Design and Evaluation of Microteaching: Emergent Learning for Acquiring Classroom Management Skill in Teacher Education

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Abstract: Schools in countries struggling with academic achievement gaps need to improve the teaching and support skills for students who facilitate classes in these gaps. This study focused on methods for acquiring complex classroom management skills for pre-service teachers. The aim of the study was to design and validate a method for teacher candidates to learn these behaviors. To achieve this, microteaching sessions in which unexpected behaviors occur were designed and carried out. A video recording of the microteaching was used in the evaluation experiment. Evaluators were five expert teachers in Japan. Statistical tests using the results of the questionnaire responses revealed that the simulated situations by student roles were close to actual situations with real students. It was also confirmed that the teaching candidates experienced situations that required various management behaviors. These results indicate that the microteaching sessions designed by the authors are useful as a method for emergent learning to achieve management skills in the classroom to control unexpected behaviors.

1 INTRODUCTION

Many countries have recognized inclusive education, but its definitions and implementations vary widely (Haug, 2017). In countries with large achievement gaps, students who struggle to follow teachers' instructions are often labeled as exhibiting "unexpected behavior".

Emergent learning, where preservice teachers respond flexibly to students' needs, is crucial for effective classroom management and enhances educational quality. It requires not only planned lessons but also improvisation to engage students.

Microteaching has been a method to train prospective teachers by allowing them to practice teaching skills in a controlled environment (Allen 1966; Sakamoto 1981; Sakuma et al. 2019). This technique helps improve skills such as attention management, questioning, and class control (Gower et al., 1995; Capel et al., 1998; Kilic, 2010). The Learner-Centred Microteaching (LCMT) model

involves decision-making, planning, application, evaluation, and reflection, and is used to help teachers learn emergent management skills (Kilic, 2010).

However, there are limited examples of emergent learning in microteaching, especially regarding management procedures and behaviors for unexpected behavior. Microteaching can teach emergent behaviors that prevent unexpected classroom disruptions. Research on teachers' decision-making and information processing is important in this context (Pittman, 1985; Yoshizaki, 1988).

To design learning in a simulated classroom, it's important to consider teachers' information processing and decision-making models. Pittman (1985) identified three strategies teachers use for management: training, corrective, and push-in. Yoshizaki (1988) viewed teachers as information processors who explore routines and adapt to classroom situations. Some studies have attempted to approximate the environment of microteaching to that

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Variation of cards

Attitude type

Achievement level		1	2	3
	A	A1	A2	A3
	B	B1	B2	B3
	C	C1	C2	C3

Example of Image Card "TypeC1"

Individual			Group	
Study −	positivity +	Study + +	Leadership −	Cooperativeness + +

How class attitude appears:

· Learns obediently following the teacher's instructions.
· Makes a concerted effort to answer questions and prompts.
· Puts forth effort to complete presentation activities and skill-related tasks.
· Is cooperative and actively participates in group learning.
· Has a good rapport with teachers and is committed to learning

Use in Microteaching

Acting close to the real

Arrangement of rolls

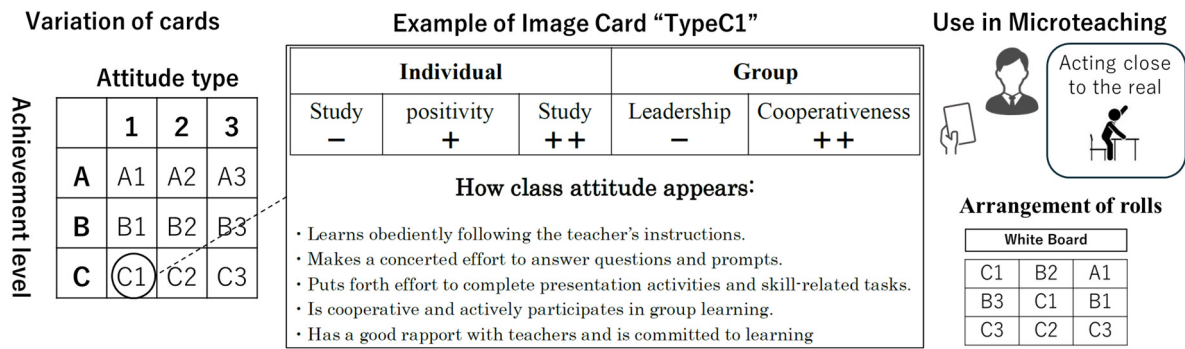| White Board		
C1	B2	A1
B3	C1	B1
C3	C2	C3

Figure 1: Overview of Microteaching Design and Simulation.

of an actual class, enhancing its effectiveness. Sakuma et al. (2019) developed image cards to assist pupil roles' acts in microteaching for this purpose.

