Research Article

Pre-Service Teachers' Perceptions on Active Learning Strategies in Online Classrooms

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Abstract

Active learning is broadly viewed across a range of subjects, as a student-centered method for transmitting knowledge in a student-engaging manner. However, in an online setting, when instructors and students interact through chat boxes, breakout rooms, microphones, or web cameras, active learning can be applied in different ways. In order to gain an understanding of the influence of active learning used in online teaching and learning, this study was conducted with pre-service teachers from a private American university in Kuwait, selected by employing purposive sampling to get reliable data. An explanatory sequential mixed method design was used with an adopted Student Response to Instructional Practices (StRIP) instrument to collect quantitative data from 96 pre-service teachers. Interviews were conducted with 15 pre-service teachers to elicit information about their experiences regarding the use of active learning strategies introduced and practiced during semester-long online teaching and learning. In contrast to previous studies about students' resistance to active learning, the current study points to a preference for the active learning method of instruction as a convenient approach that would provide an opportunity for all students in online classes to think and engage with course material and make the whole learning process more effective.

Keywords: active learning strategies; online teaching; pre-service teachers

1. Introduction

During the Covid-19 pandemic, many educators faced increased challenges in teaching and engaging students in online teaching (Flores and Swennen, 2020; Hughes et al., 2020; Harper and Neubauer, 2021; Hickling et al., 2021). In these unprecedented times, extraordinary measures have been taken in higher education to ensure continuity of instruction. While online coursework is not a new method in education and has been phased with specific instructional strategies, the sudden transition to online coursework during COVID-19 was unexpected (Czaplinski et al., 2020; Dolighan and Owen, 2021). Therefore, the emergency transition left educators with an increased workload and the need to incorporate new strategies to engage students online (Czaplinski et al., 2020; Dolighan and Owen,

2021; Danchikov et al., 2021; Czekierda et al., 2021). Active learning has been found as a teaching approach for online instruction to interact with the students and distinguish from the traditional teacher-centered practices, sometimes colloquially referred to as "sit and get".

Active learning is broadly viewed across a range of subjects, including teacher education programs, as a student-centered method for transmission of knowledge in a student-engaging manner (Du, et al., 2020). In practice, most active learning may involve various techniques: discussions cooperative learning, concept mapping, and peer review aimed to encourage student participation in learning (Kamenetskiy, 2020; Hugget and Jeffries, 2021).

Although numerous studies on active learning in online classes have been conducted, no research has yet been done to evaluate the effect of active learning in Kuwait. Therefore, this study has a dual purpose of investigating active learning in online courses: (1) determining pre-service teachers' perception of active learning during online instruction, and (2) student engagement during online instruction when active learning strategies are used.

2. Literature Review

The massive switch to online education, experienced in Spring 2020 due to the coronavirus outbreak, found all educational institutions with little or no preparation. Video conferencing platforms (Zoom, MS Teams, Google meet) served as a solution to teaching remotely (Garcia et al., 2020; Redinger et al., 2020; Nisiforou et al., 2021). According to numerous studies, online teaching requires different approach skills, especially in the areas of pedagogy and technology (Cutri and Mena, 2020; Răducu et al., 2021). For example, some research studies focused on online teaching readiness in K-12 classrooms (Howard et al., 2020), while others focused on students' online readiness (Hung et al., 2010; Rippé et al., 2021; Ribeiro-Silva et al., 2022; Reister and Rook, 2021). The findings of the studies indicate that the majority of the teachers lacked the competence to teach online due to the of lack technological or pedagogical skills required for online teaching, or both. Other research studies investigated instructors' and faculty members' pedagogical skills to teach online. Scherer et al (2021) indicated that in terms of readiness the groups of instructors were not homogenous.

Active learning is defined by early research as "learning that is done with the expectation of using the material" (Benware and Deci 1984, p.758). The authors' definition was based on motivational theory and argued that active learning facilitates students' meaningful learning. As active learning has evolved over several decades, it can be defined as an instructional method that engages learners in the learning process and meaningful behavior. (Benware and Deci 1984; Prince, 2004; Cherney, 2011; Conrad and Openo, 2018; Czaplinski et al, 2020).

