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Elementary teachers' perspective on Nearpod in flipped classrooms

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Background: The increased use of technology in education has prompted the investigation of innovative media that can support modern-era learning.

Aim: This study aims to investigate elementary school teachers' perceptions, based on their years of experience, regarding the use of Nearpod as an innovative medium in flipped classrooms.

Setting: The research cohort comprised all elementary school teachers in West Sumatra, with 153 participants serving as the sample.

Methods: The study utilised a quantitative methodology and questionnaires as the data collection technique.

Results: Using Nearpod in elementary school flipped classrooms had positive outcomes. However, teachers' years of experience did not significantly correlate with their perspectives on instructional media or Nearpod in a flipped classroom. A notable 69.3% of teachers disagreed with the use of diverse learning, indicating potential limitations in their learning resources and familiarity with new technology. Additionally, 37.3% of teachers expressed low agreement with the idea that flipped classroom-based Nearpod would help them deliver lesson materials, suggesting that this teaching model may not align with their preferred teaching style.

Conclusion: The research results indicate that the duration of teaching (which may be correlated with age) does not significantly show differences in technology perception in teaching.

Contribution: This study reveals a challenge in integrating innovative technology into traditional teaching. Despite positive outcomes with Nearpod in flipped classrooms, there is a displayed hesitancy among educators towards embracing diverse learning methods.

Keywords: elementary school teaching; flipped classroom; innovative medium; Nearpod; teacher's perspective.

Introduction

The globalisation of education has made it imperative to incorporate digital technologies (Dabbagh et al. 2015; Skare & Soriano 2021) in the learning experience. In modern societies, students are engaging with advanced information and communication technologies (Stošić 2015; Ratheeswari 2018). The evolution of technology and the Internet have significantly influenced the way students learn and grow. Educators now have access to a variety of materials that can enhance the learning experience. The education system has witnessed a rapid surge in the integration of intelligent digital technologies, opening up exciting avenues to enhance teaching methods, and facilitate better learning experiences (Hwang, Choi & Park 2022; Pasqualotto & Filosofi 2023; Li 2021; Wang et al. 2020).

The widespread adoption and incorporation of digital technology in education have led to numerous beneficial transformations. This development has enhanced the digital proficiency of students and teachers alike. However, effectively incorporating digital technology into the learning experience requires a shift in the mindset of both learners and educators. They must be willing to utilise collaborative digital tools and adapt to new ways of working together. As a result, incorporating digital technology into education has become a central concern for all subject instructors today. McKnight et al. (2016) assert that the extensive use of technology can enhance instructors' creativity in implementing instruction.

Environments filled with advanced technology provide educators with the opportunity to utilise digital tools and technologies, fostering creativity in students as well as the teachers themselves.

Standardised innovations, such as using media or digital support devices, improve students' subject comprehension. Teachers can use *PowerPoint* and *Prezi* to create *Android*-based media, digital multimedia, and presentation materials (Komalasari 2019). Through digital games, educators can innovate learning. This is crucial because some research has demonstrated that incorporating digital games into classrooms can boost students' creativity, increase their involvement in learning, improve critical thinking, enhance language development, and refine problem-solving abilities among students (Behnamnia et al. 2020; Melander Bowden 2019; Sykes 2018). Educators can maximise the potential of technology if they employ it intelligently and effectively. Digitally packaged instructional resources facilitate student learning, increase student engagement, and influence student motivation. Innovative instructional media also enhance teachers' and students' creativity in the classroom (Maass et al. 2019), prevent student boredom (Henderson, Selwyn & Aston 2017), promote student independence (Fernandez-Antolin, del Río & Gonzalez-Lezcano 2021), encourage students to use their devices for more beneficial purposes (Odeh & Keshta 2022), and improve technological skills (Weng et al. 2018).

Moreover, incorporating digital technology into education enables personalised learning opportunities (Tsybulsky 2020). With numerous digital tools and resources, teachers can customise instruction to meet individual student's needs, preferences, and learning styles. This customisation promotes a student-centred approach where students can actively engage with the content, investigate diverse viewpoints, and collaborate with classmates. In addition to enhancing traditional classroom activities, innovative digital media facilitate immersive and interactive learning experiences (Kustyarini, Utami & Koesmijati 2020). Virtual reality, augmented reality, and simulations can transport students to various environments, historical eras, or scientific phenomena, making learning more engaging, memorable, and consequential. By embracing these technological advances, educators can equip students with essential 21st-century skills such as critical thinking, problem-solving, digital literacy, and collaboration, thereby preparing them for success in a digital world that is swiftly evolving (Duin, Pedersen & Tham 2021).

