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REACT CONTEXTUAL APPROACH: EFFECTIVE NUMERACY TEACHING FOR FUTURE MATHEMATICS TEACHERS

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ABSTRACT

This study describes adequate numeracy learning in schools for future mathematics teachers in North Kalimantan. It involved 30 students as respondents who observed numeracy teaching carried out by local facilitator teachers in Bunyu district, North Kalimantan. The researcher utilized the REACT contextual approach to offer practical experience in school numeracy teaching. The respondents, assuming the role of students receiving numeracy instruction, observed the teaching process, filled out questionnaires, and provided feedback on the activities through interviews. We used mode score analysis and synthesis of interview results to analyze the student response data descriptively and quantitatively. The results showed that students who attended lectures with the REACT contextual approach strategy responded positively with a response mode score of 4, which is in the excellent category. The interview results showed a clear positive response from most students after participating in the activity. The students expressed that the lecturer's new strategy helped them acquire knowledge and achieve lecture objectives. Therefore, the application of the REACT contextual approach in innovative learning model lectures on effective numeracy teaching for future mathematics teachers in North Kalimantan has proven highly effective.

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1. INTRODUCTION

In the twenty-first century, learning requires students to have knowledge, ideas, and skills related to information, media, and technological advancement (Kuat et al., 2022; Wahyuni et al., 2023). To thrive in the workplace and everyday life, students must have the capacity for logical and creative thinking, collaboration, and communication skills. Students must also be skilled, adaptable, and imaginative (Dewi & Nuraeni, 2022; Kusuma et al., 2020; Saimon et al., 2023). Math can help students become better at these skills. However, most students find math classes at school challenging and uninteresting. Students often perceive math as boring, leading them to fail, become reluctant, or even fear learning it. Many students think learning mathematics will make

it difficult to quickly calculate and memorize numbers and formulas. When students responded poorly to mathematics, they often connected it to subpar prior learning experiences. They frequently expressed intensely negative feelings along with descriptions of alienation, disaffection, and failure in their school-related conversations. This perception has led many students to consider math unpleasant and useless (Dalby, 2021; Maryani & Widjajanti, 2020; Mufidah et al., 2022; Wahyuni et al., 2023). There are three primary reasons why preparing students for mathematics achievement remains necessary. Firstly, students often struggle with basic math concepts. Secondly, there needs to be more support from others to help students see the practical benefits of mathematics. Thirdly, there are inappropriate teaching strategies (Maryani & Widjajanti, 2020; Utami & Maskar, 2020).

The process for gaining math proficiency is straightforward: developing concepts and techniques, participating in conversations, and practicing with feedback. Classroom discussions should also expand students' ideas (Gal, 2024; Marret et al., 2018; Utami & Maskar, 2020). Implementing and emphasizing mathematical literacy in the education curriculum is crucial to ensuring students' holistic development and readiness for the future. Mathematics is crucial in shaping students' cognition, developing problem-solving skills, relating them to everyday life, preparing for future jobs, and balancing theory and practice (Marret et al., 2018; OECD, 2016; Sihombing & Susilowaty, 2023).

Numeracy is the capacity to effectively collaborate on mathematical knowledge and understanding to meet the challenges of everyday life. Understanding the message in a reading is crucial for making informed decisions. Meanwhile, numeracy is the ability to empower mathematical knowledge and skills in solving everyday problems (Basri et al., 2021; Dantes & Handayani, 2021; Geiger & Schmid, 2024; Han et al., 2017). Numeracy refers to the ability to use various types of numbers and symbols associated with fundamental mathematical concepts to analyze data presented in various formats (e.g., tables, graphs, and maps) and apply interpretations to make predictions and decisions to solve real-world problems in various contexts (Baharuddin et al., 2021; Demir & Altun, 2018; Han et al., 2017; Suciati et al., 2020). Numeracy is the ability to effectively apply, formulate, and interpret mathematics in various contexts to meet every day life's challenges (Fiad et al., 2017; Gal, 2024; Siskawati et al., 2021). This ability also encompasses understanding mathematically expressed information, such as graphs, charts, and tables. The individual demonstrates a high level of comfort with numbers and possesses the capacity to use mathematical knowledge to effectively address challenges in daily life (Erlyana, 2023; Ermiana et al., 2021; Han et al., 2017; Maghfiroh et al., 2021).

