

Review Article

Application of Artificial Intelligence in Teaching Grade 3 Mathematics toward Developing Student Competencies

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Abstract: The application of artificial intelligence in teaching Grade 3 Mathematics in line with a competency-based approach, aiming to improve the effectiveness of teaching and learning in primary schools, is a topic of considerable interest among education administrators, experts, educators, and teachers. Accordingly, this study clarifies several key concepts, contents, methods, and processes for integrating artificial intelligence into the teaching of Grade 3 Mathematics with a view to fostering student competencies. This effort is intended to keep pace with global trends in innovation, open up opportunities to improve the quality of education, and meet the requirements of student competency development in the era of digital transformation.

Keywords: Application of Artificial Intelligence in Teaching Grade 3 Mathematics Toward Developing Student Competencies, the Process of Applying Artificial Intelligence in Teaching Grade 3 Mathematics Toward Developing Student Competencies.

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1. INTRODUCTION

As the world enters the digital era, artificial intelligence (AI) is gradually making its way into every field of life, education being no exception. The application of AI in teaching has become, and continues to become, a trend that opens up substantial opportunities for the fundamental and comprehensive renewal of education in Vietnam. At the primary level, Grade 3 Mathematics is regarded as the stage that lays the foundation for forming and developing students' mathematical competencies. Applying AI in teaching Grade 3 Mathematics with a competency-oriented approach can help analyze each student's learning data and generate exercise suggestions suited to individual capacities; it can also support teachers in detecting learning difficulties early and making timely adjustments. In addition, AI applications are capable of creating an interactive and lively learning environment that stimulates students' interest and creative thinking.

2. RESEARCH RESULTS

2.1 Some Basic Concepts

2.1.1 Application of Artificial Intelligence

According to Stuart Russell and Peter Norvig [10], who compiled a series of definitions of artificial intelligence (AI), AI is defined as follows: AI is a fascinating endeavor to give computers the ability to perceive and think, that is, the ability to sense and

analyze the surrounding world and, from that, to generate goal-directed behavior.

AI is a set of machine actions closely related to human thinking, such as the ability to make decisions in uncertain situations or to solve complex problems without specific step-by-step guidance.

AI is a field of study concerned with intellectual capacities operating through computational models, that is, building algorithms and software systems that enable computers to reason, recognize patterns, process language, plan, and learn.

AI is the art and science of creating machines capable of performing functions that would normally require intelligence if carried out by a human, such as playing chess, translating languages, driving vehicles automatically, or diagnosing illnesses.

According to Nguyen Minh Hai, AI is one of the most advanced fields of modern computer science. AI is understood as a technology that enables machines, particularly computers, to perform tasks that inherently require human-like intelligence. Unlike traditional computer programs, which operate only according to pre-programmed instructions based on fixed logic, AI uses machine-learning systems to learn from data and

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automatically adjust its behavior in order to adapt and respond appropriately to specific situations. AI belongs to the field of computer science and is built and developed with the aim of enabling computers to automate intelligent behaviors similar to those of humans. This includes the capacity for thought and reasoning to solve problems, the capacity to communicate by understanding and processing natural language, the capacity to learn from experience, and even the capacity to adapt in changing environments. Thanks to AI, computers are no longer merely tools that execute commands but have become intelligent partners supporting many fields such as healthcare, education, finance, transportation, and manufacturing.

According to Vu Ngoc Hoa [5], AI is emphasized as a technology that creates machines and systems capable of performing complex tasks requiring human intelligence through the use of computational models, algorithms, and advanced data-processing techniques. One of the important underlying technologies of AI today is machine learning. This technology enables computer systems to analyze, learn from, and understand large data sets without needing to be programmed step by step in advance. As a result, machines can improve their performance over time based on real-world data.

Thus, AI is a technology that enables machines, particularly computers, to perform tasks that require human-like intelligence. Unlike traditional programming, which is based solely on logic, artificial intelligence uses machine-learning systems to learn and to simulate activities such as thinking, reasoning, and self-adaptation.

