

Developing Early Childhood Education Students' Competence in Designing Educational Activities Through the 5E Model in a Teaching Practicum Course

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ABSTRACT

This study aimed to examine the extent to which Early Childhood Education students demonstrated competence in designing educational activities when the 5E Model was implemented in a Teaching Practicum course at Kien Giang College of Education. A mixed-methods approach was employed, combining quantitative and qualitative data. The participants were 41 final-year students who took the course over 14 weeks during the 2025–2026 academic year. Data were collected through a competence assessment rubric, lesson plans, learning materials, microteaching observation forms, student feedback forms, and self-assessments. Quantitative data were analyzed using descriptive statistics and 95% confidence intervals, while qualitative data were analyzed thematically. The results showed that the mean course score was 8.06 (SD = 0.55), with 60.97% of students achieving a score of 8.0 or higher. Analysis of learning products and practice-based evidence indicated that five components of competence in designing educational activities were demonstrated to varying degrees: identifying educational activity objectives; designing plans and activity sequences; selecting teaching methods, organizational forms, and learning materials; organizing educational activities according to the 5E process; and assessing and adjusting activities. Student feedback indicated that the 5E Model supported their understanding of the relationships among objectives, content, methods, and assessment, while providing opportunities for practice, collaboration, and professional reflection. The findings provide initial evidence of the feasibility and potential contribution of the 5E Model as an instructional framework in a Teaching Practicum course; however, they are insufficient to establish a causal relationship between the 5E Model and the development of students' competence.

Keywords: 5E Model; competence in designing educational activities; Early Childhood Education; Teaching Practicum; teacher education.

INTRODUCTION

Literature Review

Competence-Based Teacher Education and Competence in Designing Educational Activities

Competence-based teacher education is a major orientation in current educational reform, aiming to develop learners' ability to integrate knowledge, skills, and qualities to perform professional tasks effectively. Unlike an approach that emphasizes knowledge transmission, this model focuses on organizing learning activities associated with professional experience, providing students with opportunities to apply knowledge, self-assess, and gradually improve their professional competence.

According to Circular No. 17/2021/TT-BGDDT, teacher education programs must be designed based on learning outcomes, ensuring that learners have the competence to design, organize, and assess educational activities appropriate to program objectives and learner characteristics (Ministry of Education and Training, 2021). In this context, competence in designing educational activities is a core competence, reflected in the ability to determine objectives and coherently select content, teaching methods, learning materials, and assessment forms in order to effectively organize the educational process.

For early childhood education, this competence is particularly important because the quality of educational activities directly affects children's holistic development. According to the Early Childhood Education Program (Ministry of Education and Training, 2021), activity design should ensure integration, be child-centered, and create opportunities for children to experience, explore, and interact with their environment. This requires teachers to be able to analyze children's characteristics, select appropriate methods, and flexibly adjust activities according to practical contexts.

Within early childhood teacher education programs, the Teaching Practicum course is an important environment for developing competence in designing educational activities through activities such as case analysis, educational planning, learning-material development, microteaching, receiving feedback, and reflection after practice. A lesson plan is only evidence reflecting the level of competence development; the core objective is to develop design thinking and the ability to organize educational activities appropriate to children's developmental needs.

Thus, developing competence in designing educational activities is both a requirement of teacher education learning outcomes and a central task of the Teaching Practicum course. This also provides a basis for selecting the 5E Model as an instructional framework for developing this competence among Early Childhood Education students.

Constructivism as the Theoretical Foundation of the 5E Model

The 5E Model is based on constructivist theory and experiential learning, both of which emphasize the active role of learners in the processes of knowledge construction and competence development. From this perspective, knowledge is not transmitted in a one-way manner but is constructed through experience, interaction, reflection, and application to practical situations.

According to Piaget (1972), learning is a process in which learners continuously adjust their cognitive structures when encountering new experiences. Vygotsky (1978) further argued that cognitive development is strongly influenced by the social environment; through collaboration and support within the "zone of proximal development," learners gradually expand their capacity for thinking and problem-solving. Building on these perspectives, Kolb (1984) proposed that learning occurs through a cycle consisting of experience, reflection, conceptualization, and application, whereby competence is formed and developed through action and continuous improvement.