Numeracy refers to the ability to apply number concepts and arithmetic operations. Future educators must be proficient in numeracy (Asmara & Herwin, 2023; Forgasz et al., 2017; Lopez-Pedersen et al., 2023). Future math teachers must have the knowledge, abilities, and experience necessary to teach numeracy to students to incorporate numeracy literacy into mathematics instruction. The Innovative Learning Models course offers the opportunity to acquire these three components. Students who complete this course will have a better understanding of how to use technology in the classroom and

how to create learning models and strategies that fit their unique needs. To create effective and engaging student learning experiences, we must combine robust mathematics learning principles with creative and innovative approaches (Abrahamson et al., 2020; Bobis et al., 2021; Hasbi & Fitri, 2023). This will strengthen the introduction and mastery of learning strategies and methods in the innovative learning model course, specifically within the context of numeracy literacy. To effectively teach mathematics, future math teachers will need exposure to and encouragement to experiment with a variety of cutting-edge teaching techniques and numeracy literacy models. As a result, they will fully comprehend numeracy instruction in the classroom.

The knowledge gained from theoretical lectures may result in boredom for students. We must implement a targeted lecture strategy to address this issue. Teachers can employ various strategies to combat student boredom with theoretical lectures that focus on innovative learning strategies and models in mathematics education (Schukajlow et al., 2017; Bieg et al., 2017). One such strategy is the application of contextual learning. Connecting existing knowledge with the studied teaching material and applying it in real life, the contextual approach emphasizes student involvement in learning (Hasbi et al., 2019; Afni & Hartono, 2020; Susanti & Wutsqa, 2020). The contextual approach is an instructional approach that assists educators in connecting current topics to practical circumstances. This approach may encourage students to assume greater responsibility for their education, facilitating connections between the knowledge they acquire and its potential applications in various contexts within their daily lives (Maryani & Widjajanti, 2020; Wahyuni, 2022).

This research's novelty lies in applying the REACT contextual approach, which invites students to observe the direct implementation of numeracy learning in schools. This approach aims to provide students with knowledge, insights, and direct experience related to the strategies, methods, and media teachers use in school numeracy literacy learning. Participating in this activity helps students understand the application of various innovative learning strategies, particularly in the numeracy context. Additionally, the researcher assigns students the roles of numeracy learners and observers. Furthermore, the researcher aims to ascertain how students respond to the REACT contextual approach employed as an innovative strategy for teaching numeracy at school for future mathematics teachers in North Kalimantan.

2. METHOD

The study enrolled 30 students in an innovative learning model course. The students participated in contextual lectures where they observed facilitator teachers teaching numeracy in three public elementary schools in Bunyu District, North Kalimantan. Djam'an et al. (2021) allowed students to develop an observation implementation plan, complete with observation sheets and interview guidelines for facilitator teachers, to gather necessary data on numeracy learning and its practical implementation in the classroom. Next, we asked students to fill out a feedback questionnaire about the lecture and answer interview questions. We categorized the responses as strongly disagree,

disagree, agree, or strongly agree, and converted them into a score range of 1-4, as presented in Table 1.

Table 1. Student Response Score Conversion

Students Response	Score
Strongly Agree	4,00
Agree	3,00
Disagree	2,00
Strongly Disagree	1,00

(Adapted from Arikunto, 2021)

We used the Microsoft Excel application to analyze the students' responses using the mode score and descriptive statistics. We then classified them using the criteria outlined in Table 2.

Table 2. Student Response Scoring Model criteria

Mode Score	Criteria
$X \geq 4{,}00$	Excellent
$3{,}10 \leq x \leq 3{,}99$	Good
$2{,}10 \leq x \leq 2{,}99$	Poor
$X < 2{,}00$	Extremely Poor

(Adapted from Kusuma et al., 2022)

After determining the response criteria for each indicator, the researcher defined the categories of positive and negative responses. The researcher designated the former as good and excellent, and labeled the latter as poor and extremely poor. We subjected the interview results to qualitative analysis and derived the research conclusions from a synthesis of the questionnaire data analysis and the results of interviews with respondents.

3. RESULTS AND DISCUSSION

Results

Mathematics education aims to facilitate students' comprehension of mathematical concepts, procedures, and methods, enabling them to solve a range of mathematical problems and make informed decisions in life (Geiger & Schmid, 2024; Hafizi & Kamarudin, 2020; Maulidina & Hartatik, 2019; Purwasih et al., 2018). Numeracy is made up of three components: counting, numeracy relations, and arithmetic operations. Counting is defined as the ability to verbally count an object and find its number. The capacity to count objects in more, less, taller, or shorter ways is known as numeracy relations. Arithmetic operations are defined as the ability to perform basic mathematical operations such as addition and subtraction. Future mathematics teachers need to understand and master these three components (Asmara & Herwin, 2023; Basri et al., 2021; Forgasz et al., 2017; Lopez-Pedersen et al., 2023; Salvia et al., 2022). Mathematics education provides students with learning experiences through a series of planned activities to enable them to gain competence in the mathematical material studied. Consequently, learning experiences aim to enable students to comprehend

mathematical material, solve mathematical problems, and cultivate student creativity (Adelia et al., 2024; Djam'an et al., 2021; Santia & Handayani, 2023).

