The Process of Building a Virtual Teacher According To Self-Regulated Learning in Teaching Maths in Primary Schools

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Abstract:
Chatbot is a program that interacts with users via textual or auditory. Nowadays, Chatbots are widely used in jobs such as virtual assistants for customer care, product introduction, sales, etc. Chatbots have also been applied in many different aspects of the field of education thanks to the benefits it brings including high personalization, high interactivity, speed, accuracy, etc. A popular application of Chatbots in education is using Chatbots to teach. This article analyzes the benefits that Chatbots bring to the field of education, thereby providing a process for designing a teaching Chatbot for a specific lesson in the direction of self-regulated learning to help teachers and educators have orientation in using Chatbot in teaching.

Keywords: Chatbot, Virtual Teacher, Self-regulated learning, Teaching maths in primary school

1. Introduction

Chatbots or "conversation bots" are an automated software tool using artificial intelligence (AI) that uses natural language to simulate conversational interaction between a user and a computer [7], when chatbot technology is enabled, users can 'talk' to pre-made AI chat robots, not to humans [8]. Chatbots have been applied in many fields and education is no exception. In the field of education, AI Chatbot acts as a tool to support the teaching process. AI Teaching Chatbot is a conversation bot integrating artificial intelligence (AI) that can conduct conversations with users in natural language through applications on digital devices to perform teaching tasks, thereby achieving the goal of teaching and supporting learners in personalized learning anytime, anywhere [9].

Chatbot provides knowledge, lectures, and documents for learners; provide feedback to student questions; support students to learn automatically and quickly. Additionally, when provided with questions, chatbots can provide learners with step-by-step instructions to the final solution. Therefore, besides providing queries for students' questions, Chatbot can also provide students with learning content according to certain topics or lessons, supporting students to self-study in a certain way. certain progress.

Self-Regulated Learning (SRL) was developed in the 1980s as "an active, constructive process in which learners set goals for learning and then attempt to monitor, regulate, and control one's cognition, motivation, and behavior, guided and constrained by set goals as well as contextual features in the environment." [11]

SRL is a learning process in which learners can be self-aware of their needs, interests, learning style, and learning speed, self-identify goals, and learning tasks, and be independent. Plan tasks, self-assess the learning process and results, and then adjust learning activities and learning speed accordingly [9].

SRL is considered to have a positive impact on students' motivation and academic achievement [2]. Many studies show that SRL can be promoted through instructional instruction in primary school. Therefore, teaching with a self-corrective learning orientation will form learners who are capable of self-planning, self-study, self-assessment, and self-control of their learning from an early age.

To implement the process of building a Chatbot according to SRL for primary school students, the authors took the following steps:

- Search and select typical applications of AI Chatbot; research about the benefits of Chatbot in teaching;

- Research documents about SRL

- Proposing a process for building a Chatbot according to SRL for elementary school students;

2. Results

2.1. Benefits of Chatbot in teaching

Grossman et al developed a text-based automated tutor to explain math concepts, provide practice questions, and give students tailored feedback called MathBot. Research shows that students prefer learning through Mathbot over learning through videos or other written instructions [3]. Vázquez-Cano (2021)[14] shows that chatbots can be used as a teaching tool that promotes self-regulated learning. Besides, chatting through Chatbots allows students to have a more dynamic and participatory experience in a virtual learning environment. These environments are highly customizable and scalable, allowing teachers to design learning experiences based on different content and competencies, thereby adapting to different learning rhythms and styles. together. Thereby, promoting learning participation and increasing learning interest for students. Mageira, K et al (2022) [6] introduce AI Chatbot technology to support the modern learning method of Content and Language Integrated Learning (CLIL), mainly acting as a human tutor. The proposed approach has been implemented and evaluated in English and French as foreign languages for Greek students, reporting on its effectiveness and potential. Therefore, an educational program was designed and implemented specifically according to the needs of ICT-based distance learning, due to the COVID-19 pandemic. Winkler, R et al (2022) [15] argue that Chatbots in education have the potential to improve learning outcomes because they can create personalized learning experiences for each student. Research also shows that Chatbot can support real teachers during the teaching process, and is an effective tool to measure and improve learning effectiveness. Students who use Chatbots in studying have better memory and academic results [1]. ChatGPT, a conversational chatbot released in November 2022 created by OpenAI, uses natural language processing to generate human-like responses to user inputs, which can help Instructors apply AI to teaching and learning more easily. ChatGPT has become the app with the fastest user growth in history, reaching 100 million active users two months after its launch. Reviews show that GPT chat offers many potential benefits when acting as an assistant for instructors and a virtual tutor for learners. However, GPT chat raises various concerns when using it, such as creating inaccurate information or causing educational fraud [5].