Building on these theoretical foundations, Bybee et al. (2006) developed the 5E Model, consisting of five phases: Engage, Explore, Explain, Elaborate, and Evaluate. This cycle enables learners to begin with practical situations, actively explore, exchange ideas, apply knowledge, and self-assess their learning outcomes. Therefore, the 5E Model is not only an instructional procedure but also a pedagogical framework that supports competence development through experience, collaboration, and reflection.

For the Teaching Practicum course, the 5E Model creates an environment in which students participate fully in the processes of analyzing situations, designing educational activities, practicing, receiving feedback, and revising their professional products. This provides the theoretical basis for implementing the 5E Model to develop Early Childhood Education students' competence in designing educational activities.

The 5E Model in Teacher Education and the Research Gap

The 5E Model (Engage – Explore – Explain – Elaborate – Evaluate), developed by Bybee et al. (2006) on the foundation of constructivist theory, organizes the learning process toward active knowledge construction through experience, exploration, discussion, application, and reflection. With five closely connected phases, the 5E Model not only supports knowledge development but also promotes thinking, problem-solving skills, and the ability to apply knowledge in practice. In this process, the lecturer serves as a designer, facilitator, and supporter, while learners are the subjects of the learning process.

International studies have shown that the 5E Model can be effective in teacher education by providing students with opportunities to analyze educational situations, design teaching plans, practice, receive feedback, and revise professional products. This learning process contributes to the development of pedagogical thinking, problem-solving competence, and professional reflection—core competences of teachers in the context of educational reform (Bybee, 2015; Darling-Hammond, 2006).

In Vietnam, the 5E Model has been applied primarily in STEM and STEAM education and in organizing exploratory activities for young children, with initial evidence of its effectiveness in promoting learners' active participation, collaboration, thinking, and learning interest. More recently, Tran Thanh Binh and Tran Thi Hong Them (2025) systematized the theoretical foundations of constructivist teaching and proposed a constructivist teaching process based on the 5E Model at the primary school level, emphasizing the role of 5E as an instructional process for promoting learners' competence to construct knowledge and supporting a shift in teachers' roles from knowledge transmission to organizing and supporting learning activities. However, this study mainly focused on proposing an instructional process and did not examine in depth the use of 5E as a teacher education model. Similarly, Dang Ut Phuong, Le Thi Hoa, and Tran Viet Nhi (2026) found that early childhood teachers highly appreciated the 5E Model but encountered difficulties in implementation due to limitations in their competence to design and organize educational activities.

Based on this research gap, the present study implements the 5E Model as an instructional framework in the Teaching Practicum course to support the development of Early Childhood Education students' competence in designing educational activities. The novelty of the study lies in clarifying the relationship between the phases of the 5E Model and the components of competence in designing educational activities, while examining the manifestation of competence through multiple sources of evidence, including learning products, practice outcomes, and student feedback. This approach provides additional empirical evidence for competence-oriented innovation in teacher education.

Research Framework

The study is grounded in constructivist theory, experiential learning, and the 5E instructional model. Accordingly, the 5E Model is regarded as a framework for organizing learning activities in the Teaching Practicum course, creating an environment in which students experience, practice, receive feedback, and reflect throughout the process of designing educational activities.

In this study, competence in designing educational activities is identified as the outcome variable. It refers to students' ability to analyze educational requirements, determine objectives, design activity plans, select appropriate methods and learning materials, organize implementation, and adjust activities on the basis of assessment. A lesson plan is not considered competence itself but rather evidence reflecting the level of development of students' competence in designing educational activities.

Based on the learning outcomes of the Early Childhood Education program, the objectives of the Teaching Practicum course, and the process of the 5E Model, the study identifies five basic components of competence in designing educational activities:

1. Identifying educational activity objectives appropriate to children's developmental requirements;
2. Designing plans and sequences of educational activities based on a child-centered orientation;
3. Selecting and integrating appropriate teaching methods, organizational forms, and learning materials;
4. Organizing educational activities according to the process of the 5E Model;
5. Assessing and adjusting educational activities based on feedback and implementation outcomes.

These five components provide the basis for developing the instructional process, designing assessment instruments, and analyzing students' competence development after the implementation of the 5E Model in the Teaching Practicum course.