This study provides insights into the design and implementation of microteaching sessions that incorporate unexpected student behaviors.

2 PURPOSE OF STUDY

2.1 Design of Microteaching

In this study, we developed and evaluated a microteaching method for prospective teachers to manage unexpected student behaviors in classroom settings using Image-cards (Sakuma et al. 2019).

In the microteaching which we designed, teacher-role extracts the situations of attitudes and behaviors of the student-role from the classroom situation and recognizes and discriminates between expected and non-expected behaviors. The teacher roles experienced situations by the student role's behaviors include delay in learning, interruption of learning, withdrawal from learning, disturbance to others and disturbance to the teacher. These categories were developed by classifying examples of attitudes and behaviors from Sakuma et al. (2019) image cards. It is assumed that, depending on the perceived attitude/behavior situation. The teacher roles then recognise the discrepancies between the lesson plan and the actual situation and the factors.

In addition, the teacher role has a learning opportunity to invoke or create management actions to resolve the discrepancy between the plan and the actual situation. Through this learning opportunity, the teacher role learns management behaviors to control the unexpected behavior.

Thus, we assume emergent learning, in which the number of perceived unexpected behaviors, including disruptive behaviors to the lesson, decision-making

activities related to management are activated, and the teacher role invokes management behaviors and creates alternative solutions.

Figure 1 shows that the overview of the student image cards used in designing the microteaching (Sakuma et al. 2019). They consisted of three types based on the degree of 'learning achievement' (A: high - C: low) and three types based on the degree of 'difficulty in following instruction' (1: easy to follow - 3: difficult to follow): A1, A2, A3, B1, B2, B3, C1, C2, C3. Figure 1 shows the types of image cards used and the seating arrangements of the student roles when a microteaching is conducted with nine student roles.

The microteaching which we designed has system to make it easy for situations to occur in which student roles in C1, C2, and C3 are more than half of the total number of students in the class, and in which they become noisy and cannot follow instructions. Specifically, the roles and their number were set up with reference to the characteristics of a disrupted class in which more than half of the student roles are dissatisfied with class life or are unable to comply with class rules, and in which the roles of student C1, C2 and C3 are more than half of the total number of student roles in the class, which can lead to a situation of withdrawal from class and a situation of general noisiness and lack of following instructions.

Additionally, place student roles who are difficult to reach for instruction in seats that are closest to the teacher and within the teacher's sight. The student roles whose guidance is easy to follow are put in the role of supporting the learning of the student roles. Therefore, to create unexpected behavior, C3 was placed in the seat farthest away from the teacher, contrary to the considerations. In addition, A1 was placed in the seat farthest away from C3.

Table 1: Examples of situations which confirmed in Microteaching authors designed.

Design1		Design2	
No.	Situation	No.	Situation
1	Situations where instructions are not followed and the class is held up	1	Sleeping situation from the beginning of the class
2	Messing with other children	2	Situations where they turn their back
3	Playing with stationery or teaching aids	3	Playing with stationery or misbehaving
4	Throwing things	4	Hitting another friend to wake them up
5	Threatening or provoking other children	5	Messing with a friend
6	Going outside without permission	6	Dropping things
7	Inviting other children to play	7	Walking around situation
8	Shouting or shouting	8	Going outside
9	Playing with stationery or teaching aids	9	Hitting another friend to wake them up
10	Pointing out minor mistakes by the teacher	10	Turns his/her back
11	Situations where children start to play	11	A situation where the child starts reading a book
12	Talking about topics unrelated to the lesson	12	Situations where the whole place becomes noisy
13	Drawing on the blackboard	13	Situations where the child does not want to cooperate in a cooperative learning situation
14	Singing a song when bored with learning	14	Throwing erasers or scraps of paper
15	Situations where the pupil's gaze is not looking in the direction of anyone other than the teacher	15	A situation in which the whole class becomes increasingly noisy while writing on the board
		16	A situation in which greetings are not coordinated

2.2 Application

Microteaching designs were incorporated into a practice-based class for second-year university students aspiring to become primary school teachers. The implementation date was December 12, 2015.