Research studies during pandemic (Czaplinski et al., 2020; Dolighan and Owen, 2021; Danchikov et al., 2021; Czekierda et al., 2021), have pointed out the effect of active learning online learning environment. Czaplinski et al. (2020) suggested that in order to promote active learning students should develop their self-directed and self-regulated learning skills, and more explicit teaching of effective learning strategies is needed.

Two underlying goals of using active learning have been found in the literature (Huggett and Jeffries, 2021). The first goal is the transition from teacher-centered to student-centered classrooms, and the second goal is to promote student engagement with the course content. The following are brief descriptions of the approaches to active learning and student engagement.

1. The transition from teacher-centered to student-centered classrooms

According to many educators, traditional methods of teaching are not producing the desired effect in comparison to active learning methods (Dole, et al., 2016; Michael, 2006; Lumpkin, 2015). In contrast to traditional, teacher-centered pedagogies, active learning places the student at the center of the learning process. Research suggests that active learning methods increase student achievement, participation, and retention of concepts over time in comparison to lecturing methods (Chi, 2009; Wanner, 2015; Dole et al., 2016). Other research studies indicate that active learning promotes cooperation among students and educators (Styers et al., 2018; Wu et al., 2020).

2. Promoting student engagement with course content

Student engagement has always been of interest in the higher education system in efforts to improve educational quality and student learning experiences and outcomes (Wanner, 2015). Through active learning, students are required to participate in meaningful classroom activities and reflect critically on course content (Cherney, 2011; Wanner, 2015; Tucker, 2016; Du et al., 2020;). Student engagement and interactive methods of instruction become increasingly important as societies evolve and the roles of higher education faculty and college students change. The challenge for educators is to use teaching strategies that engage students while also helping them build critical thinking skills.

Early research on student engagement in higher education was influenced by the theory of involvement (Astin, 1999) which states that the more students engage in academic activities, the more they will benefit. The theory of involvement was based on the concept of "quality of effort" suggested by Pace (1984) who viewed education as both process and product emphasizing students' responsibility in learning.

There is growing evidence to show that using active learning strategies encourages student engagement in a learning environment (Ahshan,2021; Czaplinski et al 2020; Harper and Neubauer, 2021; Kamenetskiy, 2020; Tucker, 2016; Wankel and Blessinger, 2013).

2.1   Student resistance to active learning

Student resistance to active learning has been defined as a motivational state to reject new instructional methods (Weimer, 2013; Seidel and Tanner, 2013; Finelli and Borrego, 2020; Madison et al., 2020). Based on this definition, students' resistance is considered an outcome of multiple factors such as ongoing interactions and situations among the students, the professor, and student peers (Finelli and Borrego, 2020).

Student resistance has been identified to take several forms (Weimer, 2013) such as passive, partial compliance, and open resistance. Passive resistance is characterized by faking attention in the classroom, for example appearing to take notes, while actually doing homework for another class, or by refusing to participate by not asking or answering questions. Partial compliance is characterized by students' responsibility in an assigned task, for example, they do it very quickly and poorly, or they come to class prepared with an absolute lack of enthusiasm. Finally, students' open resistance to active learning is shown by openly objecting to the active learning practices and assignments associated with it. In many cases, students may go to the professor's office during hours and ley their objections openly.

The solution to resist student resistance is by communication. Seidel and Tanner (2013) suggest that faculty should feel confident, as they need to appear and discuss the approaches showing testimonies of successful learning outcomes and students' achievements. Seidel and Tanner (2013) stated that when students' experiences with active learning develop, their confidence strengthens and the resistance fades or stops.

Numerous researchers have found that active learning has an important effect on student motivation and engagement in online environments. Therefore, this study was set to investigate students' perception of active learning strategies in an online environment.

3.   Research Questions and Hypotheses

This study is organized by the three primary research questions:

RQ1. What statistical conclusions can be made about using active learning strategies in online classes?

H1. Pre-service teachers will show a statistically significant high level of the use of active learning strategies in online classes.

RQ2.How did active learning strategies influence student engagement during online classes?

H2. Pre-service teachers will show a statistically significant high level of engagement in online learning.

RQ 3. What concrete practices have emerged from active learning strategies used during online instruction?

H3. Pre-service teachers may prefer one strategy more than the other.