2.1.2 Application of Artificial Intelligence in Teaching Mathematics toward Developing Student Competencies

AI serves as a tool that helps teachers analyze learning data and identify each student's level, strengths, and weaknesses so as to design lesson content that is appropriate and to personalize the learning process.

In lesson design, AI helps teachers build flexible lessons and create visual simulations and practical situations, helping students gain a deeper understanding and connect mathematical knowledge with everyday life.

In organizing instruction, AI contributes to building a smart learning environment through personalized learning systems, virtual assistants, problem-solving chatbots, and online learning platforms with instant feedback, thereby increasing students' initiative, creativity, and capacity for self-directed learning.

In addition, AI helps track learning progress, identify difficulties, and provide recommendations for

adjusting methods to suit each individual. The application of AI also contributes to training and developing the core competencies of Mathematics, such as logical thinking, problem-solving, mathematical modeling, tool use, collaboration, and communication.

Thus, applying AI in teaching Mathematics toward developing student competencies means integrating intelligent technologies into the process of building lesson plans and implementing learning activities, in order to improve teaching effectiveness and support the comprehensive development of the mathematical competencies students need.

It can be seen that AI not only supports the renewal of teaching but also opens up opportunities to improve the quality of education, meeting the requirements of student competency development in the digital era.

2.2. Some Issues Concerning the Application of Artificial Intelligence in Teaching Grade 3 Mathematics toward Developing Student Competencies

2.2.1 The Necessity of Applying Artificial Intelligence in Teaching Grade 3 Mathematics toward Developing Student Competencies

The 2018 General Education Program requires teachers to design learning activities that help students develop the component competencies of mathematical competence, such as: the competency for mathematical thinking and reasoning, the competency for mathematical modeling, the competency for mathematical problem-solving, the competency for mathematical communication, and the competency for using tools and aids for learning Mathematics, together with basic knowledge of numbers and calculation, geometry and measurement, and statistics and probability, while also contributing to the training of logical thinking, problem-solving ability, and the capacity to apply knowledge in practice.

Applying AI in teaching Grade 3 Mathematics with a competency-oriented approach is highly necessary and brings many benefits to both teachers and students, such as:

- Enhancing personalization in learning: AI makes it possible to build intelligent learning systems capable of identifying each student's level and competencies. As Grade 3 students absorb material at different rates, using AI to adjust the content, pace, and teaching methods according to individual needs will help them learn more effectively, avoiding overload or discouragement.
- Supporting teachers in lesson design: AI can suggest lesson plans and help build systems of questions suited to each level of thinking, from recognition to application and creativity. As a result, teachers can save time while ensuring

that lessons are both engaging and aligned with competency-development goals.

- Creating an interactive and lively learning environment: through AI-integrated software such as educational games, interactive exercises, or visual simulations, Grade 3 students can learn mathematics with greater interest. Interacting with virtual characters and receiving instant feedback helps them stay focused and develop enthusiasm for the subject.
- Assessing student competencies more accurately: AI helps teachers track students' learning progress through data; it supports the analysis of learning data such as time spent on tasks, frequency of errors, and level of task completion, giving teachers a comprehensive view of each student's competencies. This, in turn, allows teaching methods and content to be adjusted in ways that are closer to actual needs, meeting the requirement for comprehensive competency development. Applying artificial intelligence in teaching Grade 3 Mathematics is not merely an inevitable trend but also an urgent requirement for improving the quality of education in line with a competency-based approach. AI does not replace the role of the teacher; rather, it acts as a capable assistant, making teaching and learning smarter, more personalized, and more effective.