Table 1. Relationship between the stages of the 5E model and the components of educational activity design competence

5E Model Stage	Students' Learning Activities	Assessment Evidence	Component of Educational Activity Design Competence Formed
Engage	Analyzing topics, identifying educational needs and objectives	Educational activity objectives	Identifying educational activity objectives
Explore	Designing lesson plans, developing learning materials, selecting organizational methods	Lesson plans, learning materials	Designing educational plans and sequences of activities
Explain	Presenting, defending design proposals, exchanging professional feedback	Evaluation forms, feedback from instructors and peers	Explaining and refining educational activity design proposals
Elaborate	Practice teaching, organizing activities, handling pedagogical situations	Practical observation forms	Organizing educational activities and adjusting flexibly
Evaluate	Self-evaluation, peer assessment, revising lesson plans after practice teaching		

METHODOLOGY

Research Design

The study employed a mixed-methods approach, combining quantitative and qualitative data to describe and clarify the extent to which students demonstrated competence in designing educational activities after participating in the Teaching Practicum course organized according to the 5E Model. The research design focused on collecting multiple sources of evidence to cross-check competence assessment results with students' performance in learning products, microteaching activities, and post-learning feedback.

For the quantitative component, a competence assessment form was used to assess students' learning products and practice outcomes after completing the course. The assessment criteria were developed based on the research framework and the five components of competence in designing educational activities identified in Section 1.3. Because the study did not employ a control group or a pre-test–post-test design, the quantitative results were used primarily to describe students' level of achievement at the end of the course and were not used to establish a causal relationship.

Research Participants and Research Focus

The research focus was the development of Early Childhood Education students' competence in designing educational activities through the implementation of the 5E Model in the Teaching Practicum course.

The research participants were 41 final-year Early Childhood Education students at Kien Giang College of Education who participated in the Teaching Practicum course during the 2025–2026 academic year. Before taking the course, the students had completed foundational and specialized courses and had gained initial

experience in designing and organizing educational activities through practical activities and field experiences in early childhood education settings. This group was selected because the Teaching Practicum course is a stage at which students directly apply knowledge and skills to design, organize, and assess educational activities.

Including all students participating in the course enabled the study to reflect the implementation of the 5E Model within the actual instructional context of the course. However, because the study did not collect a standardized measure of each student's initial competence, differences in students' prior experience and initial competence should be taken into account when interpreting the findings.

Research Procedure

The study was conducted continuously over 14 weeks, corresponding to the entire period of implementation of the Teaching Practicum course.

The research process consisted of four stages.

Preparation stage

The lecturer developed a teaching plan based on the 5E Model, designed a system of learning tasks and assessment criteria for competence in designing educational activities, and guided students in carrying out the requirements of the course.

Instructional implementation according to the 5E process

Learning activities were organized according to the five phases of the 5E Model. Students successively carried out tasks such as analyzing educational situations, identifying objectives, designing lesson plans, developing learning materials, presenting design plans, conducting microteaching, receiving feedback, and completing their products.

Data collection stage

During the implementation of the course, the lecturer collected evidence including lesson plans, learning materials, observation forms, feedback forms, learning products, and student self-assessments to assess the development of the components of competence in designing educational activities.

Analysis and evaluation stage

After the completion of the course, all data were compiled, coded, and analyzed to assess the level achieved for each component of competence in designing educational activities and to compare these findings with qualitative evidence in order to clarify the effectiveness of implementing the 5E Model.

The research procedure ensured that students experienced all phases of the 5E Model while also enabling the lecturer to monitor learners' progress throughout the training process.

Data Collection Instruments

The study used multiple sources of data to comprehensively assess students' competence in designing educational activities.

The central instrument was a competence assessment rubric for designing educational activities, developed based on the learning outcomes of the Early Childhood Education program, the objectives of the Teaching Practicum course, the research framework, and the 5E process. The rubric consisted of five criteria corresponding to the five components of competence: (1) identifying educational activity objectives; (2) designing plans and activity sequences; (3) selecting teaching methods, organizational forms, and learning materials; (4) organizing educational activities according to the 5E process; and (5) assessing and adjusting educational activities.