4. Research Methodology

4.1 Context and participants

This study was conducted with pre-service teachers enrolled in a four-year bachelor of English teacher education program at the Gulf University for Science and Technology in Kuwait (GUST). The teacher education program at GUST provides a useful resource for exploring approaches to active learning and student engagement in higher education for several reasons. First, the pre-service teachers were enrolled in the courses aimed to develop their skills for instructional planning and instructional delivery. Second, the pre-service teachers have developed their pedagogical knowledge and awareness of active learning strategies and were being trained to apply them in their internship. Kaiser and König (2019) indicated that these characteristics reflect the teacher's beliefs which directly influence teaching effectiveness, therefore the purpose of this study is to determine the effectiveness of active learning strategies and student engagement in online courses from the pre-service teachers' perspective.

In total, 96 students provided useful responses for data analysis. The mean age was 23 years (SD = 3.15), with a range between 20 and 28, and more than 95% of the sample was under the age of 26. In this study, 90.4% of participants were female, and 9.6% were male students.

5. Data Collection

The data was collected at the end of the semester, with the pre-service teachers to understand participants' perception of active learning strategies. The goal was to explore ways to engage pre-service teachers and to prepare them to adopt active learning in their practicum and field experiences. The study was carried out in two education courses over one semester of 15 weeks, with 90-minutes class hours, and s total of 45 class hours. It involved three key phases:

- Planning for syllabi and research design for online teaching
- Administered the online survey for student-teacher learning in online classrooms
- Student-teacher focus group interviews (through videoconferencing).

5.1 Phase 1: Planning for syllabi and research design for online teaching

Prior to the beginning of the semester, a list of active learning strategies was created to be used for online teaching and learning. Activities were designed with the collaborative work component. Table 1 provides a brief description of the seven active learning strategies that were used while teaching two education courses online.

Table 1: Seven online active learning strategies

	Strategy type	General description of the strategy and task instruction
1.	Socratic dialogue	Socratic dialogue is a strategy that can be applied by asking questions, to enhance critical thinking skills. Instructors can post questions on the discussion forum and offer options for students' viewpoints). Students are expected to answer the questions and then post their own questions.
2.	concept mapping	Concept mapping online can be used by the students working in groups or individually to construct their knowledge and share experiences. The concept map is placed in a central position by using an online platform and students can visit regularly to add or delete concept items as their understanding develops over the course of the unit.

	Strategy type	General description of the strategy and task instruction
3.	think-pair-share	The Think-Pair-Share (TPS) strategy requires students to engage first individually and then work in pairs or in group discussions. A student develops a question and then discusses opinions with their peers in the group. After they summarize their conclusion, one student presents it to the class.
4.	fishbowl strategy	With the fishbowl strategy, students can analyze the content of the material with their peers by working in two groups. One group of students will discuss the content and the rest of the students listens and asks questions or comments on the topic. The second group discusses the results related to outcomes from the first group.
5.	imaginary ball	This strategy can be used as an ice-breaker in online instruction to initiate discussion and participation. Students will ask a question related to the content and throw a visualized imaginary ball to one of their peers, and will say "the ball goes to…".
6.	chalk-talk	Chalk talks can be practiced by using virtual whiteboards in Zoom, MS Teams, or any other platform. It is another strategy that allows students to engage and analyze their own thoughts. They can participate by posing their ideas without speaking or typing their answers into the chat box.
7.	internet scavenger hunt (ISH)	Internet scavenger hunt serves as a great way to develop students' Web searching ability and problem-solving and can serve as an ice-breaking activity. The instructor provides students with a prompt and then asks students to look for a piece of particular information (e.g. picture, or figure) on the Web. Students post their answers in the chat box and share their thought about the question or prompt provided by the instructor.

These strategies were also assigned to the pre-service teachers to be used in micro-teaching while working collaboratively in groups. Each group was assigned a part of the chapters to be covered and presented through micro-teaching by using active learning strategies. A student leader was also assigned to lead the discussions and was responsible for sharing the work with others. Supplementary instructional materials were provided to the students working on homework assignments to allow students to prepare for micro-teaching online. The supplementary instructional materials were designed to assist pre-service teachers by providing a worked example and step-by-step guidelines for using active learning strategies online. To help the pre-service teachers stay organized, a calendar with due dates and learning tasks was posted on the course portal. In addition, several scoring rubrics prior to grading were created for the online activities such as a scoring rubric for participation, a scoring rubric for the student-leaders of the discussions, and a scoring rubric for micro-teaching peer evaluation. These rubrics were also self-assessment tools because, after each performance, pre-service teachers were asked to place a grade or a check next to the criterion in the rubric and compare it to the professors' scores.