The participants in each group consisted of one teacher, nine students, and an extra observer. The microteaching took approximately 30 minutes. The scope of study covered the third grade of primary schools. The learning objectives for both Design1 and Design2 were "to understand how to add and subtract decimals to and from one decimal place, and to be able to perform these calculations".

The learning task for the class, designed by the teacher role in Design1, was to line up A4-sized sheets of colored paper, which were regarded as 1, with thin sheets of colored paper, which were regarded as 0.1, and ask students to think about how many 0.1s could be placed in the sheet "1". One set of these materials was prepared for each group of three. The lesson learning task designed by the teacher of Design2 was to ask the students to think about how many 0.5L and 0.3L together would be, through the juxtaposition of 'colored paper with a picture of two beakers' and 'thin colored paper that is 0.1L.

The learning task for the lesson designed by the Design1 teacher was to line up A4-sized colored paper regarded as 1 with thin colored paper regarded as 0.1 and ask the students to think about how many

0.1s could be put into 1. One set of these materials was prepared for each group of three.

The learning task of the lesson designed by the teacher in Design2 is to have the students think about how many pieces of paper 0.5L and 0.3L add up to through the arrangement of "colored paper with a picture of two beakers" and "thin colored paper that is considered to be 0.1L".

In addition, the teacher role of Design1 facilitated the class with the student roles sitting on the floor, without using a desk. On the other hand, the teacher of the Design2 conducted the class with the student roles sitting on chairs, in the seating order shown in Figure.1 (right side). The reasons for the differences in the teaching materials prepared by the teachers of the Design1 discussed below. The characteristics of the students played by the pre-service teachers in the microteaching were known from the lesson design stage for Design1. Therefore, the teacher had the original idea of having the students sit on the floor for the class and tried to attract the students' interest. In addition, it can be said that the teacher tried to avoid unexpected behavior by giving the student a specific task to do in groups of three, namely 'laying out the cards (0.1) on A4 paper (1)', so that the student role could concentrate on their learning.

2.3 Management Behavior

Hereafter, the unexpected behavior that occurred in the microteaching designed in this study will be

referred to as the simulated situation. The events and situations that occur in the actual classroom are referred to as actual situations.

Examples of simulated situations that occurred in the microteaching designed by the authors are shown, based on a series of utterances obtained by transcription from the video recordings. For reasons of space limitation, approximately one minute of each lesson is shown for both Design1 and Design2. The simulated situations are single underlined. The management behaviors created by the respective teacher roles are underlined with a chain line.

The following are the classroom situations observed at the beginning of the Design2 practice and the simulated situations.

[Teacher]: Good morning, everyone, I'd like to start the first period, Tom (C1), please wake up.

[C3 role]: *wake up - Tom (C1 role)!*

[Any roles]: *'Wake up, first period is starting'.*

[Teacher]: *Tom, you must be sleepy.*

[C1 role] : *I want to sleep, and going to home.*

[Teacher]: *George, what are you doing? Well, It's time to start first period, Bob, what are you doing?*

[C3 role]: (turning back, looking restless)

[Teacher]: *Bob, I'm going to start, but I thought I'd check one rule, Bob, face forward.*

[C3 role]: *eh.*

[Teacher]: *Look forward, yes, please. And everyone, I'm going to go over the rules that we've been going over all this time, and if, while we're teaching, you get an itch and you feel like you want to stand up, please raise your hand immediately. The reason is that if you stand up, the teacher will be worried, so if you make a signal before that, you can do it, so do you remember the rules? Bob, are you okay?*

From the utterance, it can be said that the teacher role created the management behavior of 'taking up stationery'. Similarly, it can be said that the teacher role of the Design2 implemented the management behavior of 'checking the rules of the class during the lesson.

2.4 Teacher Role's Reflections

Immediately after the practice of the microteaching, the teacher roles were asked to reflect on their own classes. The parts of transcripts of their utterances are shown below. The transcripts of the teacher role of Design2's utterances are shown below.