Nearpod, a valuable online learning resource, is one of the innovative media that can facilitate learning with modern technology. It is categorised as valuable because it has a versatile e-learning technology accessible across multiple platforms, allowing students to engage with both their peers and the instructor in real-time, irrespective of class size or subject area. This application also accommodates a variety of pupil learning characteristics (Buttrey 2021). It provides students with various engaging features, motivating them to learn (Feri & Zulherman 2021). Because of its inventiveness and pedagogical value, learning with this application is more interactive (Musa & Al Momani 2022). The application can be used as an assessment instrument in learning, providing timely and effective feedback (Nurhamidah 2021; Shehata et al. 2020). Moreover, it captures students' interest in learning (Abdullah, Inayati & Karyawati 2022; Měkota & Marada 2020; Muhtarisatul, Islamiya & Fardisah 2021; Oktafiani & Mujazi 2022; Pupah & Sholihah 2022; Ridwan & Mahliatussikah 2021). This application enables control over students' comprehension by posing queries at predetermined intervals (Mirzaev 2022; Zhao 2021). Consequently, it increases student interest in learning (Abdullah et al. 2022; Mustafa Civelek & Karatepe 2021; Xian 2021). Therefore, Nearpod is an alternative interactive, collaborative, efficient, and effective learning platform. Nearpod simplifies the educational transition by providing a versatile platform that caters to diverse learning needs while equipping teachers with crucial insights into student engagement. This innovative tool facilitates differentiated instruction, ensuring that every student receives tailored learning experiences, while also offering teachers valuable feedback on student interactions with the content.

One of Nearpod's notable features is its 'student-paced' lessons, enabling each student to progress through the material at their individual speed, both inside and outside the classroom (Civelek & Karatepe 2021). This flexibility empowers students to revisit lessons at their convenience, promoting effective review and resource retrieval (Grierson, Gallagher & St Hilaire 2024). Such adaptability is invaluable in blended and flipped learning settings, where students can engage with educational materials on their terms (Eryılmaz & Ahmed 2017). Furthermore, Nearpod allows educators to create a variety of pre-made lessons, giving students the autonomy to choose topics that resonate with their interests (Mirzaev 2022). This approach promotes differentiation and empowers students to take control of their learning journey. By integrating formative assessments like polls, quizzes, open-ended questions, and drawn responses directly into the lessons, teachers can accurately gauge students' comprehension (Veng 2023). Teachers can leverage this platform to foster an inclusive and engaging learning environment where every student can thrive and reach their full potential.

In the swiftly changing educational landscape of the 21st century, it is essential to harness the power of innovative tools such as Nearpod to create effective and engaging learning environments. Educators can accommodate various student requirements and learning styles by utilising Nearpod's interactive features and online platform (Messina et al. 2022; Sarginson & McPherson 2021). Teachers are empowered to modify their instructional strategies and address individual learning gaps when they can provide timely feedback and assess students' progress in real-time. In addition, Nearpod's collaborative nature encourages active participation and nurtures a sense of ownership over the learning process (Armas-Arias et al. 2023). With its extensive selection of interactive content and presentation capabilities, Nearpod provides students with a dynamic and immersive learning environment that captures their attention and enhances their comprehension. Nearpod is a good instrument for enhancing student engagement, promoting meaningful

interactions, and driving positive educational outcomes as education embraces technology (Alawadhi & Thabet 2023).