Each criterion was described at five performance levels, from 1 to 5, with each level defined by observable indicators in students' design products and practice performance. The complete rubric, including the criteria and detailed descriptors for each performance level, is provided in Appendix 1 to enhance transparency and replicability of the assessment process.

In addition to the rubric, the study used supplementary sources of evidence, including student-designed lesson plans and learning materials, microteaching observation forms, student feedback forms, and post-course self-assessments. These data sources were used to cross-check and explain the quantitative assessment results.

Table 2. Data Collection and Analysis System

Research question	Data source	Instrument	Analysis method
How do students demonstrate competence in designing educational activities after participating in the Teaching Practicum course organized according to the 5E Model?	Lesson plans, learning products	Competence assessment rubric	Descriptive statistics; 95% CI
How do students demonstrate competence during the practicum process?	Microteaching observation	Observation form	Thematic/content analysis
How do students perceive learning through the 5E Model?	Feedback forms, self-assessments	Open-ended questions	Thematic analysis

Validity and reliability of the assessment instruments. The criteria of the rubric were developed from the competence framework established in the study and aligned with the learning outcomes of the Early Childhood Education program and the requirements of the Teaching Practicum course. The performance descriptors were formulated in terms of observable indicators in students' products and practice activities to enhance consistency in assessment. The use of multiple sources of evidence, including learning products, microteaching observations, student feedback, and self-assessments, enabled the researchers to examine competence from different perspectives. However, because the study did not involve independent ratings by multiple assessors or statistical reliability testing of the rubric with a larger sample, the reliability of the instrument requires further examination in future studies.

Data Analysis

Quantitative data were coded and processed using SPSS 26.0. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to describe students' achievement after the implementation of the 5E Model. Where appropriate, 95% confidence intervals were calculated to indicate the precision of the estimated mean scores. The results were presented in tables to describe the level achieved for each component of competence in designing educational activities.

Qualitative data obtained from observations, lesson plans, learning products, and student feedback were analyzed thematically. The analysis focused on identifying observable manifestations of design thinking, the ability to organize educational activities, reflective competence, and the advantages and difficulties experienced by students when learning through the 5E Model.

The quantitative and qualitative findings were then compared across data sources to identify convergent and divergent evidence. This triangulation was used to strengthen the interpretation of the findings and to clarify how students demonstrated competence within the instructional context. Given the absence of a control group and pre-test–post-test comparison, the analysis was not intended to estimate the causal effect of the 5E Model.

RESULTS AND DISCUSSION

Students' Learning Outcomes After the Implementation of the 5E Model

After 14 weeks of implementing the 5E Model in the Teaching Practicum course, the learning outcomes of the 41 students were assessed based on the course assessment criteria.

The results showed that the students achieved a relatively high level of learning outcomes. The mean score was 8.06, with a standard deviation of 0.55. Of the 41 students, 25 students (60.97%) achieved a score of 8.0 or higher, while 16 students (39.03%) achieved scores below 8.0. The lowest score was 6.80 and the highest was 9.10.

Table 3. Descriptive Statistics of Students' Learning Outcomes

Statistic	Value
N	41
Mean	8.06
Standard deviation	0.55
Minimum	6.80
Maximum	9.10
Students achieving ≥ 8.0	25 (60.97%)
Students achieving < 8.0	16 (39.03%)

The results indicate that most students achieved relatively good learning outcomes after participating in the Teaching Practicum course organized according to the 5E Model. The relatively small standard deviation ($SD = 0.55$) suggests that the students' scores were not highly dispersed.

However, the results should be interpreted with caution because the study did not employ a control group or pre-test–post-test design. Therefore, the findings primarily reflect the learning outcomes achieved by students after the implementation of the 5E Model and do not allow a definitive conclusion about the causal effect of the model on students' learning outcomes.

Evidence of the Development of Competence in Designing Educational Activities

Analysis of students' learning products, microteaching observations, and assessment results showed that all five components of competence in designing educational activities were manifested to different degrees after the implementation of the 5E Model.

The first component, identifying educational activity objectives, was demonstrated through students' ability to determine objectives that were more specific and appropriate to children's developmental characteristics. Compared with initial lesson plans, students increasingly attempted to express objectives in terms of observable outcomes and to establish closer connections between objectives and learning activities.