AI Chatbot brings many benefits to the teaching process. The benefits of AI Chatbot include the ability to integrate multiple content in the same Bot, which learners can access quickly, increasing students' motivation to participate in learning, and allowing many people to learn. same-time access and immediate support for learner queries.

The first benefit that Chatbot brings is that Chatbot can integrate many content. Chatbots do not limit uploaded content, so teachers, educators, and instructors can upload all knowledge content and necessary information about a specific topic to Chatbots for students to access. easy. Not only knowledge related to lessons, Chatbots also provide timetables for lessons, exercises to do, and tests, in addition to support and testing. In particular, Chatbot can integrate many learning games to help students choose according to their interests.

The second benefit is that a Chatbot helps with quick access. Learning with Chatbots, students do not have to wait, because this virtual teacher is always present at all times. As long as the student wants to ask something, Chatbots immediately give feedback. Whatever content the student wants to play in the game, the Chatbot will immediately provide it to the student. Such quick and easy access to information helps students save time, thereby maximizing their learning ability and achievement. Students have more time to explore the world, build essential skills and have fun.

The third benefit is that AI Chatbot helps increase student motivation and engagement. In fact, students prefer to use smartphones, tablets or laptops to read and search for information online rather than reading textbooks or subject materials. Not only that, instead of playing traditional games in class, students like to participate in games on digital devices with beautiful graphics and vivid sounds. Learning with an online interactive tool does not make students bored but also allows them to absorb knowledge in a more exciting and convenient way. Therefore, using Chatbots combined with digital games in teaching will help increase student participation.

The next benefit is that Chatbot allows many people to use it at the same time. Instead of having about 35, 40 students in a classroom for teachers to manage and control, Chatbots do not limit the number of learners at the same time. That is a significant advantage of using Chatbots in teaching. Multiple students from

different locations can interact with a particular Chatbot without interruption. Many students can also participate in the same game in the same time period without limit, not only that, students can participate in playing in many forms such as individuals, teams, and groups.

Another benefit to mention is that Chatbot can support learners immediately, this is one of the most important advantages of using chatbots in teaching. Learner questions sent immediately will receive answers without the learner having to wait. Instead of a teacher who can only support each student, Chatbot can support many individual students at the same time with different queries, not necessarily the same question. Besides, Chatbot can also help students automate learning activities quickly and instantly, thereby adapting to the speed, emotions and actions of each learner.

2.2. Self-regulated learning model

There have been many studies showing the effectiveness of SRL in teaching. Jose Carlos Redaelli and his colleagues presented SRL strategies applied in teaching. The results show that this trial, although limited, has the potential to be effective. Pratya Nuankaew conducted a study on the paradigm shift of the education system focusing on the implementation of artificial intelligence technology. The results show that self-regulated learning theory is becoming increasingly popular and recognized. However, the instructor's participation is needed in the stages of self-regulated learning. In the study by I Kadek Suartama and colleagues examined the impact of popular learning strategies using self-regulated learning methods on learners' academic achievement and learning interest. The results show that there is a significant difference in academic achievement and learning initiative between groups. Depending on their self-regulated learning ability, each learner will achieve their goals, increasing their learning initiative. and varying academic achievement. Flavia Aurelia Hidajat conducted an experimental study to determine the influence of self-study on creative mathematics teaching. Research results show that implementing self-regulated teaching brings more success to creative math teaching through the mobile e-learning application "Zoom" than conventional strategies because students can adjust their perception to think of new ideas and come up with many different creative solutions.