The flipped classroom strategy allows for implementing Nearpod as an online learning aid. The flipped classroom is one of the cutting-edge, technology-based education methods utilised today. This strategy has substantial effects on learning. The flipped classroom is constructivist in that it requires students to be actively involved in their learning rather than passively receiving information. Hence, it brings positive impacts such as: (1) increased student interest and motivation to learn (Sharma & Chowdhry 2020); (2) fostering student independence and active engagement in learning (Hoshang, Hilal & Hilal 2021); (3) enhancing students' subject matter understanding, thereby improving critical thinking skills (Kolomiets, Medvedeva & Perevalova 2020); and (4) optimising classroom learning time efficiency (Konoplianyk, Melnykova & Pryshupa 2021). According to Mattei and Ennis (2014), the flipped classroom method with Nearpod assessments can be implemented in classes with 50–60 students or more, as it motivates students to complete pre-class assignments, resulting in an effective classroom learning environment. When the flipped classroom strategy and Nearpod are integrated, they create a strong synergy. The flipped classroom approach enables students to learn at their own pace and participate in interactive class exercises. Meanwhile, Nearpod enhances learning by integrating compelling multimedia content and instant assessment tools. This combination not only enhances student comprehension but also fosters a constructive and cooperative learning environment, equipping students with essential skills for their future endeavours. Therefore, additional research is required to investigate the perceptions of elementary school instructors regarding the use of learning mediums and the application of flipped classroom-based Nearpod. This study aims to assess elementary school teachers' views on using Nearpod in the flipped classroom, considering their teaching experience.

Research methods and design

Research design

This study employed a descriptive quantitative research design and survey methodology. Quantitative methods were employed to gather quantifiable data for statistical analysis of the population sample. Quantitative research is considered an appropriate approach for examining instructors' perceptions of the effectiveness of innovative media designed to promote active learning. The variables assessed in this study include teachers' perceptions of learning media and the flipped classroom using Nearpod.

Participants

This study employed a purposive random sampling technique supported by thorough considerations (Heale & Twycross 2015). The criteria used are elementary school teachers who teach in the West Sumatra area, Indonesia, and are willing to implement the teaching process, specifically the flipped classroom Nearpod-based approach, for a minimum of 2 to 4 meetings. The sampling resulted in a total of 153 elementary school teachers.

Data collection

This research technique was conducted using a survey collection technique. The instrument utilised was a survey sheet. The survey was used to clarify teachers' perceptions of implementing Nearpod as an innovative medium in the flipped classroom within elementary schools. The questionnaire was modified based on David Havens (2014) framework of technology engagement (Hegarty & Thompson 2019). In addition, this research instrument was developed using indicators for sub-variables. The questionnaire consisted of 20 multiple-choice questions. This research instrument used the Likert scale, with answer options ranging from strongly agree to strongly disagree. The Likert scale measured individuals' or groups' opinions, perceptions, and attitudes towards social phenomena (Teddlie & Tashakkori 2009). As a survey for respondents related to the investigated phenomenon, this study employed a closed-ended questionnaire with multiple-choice response options, which respondents could select via the *Google Forms* platform. The questionnaire was distributed via *Google Forms*, and the URL was shared via a *WhatsApp* group from December 2022 to January 2023. Participant responses were grouped based on the number of years of teaching experience to determine the differences between the group with a long teaching experience and their perceptions in teaching.

Data analysis

In order to ascertain respondents' perspectives on using Nearpod in the classroom, the survey data were analysed by categorising respondents' responses and calculating percentages. The data were analysed by describing and characterising the survey findings using descriptive statistics (Sugiyono 2017). In addition, data regarding teacher perceptions were separated into two categories: teacher perceptions of instructional media and teacher perceptions of flipped classrooms-based Nearpod. Both categories of data were statistically analysed using Statistical Package for the Social Sciences (SPSS, IBM, New York, USA) 26.0 to determine the relationship between teaching experience and perceptions.

This study did not conduct reliability and validity testing of the instrument since it was developed from another study, as mentioned in the data collection. Respondent demographics were presented as respondent characteristics and discussed descriptively. In addition, a prerequisite analysis was conducted before analysis of variance (ANOVA), namely normality and homogeneity. The ANOVA was conducted on two datasets separately. The first dataset aimed to assess whether there was a significant difference among groups of teachers, categorised by their length of experience, in their perception of learning media usage in teaching. The second

dataset aimed to determine whether there was a significant difference among groups of teachers, classified by their length of experience, in their perception of Nearpod implementation in the flipped classroom. The significance value used in this decision is 0.05.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Universitas Negeri Padang for Research and Community Service (No. 1494/UN.35.15/LT/2023).