2.2.2 Content of Applying Artificial Intelligence in Teaching Grade 3 Mathematics toward Developing Competencies

In the context of comprehensive educational renewal under the 2018 General Education Program, organizing instruction is directed not only toward transmitting knowledge but also toward developing students' competencies. Applying AI in teaching Grade 3 Mathematics not only helps improve teaching effectiveness but also promotes the development of student competencies in a practical and flexible manner. The contents of AI application in teaching Grade 3 Mathematics can be listed as follows:

- Using AI to support the design of personalized, flexible lessons: at the lesson-design stage, AI can help teachers build learning content suited to each group of students. Many current technology platforms, such as ClassPoint AI or other AI-based exercise-generation tools, can automatically suggest content, classify questions by level of difficulty, and even analyze prior learning data to create a personalized learning plan. For example, when designing the lesson on Multiplying a Two-Digit Number by a One-Digit Number [7, p.67], teachers can use AI-integrated software to create a system of visual, lively exercises with clearly differentiated levels of difficulty. These exercises not only help students gain a deeper understanding of the knowledge but also train

their skill in applying it flexibly in specific situations.

- Using AI to design companion characters within lessons: AI is being effectively applied to design companion characters within lessons, increasing interactivity and interest among primary school students. Applying AI to design such characters offers a more engaging and interactive way of learning. AI can create intelligent virtual characters that act as learning companions, supporting students throughout the learning process. Through AI technology, these virtual characters can respond in real time, track learning progress, and offer suggestions suited to each student's ability, creating a dynamic and friendly learning environment. Teachers can design or use AI video-generation software (such as HeyGen, Synthesia, Animaker, or Colossyan) to build AI characters with lively appearances and appealing dialogue. For instance, in Lesson 2: Review of Addition and Subtraction within 1,000 [7, p.9], AI can create a companion character named "Smart Bear." When students begin the lesson, Smart Bear greets them and then introduces the lesson's title. As students work through the lesson, if a student chooses the wrong answer for a question such as what is 37 plus 45, Smart Bear will not simply indicate the error but will offer a hint: "Let's add the units first: what is 7 plus 5?" If the student is still having difficulty, Smart Bear will use images of counting sticks or visual diagrams to illustrate the addition. Conversely, when the student answers correctly, Smart Bear will offer praise and may unlock a small virtual reward, boosting learning motivation. AI enables this character to automatically adjust its level of support according to each student's ability and responses.
- Using AI to generate images on request and to turn textbook pages into short videos: AI can convert static textbook pages into short videos with sound and lively effects, making the content more engaging and easier to understand. These videos not only help students grasp the lesson better but also stimulate creativity and attention during learning. For example, for Lesson 21: Cubes and Rectangular Boxes [7, p.63], instead of only looking at static pictures in the book, students can watch a short video created using tools such as ChatGPT or Suno AI, showing three students discussing the shapes of objects around them, accompanied by narration such as: "The Leaning Tower of Pisa looks like a cylinder - the pyramid looks like a sphere - the building looks like a rectangular box." AI can automatically turn the descriptions in the textbook into moving images with narration, helping students recognize the

characteristics of geometric shapes more easily and turning abstract textbook content into a visual, easy-to-understand, and relatable learning experience.

- Using AI to design situational videos for word problems and to simulate real-life situations: AI can analyze and build video scripts based on lesson content, simulating real-life situations so that students can solve problems connected to everyday life. These videos not only make knowledge more accessible to students but also develop critical thinking and problem-solving ability. Suggested tools: Canva Magic Media / D-ID, for creating animated videos with characters reading out word problems; ElevenLabs / TTSTReader, for generating spoken narration of problems for younger students who are not yet strong readers. For example, in designing a situational video for Lesson 43: Multiplication Table [7, p.28], the problem could relate to multiplication by 2 in daily life. Suppose AI generates a video depicting a story about a child named Minh going to a shop to buy apples. In the video, Minh buys 2 boxes of apples, each box containing 5 apples. The question is: how many apples did Minh buy in total? The video would show the steps of Minh buying apples at the shop. While watching, students learn not only how to perform the multiplication (2×5) but also how to apply arithmetic operations to everyday situations. AI can automatically vary the situation or generate different versions of the problem, helping students practice and reinforce their knowledge in an engaging way.
- Using AI to create poems, songs, or rhymes about mathematical knowledge: AI can generate playful poems or songs that repeat mathematical concepts in a memorable way, helping students remember formulas or operations through music and rhyme. Such creations not only make learning mathematics more enjoyable but also stimulate imagination and strengthen students' memory. At the same time, combining art with academic content creates an effective and engaging learning method. Suggested tools: ChatGPT, Claude AI, Gemini, for writing creative poems, rhymes, or song lyrics; AIVA, Amper Music, Soundraw.io, for composing background music; Suno AI, Boomy, LimeWire AI Studio, for creating complete songs from given lyrics or themes; DeepBeat, These Lyrics Do Not Exist, for automatically generating lyrics, particularly for rap or pop styles. For instance, when teaching Lesson 43: "Multiplication Table" [7, p.28], teachers can use tools such as ChatGPT and Suno AI to turn mathematical knowledge, such as the multiplication table, into a cheerful song so that students can remember it and approach