One of the strategies employed to enhance the numeracy skills of future mathematics teachers is through direct observation of numeracy teaching activities conducted by facilitator teachers in schools. In this study, future mathematics teachers observed numeracy teaching activities by elementary school facilitator teachers in the Bunyu sub-district, North Kalimantan. The researcher refers to and adapts the Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) strategy when observing numeracy teaching (Crawford, 2001; Susanti & Wutsqa, 2020). This innovation in learning intends to provide meaningful experiences for students. Figure 1 below provides a detailed view of the lecture activities conducted in this study, which utilized the REACT contextual approach.

Figure 1. Relating Stages

Students assuming the role of elementary school pupils observe the numeracy teaching practices of facilitator teachers. According to Figure 1, they can establish a correlation between the numeracy teaching methods of the facilitator instructors and their comprehension of the teaching concepts acquired in campus lectures that substantiate them.

Figure 2. Experiencing Stages

Based on Figure 2, the students are required to conduct an inventory of the numeracy learning media available to them, attempt to use the aforementioned media, and observe the various techniques and strategies employed by the facilitator teacher during the teaching of numeracy.

Figure 3. Applying Stage

During numeracy learning in class, students participate in collaborative numeracy learning activities under the guidance and instructions of the facilitator instructor.

Figure 4. Cooperating Stage

Students participate in the addition and subtraction of numbers to aid pupils who may encounter challenges in these areas, as illustrated in Figure 4. Rather than providing direct solutions when they encounter difficulties, they are directed to offer guidance to their peers.

Figure 5. Transferring Stages

The recently concluded numeracy teaching implementation requires students to conduct interviews and verify with the facilitating teacher the new knowledge and experience they have acquired. They are then required to write a report, providing reflections and responses on the numeracy learning activities.

After participating in the numeration learning process, we expect students to provide feedback. This study presents quantitative data in the form of mode scores derived from feedback questionnaire responses to lectures delivered using the REACT contextual approach, as well as the results of interviews with respondents. Table 4 presents the mode score of the questionnaire, which 30 student respondents completed.

Table 4. The Students Responses Mode Score of Lecture with REACT Contextual

Statement	Mode Score	Criteria	
		Statement	Response
Numeracy observation activities increase participants' knowledge and insight into the implementation of numeracy in schools	4	Strongly Agree	Positive
Facilitator teacher skills in implementing numeracy activities	4	Strongly Agree	Positive
The strategies used by teachers in numeracy activities make students involved in learning	4	Strongly Agree	Positive
The media used by the teacher varies	4	Strongly Agree	Positive
Teacher's accuracy in using media	4	Strongly Agree	Positive
Numeracy observation activities add students' insights and knowledge related to numeracy learning methods	4	Strongly Agree	Positive

Discussion

Contextual teaching is a strategy that helps teachers connect lessons to real-world applications. This method motivates students to organize their comprehension of the connections between knowledge and real-world applications. Contextual is a method of instruction that enables teachers to connect the curriculum with practical applications. This approach inspires students to organize their understanding of the relationships between information and practical application (Maryani & Widjajanti, 2020). This study effectively applies the innovative REACT contextual approach, which gives prospective mathematics teacher students a direct and meaningful experience teaching numeracy in the classroom. In the relating stage (Figure 1), students learn in the context of experience or pre-existing knowledge. At this stage, students can connect their experience or knowledge of learning numeracy at the elementary school level with the facilitator's numeracy teaching process. Students can accomplish this by adopting the roles of both learners and observers of the educational process. Students gain insight into the challenges faced by students who struggle with numeracy and observe the strategies employed by facilitator teachers to assist them in overcoming these difficulties (Afni & Hartono, 2020; Crawford, 2001). Students should recognize and document instances in which they are having trouble learning numeracy, including problems with addition and multiplication and problems with solving real-world problems in narrative tasks.

During the experiential stage (Figure 2), the facilitator teacher welcomes students into a supportive learning environment where they assume the role of learners and directly engage in numeracy learning activities. They follow the learning activities led by the facilitator teacher, starting with the opening and core activities and concluding with the closing. The core activities immerse students fully in the numeracy learning atmosphere, starting with tangible objects like corn kernels, bottle caps, and ice cream sticks and progressing to more complex numeracy concepts. Additionally, students engage in direct experimentation with numeracy learning media in collaboration with

their peers. Furthermore, students gain insights into the pedagogical approaches used by teachers in forming student work groups, which consider the diverse abilities of learners, thereby ensuring that all students can receive effective guidance in their numeracy learning (Afni & Hartono, 2020; Crawford, 2001; Ermiana et al., 2021). At the experiential stage, students engage in activities that facilitate the acquisition of knowledge related to addition and subtraction operations.