The SRL model is divided into phases: forethought, performance, and self-reflection. During the forethought phase, students analyze tasks, set goals, and plan how to achieve those tasks. At this phase, some beliefs are needed to drive the process and influence the activation of learning strategies. In the second phase, performance, students actually perform the task, while they monitor their progress and use several self-regulation strategies to keep themselves cognitively engaged and engaged motivated to complete tasks. Finally, in the self-reflection phase, students evaluate how they performed the task based on the effectiveness of their chosen strategies, making attributions about their success or failure. During this phase, students must also manage their emotions about the results achieved. These self-reflections will influence planning and goal setting in later cycles.
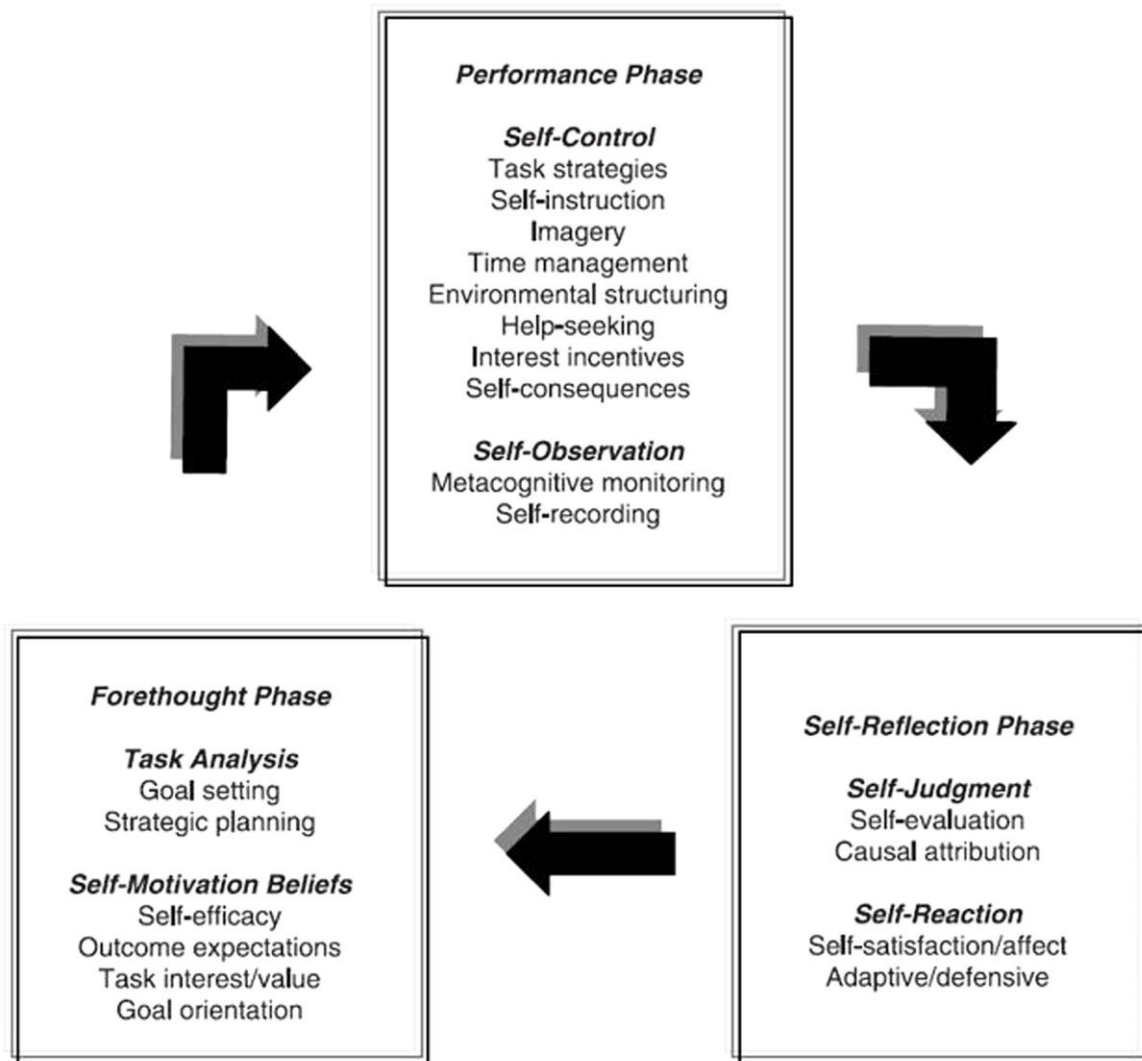
Figure 1. Phases of Self-Regulated Learning [16]

2.3. The process of designing a Chatbot according to self-regulated learning

Guiding students to learn according to a certain process brings many benefits to learners. Not only that, using Chatbot to teach according to the stages of self-regulated learning helps learners gradually form awareness and motivation to learn, actively pursue learning goals, and control the process. their learning, thereby equipping learners to be self-reliant and independent person not only in studying but also in solving problems in life.
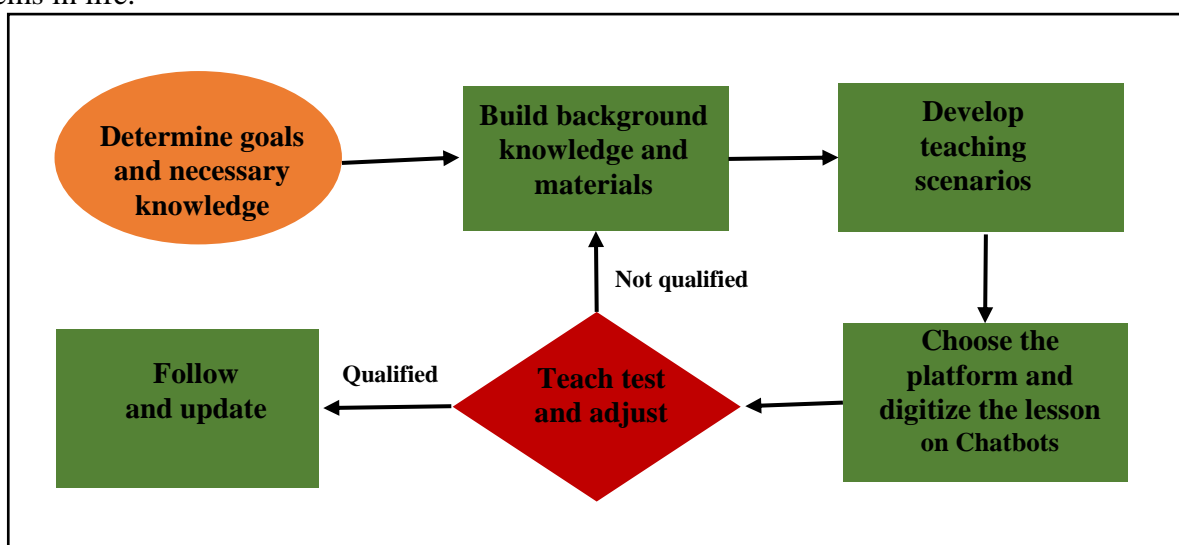