new knowledge more easily: the song "Multiplication Table."

- Using AI to design educational games and mind maps: AI can help create interactive games in which the system automatically adjusts the difficulty of tasks based on each player's ability and learning progress. This keeps the game suited to students' capacities, presenting a challenge without being so difficult that students become discouraged. At the same time, AI can generate mind maps of mathematical operations, helping students easily see and understand the relationships between pieces of knowledge, thereby improving their logical thinking and problem-solving ability. Suggested tools: ChatGPT, Perplexity AI, for designing lesson plans, game ideas, and content diagrams; Canva AI, MindMeister, Miro AI, for automatically drawing mind maps and creating teaching diagrams; Quizlet AI, Kahoot!, AI, Classcraft, for creating educational games and interactive questions; Gamma App, SlidesAI.io, for quickly creating lessons or presentations from outlines or diagrams.
- Using AI to design worksheets or survey forms to assess students' mathematical competencies: AI can be used to generate survey questions suited to each student, based on their ability and learning progress, making tests more flexible and accurate. AI is capable of generating questions matched to each student's level of cognition, from basic to advanced, while also analyzing test results to give an accurate assessment of each student's competencies. Teachers can use platforms such as Google Forms with AI integration, ClassPoint, or Quizizz to build diverse sets of assessment questions: multiple choice, fill-in-the-blank, drag-and-drop, sequencing, and so on. Test results can be graded quickly using AI tools such as ChatGPT, Google Bard, or Microsoft Copilot. Some AI-integrated learning platforms (for example, ClassDojo, Edmodo, or AI-supported learning management systems) can record students' learning progress, such as time spent on tasks, number of incorrect answers, and level of completion for each section. For example, in the topic "Multiplication and Division within 100" [7, p.67], AI can generate a worksheet containing several types of questions classified by level of difficulty, from easy to hard. After students complete the worksheet, AI will automatically grade it and identify the specific skill in which a student made errors, thereby adjusting the learning content accordingly. In addition, AI can generate multiple different versions of the worksheet to prevent rote memorization among students, while also helping teachers personalize instruction.

- Using AI for natural language processing (NLP) to enable communication, machine learning to allow characters to adapt to users, emotional intelligence to understand and respond to feelings, and AI-generated images, voices, and character-motion simulations. Suggested tools: ChatGPT API, Character AI, for enabling dialogue; Midjourney, Stable Diffusion, for drawing character appearances; Replica Studios, ElevenLabs, for generating natural-sounding voices; Inworld AI, Unity with AI plugins, for developing intelligent 3D virtual characters.

2.2.3 Methods of Applying Artificial Intelligence in Teaching Grade 3 Mathematics toward Developing Student Competencies

In the current trend of educational renewal, integrating AI into the teaching process in general, and into the teaching of Mathematics at the primary level in particular, is gradually becoming an inevitable direction for realizing the goal of comprehensive competency development for students under the 2018 General Education Program. AI is not merely a supporting technological tool; it also has the potential to become an intelligent learning assistant, contributing to changes in how learning activities are designed, organized, and personalized for each student, especially Grade 3 students, who are at the stage of forming their most basic mathematical competencies. Specifically, AI is capable of processing and analyzing each student's learning data quickly and accurately, thereby offering suggestions for learning content, practice exercises, or forms of activity suited to each individual's level of cognition, learning style, and pace of absorption. For example, in the lesson "Multiplying a Five-Digit Number by a One-Digit Number" [7, p.94], AI can track the accuracy of a student's calculations, such as $12,415 \times 3 = ?$, and, based on this, offer exercises at an appropriate level: students who make many errors will be given simpler exercises, while students who have mastered the material will be given more advanced ones.