Results

Respondent characteristics

The data presented in Table 1 shows that the majority of the respondents were female, accounting for 77.1% (118) of the total responses, while males represented 22.9% (35) of the respondents. Additionally, the largest proportion of respondents fell into the category of individuals above 40 years old, which is 34.6% (53). The age groups of 31 years – 35 years and 36 years – 40 years each had the same number of distributions, with 20.9% (32) of respondents. Furthermore, for the age group 25 years – 30 years, there were 36 respondents, constituting 23.5% of the total respondents.

Regarding work experience, respondents with 1 years – 5 years of experience comprised the largest group at 29.4% (45), followed by those with more than 15 years of experience at 28.1% (43). Respondents with 6 years – 10 years of experience accounted for 18.3% (28) of the total, while those with 11 years – 15 years represented 24.2% (37). These statistics highlight that the survey received a majority of female respondents, with a notable presence of individuals over 40 years old. Furthermore, there appears to be a relatively diverse distribution among the different work experience categories.

TABLE 1: Descriptive statistics.

Variable	%	Number of responses
Gender distribution		
Male	22.9	35
Female	77.1	118
Age group (years)		
25–30	23.5	36
31–35	20.9	32
36–40	20.9	32
> 40	34.6	53
Length of work experience (years)		
1–5	29.4	45
6–10	18.3	28
11–15	24.2	37
> 15	28.1	43

Teachers' perception of learning media

Table 2 displays instructors' perceptions of the learning media utilised in the classroom to support students' achievement of learning competencies. As many as 115 respondents (75.2%) strongly agree that creative and engaging instructional media is one of the essential factors in facilitating students' subject matter comprehension during teaching and learning activities. This aligns with the findings of Hermansyah et al. (2023) that creative learning media significantly enhances students' academic achievement. Item 6 shows the highest score for the strongly agree category compared to other statements. Meanwhile, item 5 recorded the highest score for strongly disagree (106 respondents or 69.3%), which states that teachers do not need to use diverse learning media. Tamrin, Azkiya and Sari (2017) elucidate this phenomenon, stating that the primary obstacle preventing the utilisation of diverse learning media is not related to external factors such as financial constraints or additional activities for seeking income, but rather stems from

TABLE 2: Teacher's perception of learning media.

Item No.	Statement	Score										SD	Mean	*N*
		5		4		3		2		1				
		n	%	*n*	%	*n*	%	*n*	%	*n*	%			
1	The teacher creates a comprehensive and meaningful teaching and learning process for students.	93	60.8	55	35.9	5	3.3	0	-	0	-	0.56	4.58	153
2	Teachers do not seek solutions when they encounter problems in the learning process.	9	5.9	5	3.3	7	4.6	46	30.1	86	56.2	1.10	1.73	153
3	Teachers design and create the learning process using various innovative media and available technology.	92	60.1	57	37.3	4	2.6	0	-	0	-	0.55	4.58	153
4	Teachers can develop media according to the mechanisms and consider students' characteristics and social environment.	77	50.3	68	44.4	7	4.6	0	-	1	0.7	0.65	1.44	153
5	Teachers do not need to use diverse learning media.	1	0.7	7	4.6	4	2.6	35	22.9	106	69.3	0.81	4.73	153
6	Creative and engaging learning media is one of the essential aspects of teaching and learning activities to facilitate students in understanding the material.	115	75.2	34	22.2	4	2.6	0	-	0	-	0.50	4.65	153
7	The learning media used is tailored to the learning theme and can support the achievement of essential competencies.	106	69.3	43	28.1	2	1.3	1	0.7	1	0.7	0.61	4.56	153
8	The content of learning media can motivate students in their learning.	93	60.8	54	35.3	5	3.3	0	-	1	0.7	0.63	4.40	153

Note: 5 = Strongly Agree; 4 = Agree; 3 = Neutral; 2 = Disagree; 1 = Strongly Disagree.

a lack of proficiency in mastering the media itself. Many of these teachers struggle to employ various media because of factors such as unfamiliarity with incorporating media into their teaching methods and a lack of knowledge on how to effectively utilise them.