[Teacher]: *Well, for the time being, since I was in the lower ranks...[omission]...my goal was to do 1.0, 1 and up to what we did today on the assumption that I couldn't go to the problem areas, but it still took a lot of time to deal with the student roles who were doing something or not doing something. I realized that it really takes a lot of time to deal with every student role who is doing something or not doing something, or who is standing up and walking around, and I thought I still don't know where to switch and ignore them. ...[omission]...I also thought that it was very difficult to know where to switch from caution to scolding, and I was thinking about this as I tried to deal with the student roles who were moving around. I was also thinking about how to deal with the student roles who didn't write a lot, and there were a lot of student roles who didn't write a lot this time, and whether to adapt to the role of the student roles who wrote a lot or the majority who didn't write a lot, so I adapted to that role.*

The teacher role of the Design2 was searching for a teaching method that could achieve the goal in a simulated situation where unexpected student role behavior was observed. As a result, it can be said that, as the authors intended, they created their own management behavior of 'changing the form of the learning activity' during the lesson.

3 EXPERT ASSESSMENT

3.1 Method of Evaluation

An Expert evaluation experiment was conducted on the environment and learning of a microteaching designed by the authors. The following three evaluations of the simulated classroom environment were obtained.

・Whether the simulated situation as a whole is close to the actual situation

・Whether each simulated situation is close to the actual situation

・Whether each simulated situation is an opportunity to learn management behaviors

Is it close to the individual situation that causes it (assessment of similarity)?

・Whether it is an opportunity for the teacher role to learn management behaviors (evaluation as a learning opportunity).

For evaluating learning effects, the teacher roles experienced creating management strategies that mitigate unexpected behaviors during microteaching sessions

The implementation periods were 16, 23, and 30 April and 9 and 14 May 2016. On each date, one evaluator was invited to the laboratory to carry out the evaluation experiment. The total experimental time spent per person was around 120 minutes. Evaluators were expert teachers with an average of 29.8 years of experience (S.D: 10.8 years).

The procedure for the evaluation experiment is as follows.
1. Experimental teaching
2. Viewing of video recordings of the microteaching and interviews
3. Evaluation of the simulated situation from five perspectives through a questionnaire survey. For (1), the purpose and flow of the experiment were explained to the evaluators. For (2), the evaluators were asked to randomly select and watch one of the two designs and one of the designed children that were practiced in this study. During the viewing of the video, the stop-and-motion method of Fujioka (1991) was used to obtain the evaluators' learning of the microteachings designed by the authors and their evaluative utterances of the situations that the students' roles caused.

The following questions were set for the class evaluation and semi-structured interviews were conducted.
・ What teacher skills and knowledge were learned through experiencing the focused event?

The stop-and-motion method of Fujioka (1991) was used when the evaluator spoke about the simulated situation, to implement the same format as in a classroom review meeting in a school setting.

In addition, the evaluators were asked to watch a simulated situation randomly selected by the authors beforehand, and to rate whether the simulated situation was close to the actual situation or not using a five-point scale (1: does not apply - 5: applies). At the same time, using Asada and Sako's (1991)

classification of eight types of management behaviors, the teachers were asked to choose which of the simulated situations they were asked to watch corresponded to a learning opportunity for creating management behavior. Multiple answers were allowed. The eight options were A. Inserting teaching materials, B. Changing the form of children's activities, C. Changing the order of nomination, D. Changing the sequence of questions, E. Changing the nomination-response rule, F. Changing the form of communication, G. Changing the response method, and H. Attention and instruction.

Table 1 shows the extracted simulated situations. Regarding (3), the authors clarified from five perspectives whether the situations in the student role that occurred within the microteaching designed by the authors were closer to the actual classes compared to the traditional microteaching.

In the present study, this questionnaire item was also used, and the evaluators were asked to answer the questions using a five-point scale (1: does not apply - 5: applies). The five question items used by Sakuma et al. (2019) were:
(i). Diverse situations,
(ii). Individual child situations
(iii). Overall child situations
(iv). Impact and change on other children
(v). Events that test the trust relationship with the teacher.

3.2 Results of Analysis

To determine whether the five simulated situations - (1) various situations, (2) individual child situations, (3) overall child situations, (4) effects and changes on other children, and (5) events that test the trust relationship with the teacher - approximated the actual situations, a one-sample t-test was conducted with the population mean considered to be 3. The results of the analysis showed a significant trend and a significant difference in the results of all the responses of the rater groups. The test results are shown in Table 2.

Table 2: Results of t-tests for similarity (N=5).

