from the pre-test to the post-test. Group 1's mean score increased from 7.19 to 9.19, while Group 2's mean score increased from 6.86 to 11.67. These findings suggest a significant improvement in performance for both groups following the intervention.

The main result from the provided tables is a significant improvement in performance from the pre-test to the post-test for both groups.

Independent Samples T-Test (Table 3):

- The independent samples t-test results show that there was a significant difference between the pre-test and post-test scores.
- The effect size, as measured by Cohen's d, indicates a substantial improvement from the pre-test to the post-test, with a large effect size observed (Cohen's d = -2.023).
- The negative t-value and the p-value being less than .001 suggest a highly significant improvement in performance between the two tests.

Assumptions (Table 4):

- The results of the normality test (Shapiro-Wilk) suggest that both the pre-test and post-test data distributions adhere to the assumption of normality. This indicates that the data is normally distributed, which is necessary for conducting the independent samples t-test.

Group Descriptives (Table5):

- The descriptive statistics for both groups reveal a notable increase in mean scores from the pre-test to the post-test.
- Group 1's mean score increased from 7.19 to 9.19, while Group 2's mean score increased from 6.86 to 11.67. These findings suggest a substantial improvement in performance for both groups following the intervention.

Overall, these results indicate that the intervention had a significant positive impact on the performance of both groups, with the post-test scores showing a considerable increase compared to the pre-test scores. This suggests that the instructional program or intervention implemented between the pre-test and post-test was effective in enhancing the participants' performance.

We polled the pupils in a brief survey. According to the questionnaire's results, pupils respond well to and are interested in video lessons. The video resources are an ideal addition to the lessons. Students require prerequisites for video lessons; the questionnaire's results highlight how challenging it is for students to get ready at home for video lessons in the absence of prerequisites.

We advise teachers to offer video lessons for no more than 15 minutes on average, as most pupils become disinterested after 20 minutes. Video tutorials that are brief but instructive are a good fit in many aspects. Sometimes a student may not grasp a video lesson, but they typically pick up on video lessons well when the teacher explains the material after watching. Interactive whiteboards are increasingly common in many of the nation's schools. This is very beneficial to the teacher when using video courses. Teachers actively use the many interactive whiteboards available in the twenty-first century.

Conclusion

The findings from both the pre-test, post-test analysis, and questionnaire survey provide valuable insights into the effectiveness and perceptions of integrating video materials into classroom instruction. In this section, we discuss and draw conclusions based on these findings, incorporating relevant literature to support our analysis.

The pre-test and post-test results indicate a significant positive impact on the performance of students following the intervention. This suggests that the instructional program or intervention, which likely included the integration of video materials, was effective in enhancing student performance. This finding aligns with existing research emphasizing the cognitive benefits of multimedia learning (Mayer, 2001). According to Mayer, well-designed multimedia learning messages can promote active cognitive processing in students, leading to improved learning outcomes. Additionally, the use of video materials caters to different learning styles, providing multiple entry points into the content (Gardner, 2006).

Moreover, the questionnaire survey further supports the positive effects of video materials on student learning experiences. Students expressed interest in video lessons and highlighted the benefits of short, informative tutorials. This finding resonates with the idea that multimedia messages, including video, can attract students' attention and activate emotional states, enhancing their engagement and learning (Marshall, 2002).

The questionnaire survey also shed light on the perceptions and experiences of both students and teachers regarding the use of video materials in teaching. Students emphasized the importance of conducive conditions for video lessons and suggested optimal durations for video content to maintain their interest. Furthermore, the availability of interactive whiteboards was highlighted as a facilitator for implementing video lessons effectively. These findings underscore the significance of considering technological infrastructure and instructional design in leveraging video materials for teaching

purposes.

Regarding differences in student engagement and comprehension between classes using video materials and those following traditional teaching methods, the results suggest that video integration positively influences student engagement and comprehension. Visual multimedia messages, such as videos, stimulate different areas of the brain and evoke emotional responses, which can enhance memory and cognitive learning (Bergsma, 2002). Additionally, the combination of visual and auditory stimuli in video content provides students with diverse learning experiences, potentially leading to higher learning outcomes compared to traditional methods (Kozma, 1991).