AI also provides tools for visualizing knowledge, such as animated images, situational simulations, or interactive video illustrations - elements that are especially useful in helping Grade 3 students grasp and remember mathematical concepts that are still abstract for their age group. For example, in Lesson 30: "Millimeter" [7, p.85], the tool Mozart 3D can be used to create 3D simulations of the lengths of objects, helping students more clearly visualize units of measurement in practice.

In organizing instruction, AI systems can support teachers in presenting content through automated voice narration, virtual assistants, or game-integrated learning platforms, creating a lively, engaging, and more interactive learning environment. For example, when teaching Lesson 9: The 6-Times Table [7, p.28], teachers

can use an AI application to create a "fish-catching" game, in which students select pairs of numbers that multiply to give 6 in order to "catch fish," combining fun with memory practice. In particular, for students whose reading skills are still limited, text-to-speech features help them access the lesson more easily and naturally.

In addition, AI can track learning progress by analyzing learning behavior, including time spent on tasks, rate of task completion, and level of accuracy, thereby providing instant feedback and helping teachers adjust their teaching activities to suit the needs and pace of each student. For example, in "General Practice" lessons [7, p.46], AI can compile statistics on common errors in addition and subtraction, thereby suggesting that teachers adjust the type of exercise or re-emphasize the steps of solving problems for particular groups of students.

Thus, applying AI in designing and organizing the teaching of Grade 3 Mathematics not only contributes to improving the quality and effectiveness of teaching but also promotes the development of mathematical competence, logical thinking, and proactive learning habits in students from the earliest stage of basic education.

2.3 Process of Applying Artificial Intelligence in Teaching Grade 3 Mathematics toward Developing Student Competencies

The proposed process for applying AI in teaching Grade 3 Mathematics is based on principles ensuring pedagogical soundness, scientific rigor, completeness and accuracy of content, and effectiveness.

2.3.1 Process of Applying Artificial Intelligence in Designing Lesson Plans for Grade 3 Mathematics toward Developing Competencies

Step 1: Analyzing the Curriculum and Identifying the Required Learning Outcomes:

Teachers analyze the education program to clearly identify the required outcomes of the lesson. This analysis helps teachers understand the position of the lesson within the overall program, its relationship to preceding and subsequent lessons, and the competencies and qualities students need to achieve after completing it. On this basis, teachers can formulate clear, specific lesson objectives suited to their students and identify AI tools appropriate to the lesson.

Step 2: Selecting Suitable AI Tools:

In today's era of rapidly developing technology, integrating AI tools into the teaching process not only saves time but also improves teaching effectiveness. However, to achieve optimal results, teachers need to consider carefully in order to choose AI tools that fit the lesson content, the stated objectives, and the characteristics of their students. Choosing the right tools will help make lesson design more lively, creative, and closely tied to real life:

Step 3: Designing Learning Activities Oriented Toward Competency Development:

Organizing the teaching of Grade 3 Mathematics with the integration of AI characters is carried out through four teaching activities: Warm-up - Exploration - Practice - Application. In each activity, the AI character takes on a specific role, supporting the teacher in organizing, guiding, stimulating, and reinforcing knowledge, thereby contributing to improved learning outcomes and the development of student competencies.

Step 4: Anticipating Methods of Testing and Assessment:

Teachers need to anticipate suitable methods of testing and assessment to ensure that the extent to which students achieve the lesson objectives is measured accurately. In particular, in the context of applying artificial intelligence in teaching, designing forms of assessment that are intelligent, flexible, and comprehensive becomes even more important.