5.2 Phase 3: Online survey

The participants' response to active learning was measured with an adapted version of the Student Response to Instructional Practices (StRIP) instrument (DeMonbrun et al., 2017) to measure active learning. The adapted response format included two sections of the StRIP instrument with a 5-point Likert-type scale. For the purposes of this study, the active learning category from the type of instruction was used to ask students to report their perception of active learning practices they had experienced throughout the online teaching. The response options for active learning were: almost never (<10% of the time); seldom (30% of the time); sometimes (50% of the time); often (70% of the time); very often (>90% of the time). The second section of the StRIP survey, student responses to instruction, contained 15 items and focused on students' responses to classroom participation and engagement. Response options for student engagement items were: never; seldom (1–5 times per semester); sometimes (5–10 times per semester); often (once a week); very often (more than once/week).

5.3 Phase 4: Focus group interviews

Pre-service teachers were also engaged in a focus group interview session, where the purpose was to collect information based on their experiences and perceptions of active learning strategies used during online learning. The following questions were asked during the focus group discussion: 1)

From your perspective, what, if any, changes have taken place in the way you learn compared to face-to-face teaching and learning?, (2) 'What kind of problems did they encounter during the implementation of the active learning strategies?'. Comments from twelve pre-service teachers' interviews were transcribed and coded based on two categories, pre-service teachers' perceptions regarding active learning strategies used in online courses, and the challenges that they faced during the teaching and learning process. Patterns were identified and recorded.

6. Data Analysis

For this study, non-parametric Kruskal-Wallis H tests were used as an appropriate measure to analyze Likert data followed by the Mann-Whitney U-test for multiple comparisons and determine which items of active learning were statistically significantly different and in which way students responded to the active learning strategies used during online teaching and learning. The study was based on a validated survey used by (Nguyen et al. 2021; Alonso-Nuez et al., 2021) in their work with college students and was adjusted to remove any potentially identifying information due to the small sample of 96 pre-service teachers. Cronbach Alpha reliability statistical (Nunally, 1994); analysis found the internal consistency value of -.0.916 (six items) for active learning and -.916 (fifteen) for student responses to active learning, which is a high measure of reliability. In addition, the Kaiser –Meyer-Olkin measure of sampling adequacy and Bartlett's Test of Sphericity and Bartlett's Test of Sphericity were used to measure the relationship among the variables of the survey. The results indicate a strong relationship and inter-correlation among the variables. The tables below present the results of Cronbach's Alpha tests and the Kaiser –Meyer-Olkin measure of sampling adequacy and Bartlett's Test of Sphericity.

Table 2: Cronbach's alpha test result for active learning

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.916	0.923	6

Table 3: KMO and Bartlett's Test result for active learning

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.863
Bartlett's Test of Sphericity	Approx. Chi-Square	1196.687
	df	210
	Sig.	0.000

* significance at $p<0.001$

Table 4: Cronbach's alpha test result for pre-service teachers' responses to active learning

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.637	0.691	15

Table 5: KMO and Bartlett's Test result for pre-service teachers' responses to active learning

KMO and Bartlett's Test[a]		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.863
Bartlett's Test of Sphericity	Approx. Chi-Square	702.717
	df	105
	Sig.	0.000

* significance at $p<0.001$

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7. Results

7.1 Results for the research question 1

"What statistical conclusions can be made about using active learning strategies in online classes?"

To find the answer to the first research question, pre-service teachers we asked to rate the frequency of the use of active learning during online teaching. The question was asked using descriptive statistics. More specifically, the Kruskal Wallis H test was performed to analyze the difference between the use of active learning items, and the Mann-Whitney U test was conducted as a post hoc test to indicate where the difference occurred. Data in Table 6 shows the categories of the student responses to the frequency of use of active learning in online teaching.