According to Table 2, item 6 had the smallest difference in opinion among respondents, with a standard deviation (S.D) of 0.50, showing widespread agreement on the importance of using engaging learning materials to help students understand better. This suggests a strong consensus on the value of such materials. On the other hand, item 2 had the largest difference in opinion, with a s.d. of 1.10, indicating more varied views among respondents about how teachers should solve problems during teaching. This diversity suggests different ideas on the best teaching methods. Item 5 had the lowest average score of 1.44, showing that, on average, respondents disagreed with the idea that teachers do not need to use different learning materials.

This study examines the correlation between instructors' work experience and their perceptions of educational media. For this analysis, it is necessary to conduct prerequisite tests. The results of the normality test are shown in Table 3, and the results of the homogeneity test are shown in Table 4.

The data exhibit a non-normal distribution, according to Table 3. This may lead to non-parametric analysis. However, according to Table 4, none of the analyses reveal a significant difference in variances between the groups at the 0.05 significance level. This indicates that the assumption of variance homogeneity has been met, making the data suitable for an ANOVA analysis. In this scenario, 153 is a sufficient sample size for numerous statistical analyses, including ANOVA.

Based on the ANOVA results from Table 5, there was no statistically significant difference between the groups regarding teacher perception of using learning medium ($F[3, 149] = 0.840$, $p = 0.474$). This suggests that the length of work experience did not significantly impact the teacher's perception of using a learning medium.

TABLE 3: Normality test results of teacher's perception of learning media.

Evaluation technique	Statistic	*df*	Sig.
Kolmogorov-Smirnov†	0.155	153	0.000
Shapiro-Wilk	0.954	153	0.000

sig., significance; *df*, degrees of freedom.
†, Lilliefors significance correction.

TABLE 4: Homogeneity test results of teacher's perception of learning media.

Statistics	Levene statistic	*df*1	*df*2	Sig.
Based on mean	1.149	3	149.000	0.331
Based on median	0.866	3	149.000	0.460
Based on median and with adjusted df	0.866	3	121.211	0.460
Based on trimmed mean	1.249	3	149.000	0.294

sig., significance; *df*, degrees of freedom.

TABLE 5: ANOVA tests results of teacher's perception of learning media.

Factors	Sum of squares	*df*	Mean square	F	Sig.
Between groups	15.679	3	5.226	0.840	0.474
Within groups	927.263	149	6.223	-	-
Total	**942.941**	**152**	-	-	-

sig., significance; *df*, degrees of freedom.

Teacher's perception of flipped classroom-based Nearpod

Table 6 reveals that item 9, which stated that flipped classroom-based Nearpod as a learning media has many features and offers creative, innovative, and educational activity, obtains the highest score ($N = 76$, 49.7%) for the strongly agree category compared to other items. In addition, item 14, which states that using flipped classroom-based Nearpod learning media does not assist teachers in delivering lesson materials, shows the highest score for the strongly disagree category ($N = 57$, 37.3%). This indicates that one-third of the total respondents believe that this model is not yet capable of assisting them in delivering materials and there may be a need for evaluation, or it might simply not be suitable for their teaching style. Koh (2019) supports the notion that some teachers may find certain learning models unsupportive of their teaching practices or less compatible with their instructional approach.

In this study, the researcher also investigates the relationship between teachers' work experience and their opinions of the flipped classroom-based Nearpod. Based on the Kolmogorov-Smirnov and Shapiro-Wilk tests as shown in Table 7, the data for teacher perception on flipped classroom-based Nearpod follow a non-normal distribution. The *p*-values for both tests are less than the alpha level of 0.05, indicating that the data significantly deviates from normality. Therefore, it may be necessary to use non-parametric tests for any further analysis of this data.

According to Table 8, the test results showed no significant difference in the variances of the groups, as indicated by the high *p*-values (above 0.05) for all four tests based on mean, median, median with adjusted degrees of freedom, and trimmed mean. This suggests that the assumption of homogeneity of variances was met, and that it is appropriate to use one-way ANOVA to analyse the data.

Based on Table 9, the *p*-value of 0.081 is greater than the typical significance level of 0.05, meaning there is no significant correlation between length of work experience and teacher perception of flipped classroom-based Nearpod. Therefore, we can conclude that the length of work experience does not significantly impact teacher perception of flipped classroom-based Nearpod.