	Design1			Design2		
	Degree of approximation			Degree of approximation		
Quetion	**Mean**	**S.D.**	**P-value**	**Mean**	**S.D.**	**P-value**
(i) Diverse situations	4.60	0.55	*0.032 **	4.60	0.55	*0.024 **
(ii) Individual pupil situation	4.20	0.84	*0.002 ***	4.20	0.45	*0.003 ***
(iii)Overall situation of the pupil	4.40	0.55	*0.004 ***	4.20	0.45	*0.002 ***
(iv)Impact and change on other pupils.	4.40	0.89	*0.004 ***	4.20	0.45	*0.003 ***
(v)Test the trust relationship with teachers.	4.20	0.45	*0.032 **	4.00	1.00	*0.099 +*

*not significant: n.s. p<.10: + p<.05: * p<.01: ** p<.001: ****

Table 3: Results of t-tests for degree of similarity.

	Design 1					Design2		
No.	**Mean**	**S.D.**	*P-value*		**No.**	**Mean**	**S.D.**	*P-value*
1	4.8	0.45	***		**1**	3.8	1.3	*n.s.*
2	4.8	0.45	***		**2**	4.8	0.45	***
3	4.6	0.55	**		**3**	4.5	0.58	**
4	4.8	0.45	***		**4**	3.0	0.71	*n.s.*
5	4.2	1.3	*n.s.*		**5**	4.2	0.45	**
6	3.6	1.67	*n.s.*		**6**	3.8	0.45	*
7	3.6	1.79	*n.s.*		**7**	4.4	0.55	**
8	4.2	0.84	**		**8**	4.2	1.3	*n.s.*
9	4.2	0.45	**		**9**	3.4	0.55	*n.s.*
10	4.2	0.84	*		**10**	4.2	0.45	**
11	4.6	0.55	**		**11**	4.0	1.22	*n.s.*
12	4.8	0.45	***		**12**	4.8	0.45	***
13	3.6	1.95	*n.s.*		**13**	4.2	0.84	*
14	3.6	1.52	*n.s.*		**14**	4.0	1	*n.s.*
15	4.6	0.89	*		**15**	4.4	0.55	**
					16	3.8	1.3	*n.s.*

*not significant: n.s. p<.10: + p<.05: * p<.01: ** p<.001: ****

Table 4: Percentage of similar simulated situations.

	Event(X)	No similarity (Y)	Similarity (X-Y)	Percentage
Design1	15	5	10	0.67
Design2	16	6	10	0.63

Table 5: Frequency of simulated situations that create the management skills confirmed in the experiment.

		A	B	C	D	E	F	G	H
		Add new tasks for pupil	Change how to teach	Change notable pupil	Change how to learn	Encourage pupil to learn together	Change how to communicate with pupils	Give formative feedback to pupils	Give cautions and warnings for pupil
Design1	**Measured value**	22	12	1	15	1	10	5	31
Design2	**Measured value**	16	17	4	5	1	13	6	30
Total	**Measured value**	38	29	5	20	2	23	11	61
	Expected value	(23.63)	(23.63)	(23.63)	(23.63)	(23.63)	(23.63)	(23.63)	(23.63)

The results presented in Tables 3 highlight the significant differences in the degree of similarity and frequency of management behaviors that were confirmed in the experiment. A one-sample t-test was conducted to determine whether the mean similarity scores for the simulated situations significantly differed from the expected mean score of 3. To determine the proportion of simulated situations that occur in the microteaching designed by the authors that are close to the actual situations experienced by the group of evaluators, a one-sample t-test was conducted using the results of five responses to a total of 31 simulated situations, 15 from Design1 and 16 from the Design2.

Table 4 presents the percentage of similar simulated situations by using scores of Tables 3.

From these analyses, key findings from the statistical analysis indicate that the microteaching sessions designed in this study approximate real classroom scenarios in approximately 60% of cases, providing useful insights for future study.

In addition, a chi-square test was used to compare the frequency of different types of management behaviors observed in the two designs, revealing significant differences in specific behaviors from Table 5. A chi-square test revealed no significant difference between the two designs in terms of overall learning opportunities for management behaviors. However, a subsequent analysis using the data in Table 5 found significant differences in the specific types of management behavior opportunities experienced by the teacher role (χ^2 (7) = 110.894, p < .01).