Step 5: Adjusting and Finalizing the Lesson Plan:

To ensure that the lesson plan achieves optimal effectiveness when officially implemented, the final step in the lesson-design process is adjustment and finalization. This is the stage of reviewing the entire lesson plan to detect and correct errors, ensuring that the content is logical and suited to the objectives, the students, and the actual teaching conditions, and refining the methods and activities to increase feasibility, appeal, and teaching effectiveness.

* *Illustrative example.* Lesson 21: Cubes and Rectangular Boxes (Mathematics 3, Volume 1, "Connecting Knowledge with Life" textbook series, p.63).

Step 1: Analyzing the Program Content and the Required Outcomes for Grade 3 Mathematics

Analyzing the content according to the 2018 General Education Program and identifying the required outcomes:

- Recognizing basic features such as vertices, edges, and faces of cubes and rectangular boxes through observing images, real objects, and models.
- Naming rectangular boxes and cubes through observing images, real objects, and models.
- Applying the concepts of cubes and rectangular boxes to students' everyday life.
- Contributing to forming and developing the competencies of mathematical thinking and reasoning, and mathematical communication.
- Contributing to forming and developing the qualities of diligence, honesty, and responsibility.

Step 2: Selecting Suitable AI Tools

Based on the required outcomes of the lesson, teachers can apply the following suggested AI tools: creating a warm-up video with an AI character introducing the lesson to generate interest and activate prior geometric knowledge, using software such as HeyGen or ElevenLabs; generating images or voice narration to illustrate cylinders and spheres for visual observation, and designing shape-classification games, using Canva AI and TTSReader; for practice and application activities, using Kahoot AI, Quizizz AI, or Canva AI to assign tasks to students; for testing and assessment, using Canva AI and ChatGPT.

Step 3: Designing Learning Activities

1. Warm-Up Activity: The Song "Shapes Around Us"

- AI tools: ChatGPT to write the lyrics and Suno AI to turn them into the song "I Learn About Shapes," set to a cheerful tune. This is a lively, easy-to-remember song suited to Grade 3 students, which can be sung to a lively children's melody (in 2/4 or 4/4 time). The content closely follows the lesson's knowledge: both rectangular boxes and cubes have 6 faces, 12 edges, and 8 vertices, but a cube's 6 faces are all squares, while a rectangular box's faces are rectangles.
- The teacher has students listen to the song and asks what objects are mentioned in it, what shapes those objects have, and whether the shapes are the same. The teacher then leads into the lesson "Rectangular Boxes and Cubes."

2. Exploration Activity:

- AI tools used: animated simulation images (Canva, Desmos) plus a video of an AI character explaining the concept (Synthesia/HeyGen).
- Procedure: students observe an AI-generated model simulating a rotating rectangular box and cube. The AI character asks: "How many faces do a rectangular box and a cube have?" and "Which flat surfaces does a cylinder have?" AI gives real-world examples such as a Rubik's cube, a cake box, or a milk carton, and then has students name similar objects.

3. Practice Activity

- AI tools used: Quizizz AI or Kahoot! AI, Canva AI
- Activity 1: quick multiple-choice game:
- + Questions: Which object has the shape of a rectangular box? Which object has the shape of a cube?
- + For correct answers, the AI character claps happily; for incorrect answers, it offers a gentle hint.
- Activity 2: integration into a worksheet: designing a worksheet with blank spaces for

students to paste pictures, matching pictures of objects to the corresponding shapes.

4. Application Activity:

- AI tools used: an AI storytelling video plus Canva/ChatGPT to design the teaching situation:
- Situation: the cat Miu is tidying up toys but confuses the different shapes. Students are asked to help sort them: a suitcase, a speaker, a refrigerator, and so on.
- Students are asked to classify the shapes appropriately, after which AI provides feedback on whether the classification is correct or incorrect, along with an explanation.

Step 4: Anticipated Methods of Testing and Assessment

- Ongoing assessment: through interactive classroom activities (AI games, response questions).
- AI-based assessment: Canva and ChatGPT, with Canva designing the worksheets and ChatGPT providing quick results.