Discussion

Teachers must utilise diverse learning resources and present them inventively and creatively (Pimdee et al. 2023). They must also utilise digital technology effectively to create more contemporary learning experiences (Gui et al. 2023).

TABLE 6: Teacher's perception of flipped classroom-based Nearpod.

Item No.	Statement	Score										SD	Mean	*N*
		5		4		3		2		1				
		n	%	*n*	%	*n*	%	*n*	%	*n*	%			
9	Flipped classroom-based Nearpod as a learning model has many features and offers creative, innovative, and educational activity content.	76	49.7	64	41.8	12	7.8	0	-	1	0.7	0.69	4.40	153
10	Flipped classroom-based Nearpod can present more concrete materials, allowing students to understand and retain the content quickly.	71	46.4	71	46.4	11	7.2	0	-	0	-	0.62	4.39	153
11	The flipped classroom-based Nearpod learning model provides video and image features that are suitable for learning.	70	45.8	73	47.7	10	6.5	0	-	0	-	0.61	4.39	153
12	The overall design of flipped classroom-based Nearpod learning model is attractive, and the presentation of the materials is systematically organised.	70	45.8	65	42.5	17	11.1	1	0.7	0	-	0.70	4.33	153
13	Flipped classroom-based Nearpod facilitates teachers in creating modules or instructional materials.	65	42.5	72	47.1	16	10.5	0	-	0	-	0.66	4.32	153
14	The use of flipped classroom-based Nearpod learning model does not assist teachers in delivering lesson materials.	17	11.1	19	12.4	13	8.5	47	30.7	57	37.3	1.37	2.29	153
15	Administering quizzes through the educational game 'Time to Climb' on flipped classroom-based Nearpod can capture students' attention and can help enhance students' learning interests.	74	48.4	65	42.5	11	7.2	3	2.0	0	-	0.71	4.37	153
16	The Nearpod platform used in a flipped classroom setting is highly user-friendly and can be accessed for free through mobile phones.	54	35.3	74	48.4	21	13.7	4	2.6	-	-	0.76	4.16	153
17	In the flipped classroom-based Nearpod learning model, students can engage independently or in groups.	54	35.3	78	51.0	20	13.1	1	0.7	-	-	0.68	4.21	153
18	Students show more interest in participating in learning activities when using Nearpod in a flipped classroom.	64	41.8	64	41.8	24	15.7	1	0.7	-	-	0.74	4.25	153
19	Using Nearpod in a flipped classroom setting can encourage students to actively participate in learning.	67	43.8	71	46.4	14	9.2	1	0.7	-	-	0.67	4.25	153
20	Student learning outcomes tend to improve after the implementation of a flipped classroom supported by Nearpod as a learning medium.	63	41.2	62	17.6	27	17.6	1	0.7	-	-	0.75	4.22	153

Note: 5 = Strongly Agree; 4 = Agree; 3 = Neutral; 2 = Disagree; 1 = Strongly Disagree.

TABLE 7: Normality test results of teacher's perception of flipped classroom-based Nearpod.

Evaluation technique	Statistic	*df*	Sig.
Kolmogorov-Smirnov†	0.097	153	0.001
Shapiro-Wilk	0.965	153	0.001

sig., significance; *df*, degrees of freedom.

†, Lilliefors significance correction.

TABLE 8: Homogeneity test results of teacher's perception of flipped classroom-based Nearpod.

Statistics	Levene statistic	*df*1	*df*2	Sig.
Based on mean	0.439	3	149.000	0.726
Based on median	0.393	3	149.000	0.758
Based on median and with adjusted df	0.393	3	143.696	0.758
Based on trimmed mean	0.433	3	149.000	0.730

sig., significance; *df*, degrees of freedom.

On the other hand, a fundamental concern arises when it comes to the utilisation of digital technology in the teaching and learning process: the proficiency of teachers in information and communication technology (ICT). According to the data, 60% of teachers still have limited ICT proficiency (Mutohhari, Sofyan & Nurtanto 2021). The government has made efforts to meet the demand for educational technology. In order to address the ICT proficiency gap, the Ministry of Education and Culture of the Republic of Indonesia has launched the Technology-Enhanced Learning programme, which aims to improve the ICT skills of instructors. The government aims to train 75 000 instructors in ICT and Technology-Enhanced Learning (Abduh, Utami & Sumarno 2022).