Multiple comparisons using Ryan's nominal levels revealed significant differences among management behaviors. Inserting teaching materials was more effective than changing the nomination order, nomination-response rules, or response methods. Changing the children's activities was more effective than changing the nomination order or rules but less effective than attention and instruction. Additionally, changing the order of nomination was less effective than changing the sequence of questions, communication, or attention and instruction.

Additionally, changing the order of nomination was less effective than changing the sequence of questions, communication, or attention and instruction. Changing the sequence of questions was less effective than attention and instruction. Finally, changing the nomination-response rule was less effective than changing the form of communication or attention and instruction. Furthermore, it was observed that F: changing the form of communication <H: the way of attention/direction *(critical ratio = 4.0, p = 0.0002)*. Finally, it was found that G: changing the method of response < H: the way of attention/direction *(critical ratio = 5.8, p = 0.0002)*.

These results indicate that through the practice of the microteaching designed in this study, the teacher roles had the opportunity to learn the management behavior of inserting teaching materials rather than changing the order of nomination, nomination-response rules and response methods to establish a lesson. It was evident that the students had the experience. Similarly, it can be said that the teacher role experienced the opportunity to learn the management behavior of changing the form of the children's activity rather than changing the order of nomination or changing the nomination-response rule.

4 DISCUSSIONS

4.1 Environmental Assessment

It was found that the microteaching designed by the authors could be practiced to enable learning in a situation close to the actual unexpected behavior. Furthermore, the similarity between the simulated situation and the actual situation was approximately 60%, which means that more than half of all situations in the microteaching designed by the authors were inevitable situations in which the teacher role had to invoke and create management behaviors.

In other words, a certain quality is guaranteed as a method for learning management behaviors to control unexpected behavior.

4.2 Causes of Low Similarity

The following reasons can be given as to why a total of 11 simulated situations that did not show statistically significant differences were not close to the actual situations.

One possible reason for the low similarity between simulated and actual situations is the over-exaggeration of certain student roles based on the image cards. For example, a student role labeled C3 may have been overly disruptive due to a lack of nuanced understanding of the behavior expectations, leading to a deviation from realistic classroom dynamics. Future research could involve more detailed role-playing instructions to mitigate such discrepancies. This indicated that, to have the opportunity to learn in a context close to the actual classroom, the children acting out C3 needed to be given prior instruction to avoid overacting. However, no differences were found in the proportion of simulated situations that occurred within each microteaching. In other words, there was no difference in the type and number of simulated situations occurring between the different designs.

4.3 Evaluation of Learning Effectiveness

The teacher roles in both Design1 and Design2 experienced various management behaviors, including attention, instruction, material insertion, question sequencing, communication, and activity changes. They found that unexpected behavior triggered management behaviors like cautioning, scolding, and interrupting the class. While students were confused, the teacher roles learned to identify key student roles, adjust their lesson plans, and implement appropriate management actions. This suggests the method's effectiveness as an emergent learning approach for invoking and creating management behaviors.

4.4 Comparison with Previous Studies

This study proposed a method to cultivate classroom management skills in pre-service teachers using microteaching.

Previous studies have highlighted the potential importance of emergent learning in classroom management. Haug (2017) noted the varying

definitions and implementations of inclusive education across countries, emphasizing the need for flexible responses to students' needs. This aligns with our findings, suggesting that emergent learning, where preservice teachers adapt to unexpected behaviors, may be beneficial for effective classroom management.

Additionally, this study supports the potential effectiveness of microteaching in improving teaching skills such as attention management, questioning, and class control (Gower et al., 1995; Capel et al., 1998; Kilic, 2010). Our findings indicate that microteaching could help in teaching emergent behaviors to handle unexpected classroom disruptions.

Furthermore, Sakuma et al. (2019) developed image cards to assist student roles in microteaching, enhancing its effectiveness. Our study builds on this by incorporating unexpected behaviors into microteaching sessions, suggesting that this approach may provide a more realistic and comprehensive training experience for preservice teachers.

5 CONCLUSIONS

This study provides insights into the design and implementation of microteaching sessions that incorporate unexpected student behaviors. While the findings suggest potential benefits, further research is needed to establish more robust scientific validation.

The microteaching sessions provided valuable insights into the challenges faced by teachers in managing unexpected behaviors. However, more comprehensive studies are needed to validate these findings across different contexts and sample sizes. By refining the pre-teaching preparation of student roles and considering more diverse simulated situations, future studies can better assess the effectiveness of emergent learning strategies in classroom management training.

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