The second component, designing plans and sequences of educational activities, was reflected in students' ability to organize activities in a more logical sequence. Students gradually moved from designing activities as separate steps toward constructing a coherent sequence in which the stages of the activity were connected and supported the achievement of the identified objectives.

The third component, selecting teaching methods, organizational forms, and learning materials, was demonstrated through students' increasing attention to the appropriateness of methods and materials for children's characteristics and the intended learning outcomes. Students showed greater effort in combining different methods and designing learning materials that could support children's participation and exploration.

The fourth component, organizing educational activities according to the 5E process, was reflected most clearly in students' microteaching activities. Students were able to organize learning experiences according to the five stages of Engage, Explore, Explain, Elaborate, and Evaluate, although the level of implementation varied among students.

The fifth component, assessing and adjusting educational activities, was demonstrated through students' ability to receive feedback, identify limitations in their lesson plans and microteaching performance, and make appropriate adjustments. This component also reflected the role of reflection in the process of developing professional competence.

Table 4. Evidence of the Development of the Components of Competence in Designing Educational Activities

Component of competence	Main evidence
Identifying educational activity objectives	Objectives were increasingly specific, observable, and appropriate to children's developmental characteristics.
Designing plans and sequences of educational activities	Activities were organized in a more logical and coherent sequence.
Selecting teaching methods, organizational forms, and learning materials	Methods and learning materials were selected with greater attention to children's characteristics and learning objectives.
Organizing educational activities according to the 5E process	Students demonstrated the ability to organize activities through the five phases of Engage, Explore, Explain, Elaborate, and Evaluate.
Assessing and adjusting educational activities	Students used feedback and reflection to identify limitations and revise their educational activity designs.

The evidence above suggests that the implementation of the 5E Model provided students with opportunities to practice different aspects of competence in designing educational activities in an integrated manner. In particular, the repeated cycle of experience, practice, feedback, and adjustment helped connect the process of designing educational activities with the actual organization of educational activities.

Nevertheless, the development of these components was not completely uniform across students. Some students were able to establish clear relationships among objectives, content, teaching methods, and assessment, whereas others still experienced difficulties in ensuring consistency among these elements and in flexibly adjusting activities during implementation.

Students' Feedback on Designing Educational Activities Through the 5E Model

Students' feedback indicated that learning through the 5E Model created a more active learning process and provided them with more opportunities to participate in the design and implementation of educational activities.

A number of students reported that the sequence of Engage, Explore, Explain, Elaborate, and Evaluate helped them better understand how an educational activity should be developed from identifying the learning requirements to designing, implementing, assessing, and adjusting the activity.

Students also emphasized the value of practice and feedback. Through microteaching and peer and lecturer feedback, students had opportunities to recognize limitations in their lesson plans and make adjustments before completing their final products. This process contributed to increasing students' confidence in designing and organizing educational activities.

In addition, students reported that working in groups during the learning process created opportunities for exchanging ideas, discussing different ways of designing activities, and supporting one another in completing learning tasks. These interactions contributed to the development of collaboration and professional reflection.

However, some students also indicated that implementing all five stages of the 5E Model required considerable time and preparation. Students who had limited experience in designing educational activities initially encountered difficulties in distinguishing clearly between some phases of the model and in ensuring that each phase was connected to the overall learning objectives.

Overall, student feedback suggests that the 5E Model was positively received and was perceived as useful for supporting the process of designing educational activities. At the same time, its effective implementation requires appropriate time allocation, clear guidance, and sufficient opportunities for practice and feedback.

The implementation of the 5E Model should also be considered within the specific institutional and instructional context of the study. The intervention was conducted in one Teaching Practicum course at Kien Giang College of Education over 14 weeks, with direct guidance and feedback from the lecturer. Students' prior practical experience, access to learning materials, opportunities for microteaching, available instructional time, and peer and lecturer support may have influenced their learning outcomes and competence performance. Therefore, the observed results should be interpreted as context-dependent evidence rather than as evidence that can be generalized directly to other teacher education institutions. Further multi-site research is needed to examine how institutional conditions, available resources, and students' prior experience may affect the implementation of the 5E Model.