TABLE 9: ANOVA test results of teacher's perception of flipped classroom-based Nearpod.

Factors	Sum of squares	*df*	Mean square	F	Sig.
Between groups	261.165	3	87.055	2.283	0.081
Within groups	5682.142	149	38.135	-	-
Total	**5943.307**	**152**	-	-	-

sig., significance; *df*, degrees of freedom.

Another challenge that needed to be overcome arises from the students themselves. Characteristics of students from the Y, Z, and, notably, the Alpha generations are intricately intertwined with technology, necessitating the use of technology (media) in the learning process (Degner, Moser & Lewalter 2022). However, not all instructional materials are suitable for all learning topics. Similarly, not all media can support learning accurately for students with varied learning styles, environments, and personality development levels. The selection of learning media becomes an ongoing task for educators who wish to incorporate media into the instructional process. The veracity of media selection significantly impacts the effectiveness of media usage (Knaus 2023).

The results of this study align with previous research findings that emphasise the use of diverse media to engage students' senses in exploring their encircling environment (Sahronih, Purwanto & Sumantri 2019). By utilising instructional media such as VCDs, overhead projectors (OHPs), aquariums, ponds, school yards, and other resources, instructors can utilise prior knowledge to solve real-world problems in their students' environments. In addition, using various media can improve educators' efficacy as professionals (Straubhaar, LaRose & Davenport 2015).

Teachers significantly impact the efficacy of using learning media to support learning objectives (Uzun & Kilis 2019). Teachers are responsible for designing the learning process, which includes selecting the appropriate instructional media and materials. Effective and diversified use of learning media can combat student apathy (Degner et al. 2022). Media can generate motivation or enthusiasm for learning, improve interaction in the teaching and learning process, and enable students to learn independently, following their individual characteristics and developmental levels (Uzun & Kilis 2019). While the curriculum and educational materials are the same for all students, each has unique characteristics and has been exposed to various environments and situations. Therefore, teachers need the assistance of appropriate learning media and methods to surmount these limitations and attain the desired core competencies (Vargas-Pérez et al. 2023).

Nearpod is a web-based application for creating interactive media that can be used for both online and offline learning. This application offers numerous appealing features, permitting instructional materials to be presented more engagingly and expertly. Nearpod provides real-time interaction between teachers and students through interactive lesson materials, interactive videos, gamification, and other educational activities (Civelek & Karatepe 2021; Musa & Al Momani 2022; Qi, Shen & Xue 2021). Integrated and directed instruction provided by the Nearpod application has resulted in high student satisfaction, as measured by teacher perception data. This is supported by research conducted by Perez (2017), who explains that the application can assist educators in creating engaging, quick, and easily digestible material presentations. During virtual meetings, teachers can construct presentations with images, text, videos, and interactive quizzes. Nearpod provides two options for developing interactive presentations: content and activities (Civelek & Karatepe 2021). Content refers to materials that can be inserted into a presentation, including transparencies, videos, web content, 3D instructional materials, simulations, virtual reality content, content from Microsoft Office's Sway, and more. Meanwhile, activities consist of interactive exercises designed to make learning more active, engaging, and accessible through Nearpod.

The findings of this present study are consistent with previous research that emphasises the significance of developing a meaningful learning process that connects concepts to produce a comprehensive, well-understood understanding that is not readily forgotten (Knaus 2023). To accomplish meaningful learning, teachers must continually seek to comprehend and investigate the concepts possessed by their students (Vargas-Pérez et al. 2023). Teachers then assist with integrating these concepts with new information to be taught. Learning a particular subject is a common problem that students endure. These obstacles result from various factors that, if not addressed, can disrupt the teaching and learning process in the classroom (Ng, Ching & Law 2023). When problems arise in the classroom, teachers should ideally actively pursue solutions.

In the meantime, this study's results indicate no correlation between instructors' years of teaching experience and their perceptions of learning media or flipped classroom-based Nearpod. Several factors may explain the lack of correlation between years of teaching experience and perceptions of learning media or flipped classroom-based Nearpod. One possible explanation is that the effectiveness of learning media and instructional strategies may not inherently depend on a teacher's career duration. Other factors, such as the teachers' individual teaching manner, instructional methods, and personal preferences, may significantly influence their perception of learning media. In addition, additional variables or factors may contribute to the results that were not accounted for in this study.