Table 6: Statistically significant dimensions of active learning in online classes

	Mean	SD	Kruskal-Wallis H	DF	Sig.dif
Make individual presentations to the class.	4.49	0.871	37.668	15	0.001
Be graded on my class participation.	4.19	1.098	47.726	15	0.000
Solve problems individually during class.	4.14	1.139	46.415	15	0.000
Answer questions posed by the instructor during class.	4.23	1.110	74.248	15	0.000
Ask the instructor questions during class.	3.82	1.273	65.587	15	0.000
Preview concepts before class by reading, watching videos, etc.	3.47	1.305	52.931	15	0.000
Total	4.05	6.796			

*Significance at $p < = 0.005$ level

An examination of the means and standard deviations shows that respondents reported frequent use of active learning in online classes (M=4.05; SD=6.796). Overall, the p values are less than the significance level of 0.005, indicating significant differences in each dimension of active learning. Statistically significant differences were found in the item:" Make individual presentations to the class," the means differed significantly at the $p < = 0.005$ level, where respondents' score was the highest (M=4.49; SD=0.871), followed by "Answer questions posed by the instructor during class." (M=4.23; SD=1.110).

Based on the previous research, it was assumed that the pre-service teachers will show a statistically significant high level of the use of active learning strategies in online classes. The results of this study indicate that the first hypothesis was found to be true and accepted. These results support the studies that found a statistically significant level of the use of active learning in online classrooms (Ahshan,2021; Cheung, 2021; Dolighan and Owen, 2021).

7.2 Results for the research question 2

"How did active learning strategies influence student engagement during online classes?"

To explore student engagement in the online classroom with active learning strategies four categories of the StRIP survey questionnaire related to 'students' responses to instruction' were analyzed: (1) students' value of the activity, (2) students' attitude towards the activities; (3) students' level of their participation; and (3) students' destruction during the activities. To find the answer to the second research question, pre-service teachers we asked to report the way they felt about the use of active learning during online teaching. Kruskal Wallis H test was performed again to analyze the difference between the items in each category, and the Mann-Whitney U test was conducted as a post hoc test to indicate where the difference between the categories occurred. The results in Table 7 show the answer to research question two regarding student engagement in online courses as seen from the pre-service teachers' perspective.

Table 7: Statistically significant items for the student engagement in online classes

		Mean	SD	Kruskal-Wallis		
				X2	DF	p-value
Value	I felt the time used for the activity was beneficial.	4.52	0.858	69.830	8	0.000
	I saw the value in the activity.	4.52	0.808	67.609	8	0.000
	I felt the effort it took to do the activity was worthwhile.	4.03	1.090	77.618	8	0.000
	Total	4.35	2.349			
Positivity	I felt positively towards the instructor.	4.68	0.761	83.415	8	0.000
	I felt the instructor had my best interests in mind.	4.35	0.917	75.751	8	0.000
	I enjoyed the activity.	4.58	0.777	58.798	8	0.000
	Total	4.53	2.084			
Participation	I participated actively (or attempted to).	4.16	1.060	44.709	11	0.000
	I tried my hardest to do a good job.	4.56	0.751	13.418	11	0.267
	I gave the activity minimal effort.	1.95	1.341	40.095	11	0.000
	I rushed through the activity.	2.32	1.261	40.541	11	0.000
	Total	3.24	2.332			
Distraction	I distracted my peers during the activity.	1.27	0.703	46.150	15	0.000
	I talked with classmates about other topics besides the activity.	1.92	1.237	50.039	15	0.000
	I surfed the internet, checked social media, or did something else instead of doing the activity.	1.97	1.318	47.817	15	0.000
	I pretended to participate in the activity.	1.72	1.254	56.923	15	0.000
	I did not actually participate in the activity.	2.66	1.691	55.644	15	0.000
	Total	1.90	3.876			

Significant at p< =0.005

Comparisons of outcome results of the responses demonstrated positive responses to active learning strategies. The standard deviations results show that respondents valued highly the active learning strategies, (M=4.35; SD=2.349), their attitude was highly positive (M=4.53; SD=2.084), and their participation was very high (M=3.24; SD= 2.332). In terms of destruction during class time, the respondents reacted negatively as the mean score was very low (M=1.90; SD=3.876). This is considered to be an important finding considering that previous research results reported student resistance to active learning (Weimer, 2013; Seidel and Tanner, 2013; Finelli and Borrego, 2020; Madison et al., 2020; Andrews et al 2020).