DISCUSSION AND LIMITATIONS

The findings of this study are broadly consistent with the theoretical foundations of constructivism and experiential learning, according to which learning and competence development occur through active participation, experience, reflection, and application. The implementation of the 5E Model created conditions for students to move through a continuous process of engagement, exploration, explanation, application, and evaluation, thereby connecting pedagogical knowledge with professional practice.

The findings are also consistent with previous studies indicating that the 5E Model can promote active learning, interaction, problem-solving, and reflection. In the context of teacher education, these elements are particularly relevant because professional competence cannot be developed solely through the acquisition of theoretical knowledge but requires repeated opportunities for practice, feedback, and adjustment.

A notable finding of the present study is that the 5E Model was used not simply as a procedure for organizing students' learning but as a framework for developing competence in designing educational activities. The five phases of the model were connected with five components of competence, creating a relatively coherent relationship between the learning process and the intended professional competence.

Nevertheless, several limitations should be acknowledged. First, the study involved only 41 final-year Early Childhood Education students from a single institution, which limits the transferability of the findings to other teacher education contexts. Second, the study used a one-group, post-course design without a control group or a formal pre-test–post-test comparison. Therefore, the observed level of competence at the end of the course cannot be attributed specifically to the 5E Model, as students' prior experience, other learning activities, lecturer support, and contextual factors may also have contributed to the results.

Third, the central assessment instrument was developed within the context of the study, and the lecturer who implemented the instructional intervention also served as the main assessor. Although the use of explicit

performance descriptors and multiple sources of evidence helped reduce the risk of subjective judgment, confirmation bias cannot be completely excluded. Future research should therefore involve independent assessors and examine inter-rater reliability.

Fourth, the study did not examine whether the competence demonstrated by students was maintained over time or transferred to authentic teaching contexts in preschools. The findings therefore reflect students' competence performance within the Teaching Practicum course rather than evidence of long-term professional competence. Finally, differences in students' prior experience and initial competence were not controlled statistically.

Taken together, these limitations mean that the findings should be interpreted as initial, context-dependent empirical evidence concerning the feasibility and potential contribution of the 5E Model to competence-oriented learning in a Teaching Practicum course, rather than as definitive evidence of causal effectiveness. A stronger future research design should employ a quasi-experimental approach with experimental and comparison groups, pre-test and post-test measures, independent assessors, and follow-up assessment to examine both the development and sustainability of competence.

CONCLUSION

The study investigated the implementation of the 5E Model in the Teaching Practicum course to develop Early Childhood Education students' competence in designing educational activities at Kien Giang College of Education. Based on the quantitative and qualitative evidence collected from 41 final-year students over 14 weeks, the study found that students achieved relatively good learning outcomes, with a mean score of 8.06 (SD = 0.55) and 60.97% of students achieving a score of 8.0 or higher.

Analysis of students' learning products, microteaching observations, and feedback indicated that five components of competence in designing educational activities were manifested after the implementation of the 5E Model: identifying educational activity objectives; designing plans and sequences of educational activities; selecting teaching methods, organizational forms, and learning materials; organizing educational activities according to the 5E process; and assessing and adjusting educational activities. The learning process also provided students with opportunities to connect pedagogical knowledge with practice through experience, collaboration, feedback, and reflection.

The findings suggest that the 5E Model can serve as a feasible instructional framework for organizing learning activities in a Teaching Practicum course, particularly by creating structured opportunities for students to design, practice, receive feedback, reflect, and revise educational activities. The alignment between the five phases of the 5E Model and the five components of competence provides a practical framework for integrating competence development into teacher education activities.

However, given the small sample, single-institution context, differences in students' prior experience, and the absence of a control group or formal pre-test–post-test comparison, the findings should be interpreted as initial evidence of feasibility and potential contribution rather than evidence of a causal effect of the 5E Model. The study also does not establish whether the competence demonstrated by students is sustained over time or transferred to authentic preschool teaching contexts. Future studies should employ quasi-experimental designs with pre-test and post-test measures, comparison groups, independent assessors, larger and more diverse samples, and follow-up assessments to examine the effectiveness, sustainability, and transferability of the 5E Model in Early Childhood teacher education.

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