Indeed, the era of smartphones and simple internet access could contribute to the diminished significant difference between older and younger teachers' perceptions of learning media. The advancements in technology and increased accessibility to online resources have likely impacted older and younger instructors, narrowing the gap between their familiarity and comprehension of various learning media. Teachers of all ages now have greater access to various digital tools and resources, such as educational applications, online platforms, and multimedia content, because of the widespread adoption of smartphones and the Internet. This increased exposure and access to technology may have led to a more unified perception among instructors regarding the potential benefits and applications of various learning media. Additionally, as technology becomes increasingly integrated into educational practices, professional development opportunities and training programmes may have helped equip older teachers with the necessary skills and knowledge to use learning media, bridging the generational gap effectively.

Recommendations

It is essential to investigate the efficacy of Nearpod-based flipped classroom in various educational settings. Firstly, by analysing its impact across multiple grade levels and subject areas, its benefits and limitations can be better understood. Secondly, investigating the implementation strategies of the Nearpod-based flipped classroom would provide insights into best practices and guidelines for successfully integrating instructional practices. This investigation could resolve potential obstacles and maximise the advantages of this innovative approach. In addition, future research should assess the impact of Nearpod-based flipped classroom on student learning outcomes to determine its efficacy in boosting student achievement, motivation, and overall learning. In order to comprehend the approach's ongoing benefits and opportunities for enhancement, it is necessary to consider its long-term effects and sustainability. Finally, investigating the role of teachers' professional development in integrating the Nearpod-based flipped classroom would provide valuable insights for supporting their preparedness and competence in adopting and employing this strategy effectively.

Limitation

Firstly, the study's sample size and scope may limit the results' generalisability. The research may have focussed on a particular group of teachers or an educational context, limiting the generalisability of the findings. Secondly, the study also relied on self-reported data from instructors, which introduces the possibility of response or social desirability bias. The subjective nature of perceptions and attitudes toward learning media may also be influenced by various factors, such as individual beliefs, experiences, and contextual factors, which may not have been entirely accounted for in the research. In addition, the research focussed on the correlation between teaching experience and teacher perception, but other variables or factors that could potentially influence perceptions were not examined in detail. Future research could investigate additional variables or employ mixed-method approaches to comprehend the involved complexities better. The study's design may not have permitted causal inferences regarding the relationship between teaching experience and perception. Additional longitudinal or experimental research could provide vital evidence of the causal effects, enabling a more nuanced comprehension of the relationship between teaching experience and teacher perception of learning media.

Conclusion

Based on the research findings, it is possible to conclude that using Nearpod in a flipped classroom in elementary schools has the potential to yield positive results. The Nearpod-based flipped classroom can be viewed as an innovative tool for elementary level learning. This is because Nearpod's flipped classroom offers numerous innovative services that make learning more engaging. Based on the distributed questionnaire, it is evident that teachers have designed a comprehensive and meaningful teaching and learning process for their students. In addition, teachers actively pursue solutions to problems encountered during the learning process. These solutions are implemented by designing and developing a learning process that uses innovative learning media and existing technology. The ability to produce media that corresponds to students' mechanisms, characteristics, and social environment facilitates the development of innovative instructional design. According to the results of the data analysis, there is no distinction between teachers' years of teaching experience and their perception of learning media or Nearpod-based flipped classrooms. Technological advancements and increased access to online resources have likely impacted older and younger instructors, narrowing the gap between their familiarity and comprehension of various learning media. Teachers of all ages now have greater access to various digital tools and resources, such as educational applications, online platforms, and multimedia content, because of the widespread adoption of smartphones and the Internet.

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Authors' contributions

E.S. conceptualised and developed the study, conducted formal analysis and wrote the original draft. S.R. contributed to the original draft and revisions, provided resources, and supervised the study. I.I. conceptualised the study, conducted validation and data curation, and was responsible for project administration.

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Data availability

The data that support the findings of this study are available from the corresponding author, E.S., upon reasonable request

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