In conclusion, the findings from both the pre-test, post-test analysis, and questionnaire survey support the effectiveness of integrating video materials into classroom instruction. Video materials not only improve learning outcomes but also enhance student engagement and comprehension. These findings underscore the importance of leveraging multimedia learning strategies to cater to diverse learning styles and promote active cognitive processing. Moving forward, educators should continue to explore innovative ways of integrating technology, such as video materials, into teaching practices to optimize student learning experiences.

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ФИЗИКА ПӘНІН ОҚЫТУ ПРОЦЕСІНЕ БЕЙНЕМАТЕРИАЛДАРДЫ ҚОЛДАНУДЫҢ ӘСЕРІ

Аңдатпа. Бұл зерттеу оқушылардың оқу нәтижелерін жақсартуда, әсіресе физика білімі контекстінде бейне материалдарды пайдалана отырып, оқыту әдістерінің тиімділігін зерттеуге бағытталған. Студенттердің жаңа тақырыптар мен физика пәнін түсінудегі қиындықтарын мойындай отырып, біз тиімді оқуға кедергі келтіретін кедергілерді анықтауға тырыстық. Қолданыстағы зерттеулер мен әдістемелерге сүйене отырып, біз оқушылардың түсінуін жеңілдету үшін бейнеге негізделген оқытудың жарамдылығы мен тиімділігін бағалауға арналған сынақтар жүргіздік.

Сонымен қатар, біз студенттердің қолданылатын оқыту әдістері туралы түсініктерін бағалау үшін сауалнама жүргіздік. Сауалнама нұсқаулық тәсілінің болжамды тиімділігін анықтауға бағытталған 20 нақты сұраудан тұрды. Зерттеуге Ұлытау облысындағы "№3" Білім-инновация "Мектеп-Интернатының" қырық екі оқушысы қатысты. Жиналған деректерді

талдау арқылы біз оқушылардың пәнге деген көзқарасының айтарлықтай өзгеруін, физика ұғымдарын түсінудің жақсарғанын және сыныптағы іс-шараларға қатысудың артқанын байқадық.

Бұл зерттеу оқытудың инновациялық әдістемелері және олардың оқушылардың оқу нәтижелеріне, әсіресе физикалық білім беру саласына әсері туралы үздіксіз дискурстың дамуына ықпал етеді. Нәтижелер оқыту стратегияларын оңтайландыруға және оқушылар үшін қолайлы оқу ортасын құруға ұмтылатын оқытушылар үшін құнды ақпарат береді.

Түйін сөздер: физика білімі, оқыту әдістері, бейнематериалдар, оқушылардың оқу нәтижелері, оқыту стратегиялары, білім беру тиімділігі, оқушылардың қабылдауы, сабаққа қатысуы, сауалнамалық сауалнама, инновациялық педагогика.

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ВЛИЯНИЕ ИСПОЛЬЗОВАНИЯ ВИДЕОМАТЕРИАЛОВ НА ПРОЦЕСС ПРЕПОДАВАНИЯ ФИЗИКИ

Абстракт. Целью данного исследования было изучение эффективности методов обучения с использованием видеоматериалов для улучшения результатов обучения учащихся, особенно в контексте обучения физике. Осознавая трудности, с которыми сталкиваются учащиеся при изучении новых тем и дисциплины физики, мы попытались выявить препятствия, препятствующие эффективному обучению. Опираясь на существующие исследования и методологии, мы провели тесты, призванные оценить пригодность и эффективность видео-обучения для облегчения понимания учащимися.

Кроме того, мы провели анкетирование, чтобы оценить восприятие учащимися используемых методов обучения. Анкета состояла из 20 отдельных вопросов, направленных на выяснение предполагаемой эффективности подхода к обучению. В исследовании приняли участие сорок два ученика из "Лицея-интерната №3 "Білім-инновация" в Улытауской области. Проанализировав собранные данные, мы заметили заметные изменения в отношении учащихся к предмету, улучшили понимание физических концепций и повысили вовлеченность в занятия в классе.