Step 5: Adjustment and Finalization

- Adjustment: simplifying the AI character's dialogue if students are not yet strong readers, and adding more picture-based hints if students find it difficult to tell the shapes apart.
- Backup preparation: in case of equipment failure, having a direct-teaching alternative ready (using real objects such as plastic boxes and milk cartons).

2.3.2 Process of Applying Artificial Intelligence in Organizing the Teaching of Grade 3 Mathematics toward Developing Competencies

Step 1: Designing the Lesson Plan

First, teachers need to analyze the curriculum content and clearly identify the required outcomes of the lesson. Based on these required outcomes and the lesson content, teachers proceed to design the lesson plan. Teachers can use AI tools such as ChatGPT, BlackboxAI, or Gemini to look for additional ideas to make the lesson more engaging. Teachers then design a PowerPoint lesson, which may use AI tools such as Gamma to automatically generate slides. In addition, teachers can create interactive activities using AI platforms such as Kahoot AI, Quizizz AI, or Nearpod.

Step 2: Organizing Instruction

The teaching process is still based on the basic stages of Warm-up - Exploration - Practice - Application, but AI is integrated to provide more effective support at each stage:

- + Warm-up activity: teachers can generate students' interest in learning through short videos, riddles, images, and interactive games

suggested and designed by AI tools. One common application of AI at this stage is creating companion characters suited to students' preferences; well-known and currently trending characters designed by AI can capture attention and generate enthusiasm for learning from the very first minutes of the lesson.

- + Activity for building new knowledge: teachers organize students to explore the lesson content through lessons integrating video, visual models, or AI chatbots that explain the material. AI can act as a teaching assistant, answering students' questions, analyzing examples, and illustrating real-life situations. One common application of AI at this stage is using it to turn images into video, transforming textbook or real-life word problems into situational videos. In this way, solving problems becomes more engaging thanks to lively videos.
- + Practice activity: students complete individual or group exercises, which are automatically graded by an AI system that suggests corrections or analyzes common errors so that students can learn from them. Software such as Plickers helps teachers quickly obtain results for each student's work. Software such as Edmodo AI and Classkick AI allows teachers to assign tasks and track each student's progress directly.
- + Application activity: students apply their knowledge to solve real-life situations, small projects, educational games, or open-ended questions. AI helps find materials, simulate word-problem situations, and design songs, poems, or rhymes to help students systematize their knowledge. Students find it easier to learn and review with lively, musical rhymes and songs.

Step 3: Assessing, Giving Feedback, and Adjusting After the Lesson, Collecting Feedback, and Evaluating Students

Collecting and analyzing feedback:

Teachers use automated survey tools (Google Forms with AI integration, Mentimeter AI, etc.) to collect students' feedback on the lesson, such as their level of understanding, their level of interest, and the difficulties they encountered.

Assessing Learning Outcomes:

An AI system automatically grades tests and analyzes statistical data (the rate of correct/incorrect answers by content area), thereby determining the extent to which students have achieved the learning objectives. For essay-type exercises, teachers can use AI tools to suggest assessment frameworks and semi-automatic grading in order to save time.

Adjusting the Teaching Plan:

Based on the assessment results, teachers analyze the effectiveness of each activity and each AI tool used. AI can suggest improvements, such as changing methods, adding missing content, or personalizing the learning path for students who have not yet met the requirements.

Example: Lesson 66. Reading the Clock. Months - Years (Period 1, Mathematics 3, Volume 2, "Connecting Knowledge with Life" textbook series, p.77).

Step 1: Designing the Lesson Plan

Teachers study and analyze the content of the Mathematics program and identify the required outcomes of the lesson:

- Recognizing units of time: days, hours, minutes.
- Reading the time accurately to the nearest 5 minutes and to the nearest minute on a clock.
- Determining the interval of time between two simple points in time.
- Applying units of time to everyday life.
- Contributing to forming and developing the competency for mathematical problem-solving and the competency for mathematical communication.
- Contributing to forming and developing the qualities of diligence, honesty, and responsibility.