In the applying stage (Figure 3), the facilitator teacher allows students to practice using numeracy worksheets and numeracy learning media, including frame 10, counting media packages with grains, hundred boards, and songs related to the rules of addition and subtraction of numbers. At the application stage, students apply the knowledge and experience they've gained from the relating and experiencing stages to build new knowledge and skills for teaching numeracy to their peers in the classroom (Crawford, 2001; Demir & Altun, 2018; Moreno, 2010).

Students also act as peer tutors for students in the cooperating stage (Figure 4), who, together with students, use the media to complete the tasks assigned by the teacher. The teacher facilitates students' focus and helps them work together to complete the assigned tasks. Students can also observe the various characteristics of students in learning numeracy, the difficulty level of the problems assigned by the teacher, the learning media used for numeracy, and the teacher's strategy to assist students with difficulty in solving numeracy problems (Crawford, 2001; Anazifa & Djukri, 2017).

Transfer is the final stage of the REACT contextual approach (Figure 5). In this stage, students can discuss numeracy teaching and interview the facilitator teacher. Students share their opinions about the numeracy instruction they received and highlight critical lessons they took away from the facilitator teacher. The facilitator teacher shares strategies for teaching numeracy, including using various learning media, teaching techniques, and potential challenges encountered during learning, as well as methods for overcoming these obstacles. The REACT contextual approach allows students to assimilate and construct their knowledge, engage in meaningful learning, and adopt a novel perspective on how to teach numeracy in the classroom (Moreno, 2010; Arends., 2012; Woolfolk, 2017; Rini et al., 2020; Mahmud & Drus, 2023).

Table 4 shows that the average score for the 30 respondents who completed the feedback questionnaire on the lecture using the REACT contextual approach was 4. This result suggests that the REACT contextual approach effectively provides new experiences for learning and gaining knowledge about teaching numeracy in the classroom. The facilitator's experience teaching numeracy at the school allows students to connect the theory they learned in the campus lecture class with their understanding. The skills of facilitator teachers in creating and using learning media and teaching strategies employed in teaching numeracy provide students with new knowledge and experience in the practical teaching of numeracy. This condition offers North Kalimantan mathematics teacher candidates with insight and perspectives on numeracy teaching (Crawford, 2001; Susanti & Wutsqa, 2020; Wahyuni, 2022).

The interview results indicate that the REACT contextual approach represents a novel lecture strategy. The approach lecturers employ provides students with a direct

experience of creating and utilizing media for numeracy learning. Students gain insight into how teachers use various media in the classroom to teach numeracy. Furthermore, students actively engage in teachers' numeracy learning, serving as observers throughout the process. Students said that lectures using REACT contextual approaches helped them understand how teachers deal with differences in student abilities, different teaching methods, the assignment of work, and problems that instructors face, including problems that come from students, to get more attention during explanations. To be numerate means to reason, solve problems, describe, explain, and forecast future events using mathematical ideas, techniques, facts, and instruments. It entails identifying numeracy in various situations, posing mathematical queries, and selecting relevant approaches to address issues. It also entails having the flexibility to go back and make different decisions in teaching numeracy in the classroom (Crawford, 2001; Bolstad, 2023). Additionally, students gained experience sharing teaching strategies and techniques with teachers through discussions following their participation in the learning process in the classroom. Following their participation in teachers' numeracy learning activities, students have the opportunity to interview teachers and share their impressions, thereby gaining further insights into numeracy teaching.

The innovative learning model course's lecture design, which applies the REACT contextual approach, facilitates students' learning in real environments and situations. This approach enables students to gain meaningful knowledge related to effective numeracy instruction. Consequently, students can improve their understanding and mastery of mathematical concepts and numeracy teaching strategies, thereby developing a specialization in mastering concepts related to mathematics learning, which is a characteristic of future mathematics teachers (Crawford, 2001; Rini et al., 2020; Susanti & Wutsqa, 2020; Afni & Hartono, 2020; Btemirova et al., 2020; Klorina & Juandi, 2022).

4. CONCLUSION

Future North Kalimantan mathematics teachers can apply the innovative REACT contextual approach to their innovative learning model lectures and provide adequate practical numeracy instruction. Students' feedback on applying this approach has a mode score of 4, indicating a positive response. Furthermore, students expressed that attending the lecture gave them a deeper understanding of numeracy teaching, a valuable insight for their future roles as mathematics teachers in North Kalimantan. Further research on numeracy learning at the secondary or higher education level can explore the application of the REACT contextual approach in this study.

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