Это исследование вносит свой вклад в обсуждение инновационных методик преподавания и их влияния на результаты обучения учащихся, особенно в области физического образования. Полученные результаты дают ценную информацию преподавателям, стремящимся оптимизировать стратегии обучения и создать благоприятную среду для обучения учащихся.

Ключевые слова: образование по физике, методы обучения, видеоматериалы, результаты обучения учащихся, стратегии обучения, эффективность обучения, восприятие учащихся, вовлеченность в класс, анкетный опрос, инновационная педагогика.

Appendices

Appendix A

Pre-Test

Photoelectric effect

1. A particle of light is called a..

a) Photoelectron

b) Photon

c) Proton

d) Electron

2. What color of light has the greatest energy per photon?

a) Red

b) Green

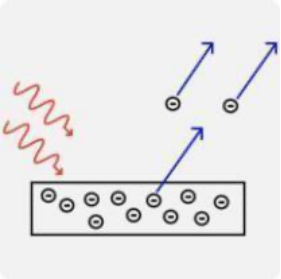
c) Blue

d) Violet

3. A particle of light is called a photon.

a) True

b) False



Points out of 15	Average	Class	Points out of 15	Average	Class
6			9		
7			8		
8			8		
7			8		

4. This image is an illustration of

a) photoelectric effect

b) Dalton's atomic theory

c) Bohr model

d) Quantum mechanical model

5. The photoelectric effect only occurs if the light shining on the metal is:

a) coherent.

b) above a minimum intensity.

c) above a minimum frequency.

d) above a minimum wavelength.

6. What is the best description of 'threshold frequency'?

a) The minimum energy needed for electrons to escape a surface.

b) The maximum kinetic energy that an emitted electron has.

c) The minimum frequency of a photon that will cause an electron to be emitted.

d) The frequency that an emitted electron will have.

7. What is the energy, in eV, of a photon that has a wavelength of 620 nm?

a) 1eV

b) 2eV

c) 3eV

d) 4eV

8. What is the energy of a photon with a frequency of $5x10^{14}$ Hz? h=$6.6x10^{-34}$J/Hz

a) $2.5x10^{-19}$ J

b) $3.0x10^{-19}$ J

c) $3.3x10^{-19}$ J

d) $4.5x10^{-19}$ J

9. What year was the beginning of the X-ray? a) 1875
b) 1895

c) 1835

d) 2016

10. The physicist name was Wilhelm Roentgen? answer choices
a) True

b) False

11. What disease can an X - Ray cause?

a) Dyslexia

b) Cancer

c) Diabetes

d) Polio

12. Who invented X - Rays?

a) Donald Trump

b) Louis Pasteur

c) Thomas Jefferson

d) Wilhelm Conrad Roentgen

13. X - Rays use_____radiation a)Cosmic
b) Electromagnetic c)Neutron

d) Alpha

14. Were X - rays made by accident?

a) No

b) Yes

15. Who performs an X - ray?

a) Cardiologist

b) Radiologist

c) Ophthalmologist

d) Biologist

Appendix B

1. What (grade/course) are you in?
2. Does the teacher often show video lessons?
3. Do you have a device for video lessons at home?
4. Do you have internet at home?
5. Are you preparing for video lessons?
6. Do you have an interactive whiteboard in your class?
7. Are you comfortable using video lessons?
8. Do you understand the video tutorials?
9. Do you watch replays of video lessons?
10. How long does a video lesson last on average?
11. What language is the video lesson in?
12. How much time do you spend on average repeating video lessons at home?
13. Are you comfortable with video lessons?
14. Is it better to study with a video lesson individually or with a class?
15. Do parents help with the video lesson at home?
16. What are the inconveniences in video lessons?
17. Do you need additional resources besides video tutorials
18. Do videos show lessons in all subjects?
19. Do you find it difficult to watch replays of video lessons at home?
20. Does the teacher explain the video lesson?

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