Overall, the p values are less than the significance level of p< =0.005, indicating significant differences in each dimension of active learning except for "I tried my hardest to do a good job" (p-value>0.05).

7.3 Results for the research question 3

"What concrete practices have emerged from active learning strategies used during online instruction?"

This section reports findings of student teachers' concrete practices from the active learning strategies. Pre-service teachers were asked the following question: "Which were their most preferred strategies used online". The issues investigated here were their reactions to active learning strategies and whether they affected their interest and motivation to participate. Figure 1. presents pre-service teachers' preference scale for active learning strategies used during online teaching.
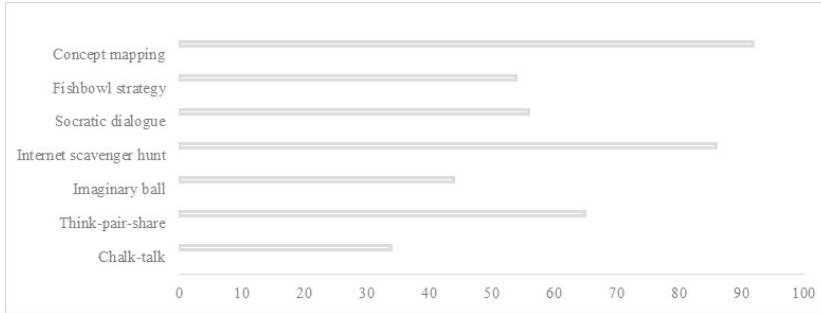
Figure 1: Preservice- teachers' preference scale for active learning strategies

When comparing the scores, the two most preferred active learning strategies were the Concept Mapping (92%) and Internet Scavenger Hunt (86%), followed by the think-pair-share strategy (65 %). However, their preference for the Socratic dialogue (56%) and Fishbowl strategy (54%) decreased. The lowest strategies in the rank were Imaginary ball (44%), and Chalk-talk (34%) strategies. This table presents a preference for a learning style and it is not considered a limitation in the study. The core element here is for pre-service teachers to act as real teachers and at the same time self-direct their learning.

7.4 Qualitative data on pre-service teachers' classroom practices

Another source of evidence related to the effect of active learning in online classes comes from the structured interview with 12 pre-service teachers. One of the questions asked was 'From your perspective, what, if any, changes have taken place in the way you learn compared to face-to-face teaching and learning?'. This question was intended to investigate the perception of the pre-service teachers about the use of active learning in online courses.

Pres-service teachers commented on their experience with active learning strategies online the way they understood content of the material. Most of the pre-service teachers (9 out of 12) stated that although they had been practicing active learning in face-to-face classrooms, the use of active learning online was a bit challenging at the beginning. Nevertheless, pre-service teachers' comments addressed the benefits of using active learning strategies in online learning. Below are several pre-service teachers' comments:

> *"To start with, I think that all strategies used during online classes have been very helpful since they are easily adapted to the online environment. For me using the Fishbowl, Socratic dialogue, and Think- Pair -Share helped us to discuss the content and share opinions with each other in breakout rooms was very beneficial."*

> *"Active learning strategies helped me to understand the material better."*

> *"When we are in the breakout rooms, I am more inspired to participate and discuss the topic."*

> *"With active learning strategies. We took full responsibility for our learning, we were active and participated in all activities, which is not usual in online courses, where students would sit and listen, or use the recorded sessions to review for the exams. Personally, I was ready to enter any quizzes or exams at any time with a little review of the material."*

The majority of the interviewed pre-service teachers stated that active learning strategies during online teaching and learning helped them to develop their understating of the content and learn new strategies that will help them in their future teaching careers. The pre-service teachers also pointed

out that being trained with new strategies gave them the courage, the knowledge about their study and teaching skills:

"Actually, I was familiar with active learning strategies before we switched to online learning. Think-pair-share, Mind mapping, and Scavenger hunt, which became 'internet Scavenger hunt' during online teaching, were all strategies we had used before. Using the active learning strategies online, made me understand my role as a future teacher because I understood the importance of active learning and how it keeps students engaged and encourages them to participate."