Based on these required outcomes, teachers design the lesson plan while integrating AI tools to enhance the quality and appeal of the lesson:

- + Searching for ideas and forms of activity: using ChatGPT to get suggestions on how to explain "hours and minutes" in a lively way suited to Grade 3 students, and using Gemini AI to build a diagram of activities corresponding to each stage of the lesson, as well as to suggest games and riddles about time.
- + Designing the PowerPoint lesson: using Gamma App (an AI presentation tool) to create slides integrating an animated clock, fun icons, and an appealing, lively presentation; inserting images, videos, and animations illustrating the concept of hours and minutes, automatically generated by AI (Pictory AI, Canva AI).
- + Building interactive games: creating the game "Mystery Clock" using Kahoot AI, in which students choose the correct answer corresponding to a clock image; creating the quiz "What Time Does the Clock Show?" on Quizizz AI, which automatically generates a variety of questions and answers ranging from easy to difficult.

Step 2: Organizing Instruction

Instruction is organized following the sequence of activities Warm-up - Exploration - Practice -

Application, with the integration of AI tools to enhance effectiveness.

1. Warm-Up Activity:

- The teacher uses HeyGen AI or Canva AI Video to create a short animated video, "A Busy Day for Hong," telling the story of a young character learning about the times of day. The AI-designed video includes humorous elements and relatable images that help capture students' attention.
- After the video, the character "Friend Clock" (created using Character AI) appears on screen to ask open-ended questions: "Do you know when we go to school? When do we eat lunch? How many hours are there in a day?"

2. Exploration Activity - Building New Knowledge:

- The teacher presents slides created with Gamma, integrating images of analog and digital clocks.
- AI clock simulations (Toytheater, Clockify) are used to have students drag the clock hands to a requested time. When students ask questions such as "Why does 15 minutes point to the number 3?" the teacher uses a classroom AI chatbot (SchoolAI, Curipod) to provide an explanation with illustrations.
- The teacher turns the problem "How many minutes are there from 6:00 to 6:30?" into a situational video created by AI (using Lumen5 or Pictory), for example simulating a breakfast activity lasting 30 minutes. Students then work together to build a mind map.

3. Practice Activity

- The teacher assigns clock-reading exercises (with images) using Classkick AI. The system grades automatically and identifies common errors (for example, confusing the hour hand with the minute hand), suggesting the correct approach.
- Plickers is used to have students hold up cards to answer multiple-choice questions such as: "The short hand points to 3, the long hand points to 12. What time is it?" Results are displayed instantly, allowing the teacher to see who answered correctly or incorrectly.

4. Application Activity

- Students complete a mini project, "My Day," drawing or presenting according to time of day. AI helps suggest a reasonable schedule (for example, going to bed at 9:00 p.m., having breakfast at 6:05 a.m., and so on).
- Canva AI or Renderforest AI is used to create a poster or short video illustration. AI content-creation tools (RhymeZone AI) are used to create a fun rhyme: "Wake up right at 6:15, eat lunch at 11:00..."

Step 3: Assessment - Feedback - Adjustment

- Collecting student feedback: the teacher uses Google Forms AI or Mentimeter AI to have students rate their level of understanding, the part of the lesson they liked most, and the difficulties they encountered.
- Assessing learning outcomes: the teacher uses Edmodo AI or Graspable Math AI to analyze students' test results; the AI system generates a report, for example showing that the error rate for reading times that are not exact hours is higher than for reading exact hours, and accordingly suggests further practice on this content.
- Adjustment after the lesson: increasing practice time on "non-exact hours"; personalizing review for the group of weaker students (with AI suggesting an individualized review plan); ChatGPT suggesting improvements to the lesson content by incorporating more videos with animated clocks, or turning the game into a simple mobile application that students can play at home.

3. CONCLUSION

The findings of this study have contributed to addressing theoretical issues relating to AI and to the application of AI in teaching Mathematics with a competency-oriented approach, and on this basis have proposed a process for applying artificial intelligence in teaching Grade 3 Mathematics toward developing student competencies, in order to improve the quality and effectiveness of teaching and learning in primary schools in the context of today's educational renewal, thereby contributing to the effective realization of educational goals.

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