Another question was 'What kind of problems did they encounter during the implementation of the active learning strategies?'. This question was intended to explore the pre-service teachers' understanding and perceptions of the problems encountered during the use of active learning strategies online. Despite all of the benefits, pre-service teachers stated that active learning also has some flaws, such as student engagement in breakout rooms, where some pre-service teachers dominated the discussions and interrupted others in the group:

"Active learning strategies are not easy to be implemented in online classes. Strategies that require discussions in the breakout rooms might not work well."

"In the beginning, in the breakout rooms, my classmates would sit silently and not participate, so I had to draw conclusions on behalf of all the students, and present them in the general online classroom. But once we established a team dynamic it was OK."

"Some of my classmates contributed readily to the discussions in the breakout rooms but they in a way dominate it, and others couldn't have their words."

The pre-service teachers' perception in the context of active learning in online courses is based on their general thinking about teaching and learning. These transcriptions originated at the end of the semester when pre-service teachers could clearly show the value of active learning even if at some point students were a bit confused. It is important to note that comments revealed in these excerpts show that pre-service teachers expressed professional satisfaction from the active learning strategies. The data also suggest that respondents developed their skills for using active learning strategies in an online environment, but discrepancies have been identified between the level of collaboration and engagement.

The implementation of active learning online was able to develop pre-service teachers' ability to teach in this setting, including the creation of lesson plans, managing the classroom online, and getting ready to do the online teaching internship.

8. Conclusion

The present study demonstrates that the StRIP (DeMonbrun et al., 2017) is a valid instrument to apply to pre-service teachers, as the responses provided proved to be correctly understood. The descriptive analysis corroborates that each item is important in order to measure the frequency of active learning in online classes as well as pre-service teachers' responses to active learning. This study is in line with previous studies (Meyer, 2014; Nguyen et al., 2021) indicating that the Student Response to Instructional Practices (StRIP) survey instrument can be used to assess pre-service teachers' perceptions of active learning in the online environment, and this assessment can predict factors of the use of active learning strategies.

In addition, the study is not consistent with previous research (Weimer, 2013; Seidel and Tanner, 2013; Finelli and Borrego, 2020; Madison et al., 2020; Andrews et al 2020) when students showed resistance to the use of active learning online.

Overall the student-teachers reported their preference for active learning strategies (Puskas, 2021; Reister and Rook, 2021; Nisiforou et al., 2021) and a high level of engagement during online

courses. Instructions on the use of online strategies were provided to students for 180 minutes per week during the first four weeks of the semester with an additional office hours consultation devoted to practicing new active learning and teaching strategies. The strategies have been repeated and practiced by the student-leaders with new content material. Instructions for using the active learning strategies faded after successful classes of practice for each strategy until the end of the semester.

This study discussed the ways of planning and using active learning strategies in online learning courses. The results indicate that incorporating active learning strategies is a key to successful student class participation and engagement. Participation is connected to well-planned activities for online classes and successful applications in online engagement are crucial.

The literature (Shields et al., 2021; Kosslyn, 2021; Scherer et al., 2021) indicates that although the instructor's role in designing and planning instruction for supporting interaction and collaboration in online teaching and learning is important, it is often overlooked. The evidence suggests that in a learning environment assigning students to work in groups without proper guidance they are unable to interact (Howard et al., 2020; Hickling et al., 2021; Finelli and Borrego, 2020), thus online teaching poses more challenges for faculty and instructors.

As online continuing education continues to grow, this study may help educators who consider using an active learning approach when teaching online. Considering that active learning requires the students to become independent learners, educators will change their role as authoritative teachers to a facilitator.

Although the results of this study suggest some interesting findings, in this research, several limitations have been identified: i) the study focused on a small group of students in an education undergraduate degree program, who have received adequate training on implementing active learning strategies; ii). When an instructor or teacher investigated her own teaching, personal bias must be considered. The researchers' personal involvement with the course may increase the possibility that recorded interviews highlight specific positive outcomes while ignoring the challenges that the students may have faced during the instructional process. Although the interviews took place after the grades were posted, there are possibilities that the pre-service teachers might not have shared all their opinions about the course. Based on the experience with active learning and familiarity with the courses, the co-authors of the study reviewed the students' comments for their trustworthiness. The product of this study may be considered as a model that could be used in other online courses for instructors who are considering using active learning strategies in their online courses.

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