Figure 2. The process of designing a Chatbot according to self-regulated learning

Step 1: Determine goals and necessary knowledge of the lecture

The goal of the lesson is the destination that teachers and students must aim for. Clearly defining the objectives and key contents of the lesson helps teachers orient and plan to organize teaching activities and use appropriate teaching methods and means; orientation for finding teaching materials; develop teaching scenarios; is the basis for determining learning outcomes, for testing and evaluating learners.

To specifically determine the goals that students need to achieve after the lesson, teachers need to carefully study the lesson content in textbooks, reference books and related documents; Analyze the psychological and pedagogical characteristics of elementary school students. Lesson objectives must be clear, practical, appropriate and feasible (achievable).

Step 2: Build background knowledge and materials related to the lesson content

After determining the objectives to be achieved of the lesson as well as the key contents, to have a successful lesson, teachers need to find and prepare background knowledge related to the lesson and materials. Necessary for lectures to help students absorb new knowledge easily, quickly and effectively. These materials can be in the form of images, audio or videos, as well as books, newspapers, etc. References from reputable sources on the internet, teaching software or can be self-created materials, etc. These materials need to ensure high accuracy, quality and logic. Collecting complete and detailed data and arranging them into a library and directory tree will help teachers perform better and more conveniently in the process of building teaching scenarios for students.

Step 3: Develop a teaching scenario according to self-regulated learning

Building a teaching scenario before designing a lesson helps teachers specify the tasks and activities that need to be carried out in a certain process. The more specific and detailed the scenario, the easier and faster the bot training process will be. This step also helps teachers review knowledge content in advance to avoid omissions or errors when posting to the bot.

At this step, the teacher presents the teaching process, the tasks of the real teacher, the Chatbot virtual teacher and the students. In addition, teachers also need to prepare sample sentences for students to enter when using the bot. These sample sentences need to be consistent with the physiological and psychological characteristics of the age group and understand the students' intentions.

The teaching scenario using AI chatbot to support students in self-regulated learning is a scenario that teachers build to help students self-study with AI Chatbot virtual teachers according to 3 stages of self-regulated learning: thinking and thinking. think ahead, implement and self-reflect. This teaching scenario includes 3 parts: Teachers use AI Chatbot to design the knowledge flow of the lesson, AI Chatbot communicates with students about the lesson, and students self-regulate learning.

Step 4: Choose the platform and digitize the lesson on AI Chatbot

In this step, teachers will choose the appropriate platform to design AI Chatbot virtual teachers. The platform used to create a chatbot needs to be based on criteria such as: easy to design, easy to operate, suitable for the scenario, knowledge base as well as the Chatbot's ability to learn and respond, reasonable cost. …The Chatbot building platform needs to be compatible with commonly used display platforms in Vietnam such as: website, Facebook, or Zalo.

Digitizing lectures from video recording, editing, recording, or editing videos, audio files, etc. needs to be accurate, logical, and must ensure the requirements in terms of content, method, aesthetics and pedagogical intentions. The process of digitizing and synchronizing lectures to AI Chatbot, if done well, will help the teaching process achieve higher results, and students will learn more easily and with more excitement.

Step 5: Teach test and adjust

In the process of digitizing knowledge content as well as uploading lecture content to AI Chatbot, errors cannot be avoided. Therefore, after designing the AI Chatbot, teachers conduct trial lessons to check the content. content of knowledge as well as the progress of teaching activities, review errors that arise to promptly make adjustments to further improve the quality of lectures. During the trial run, teachers need to anticipate possible intentions and situations to handle them flexibly. This step is very important before officially allowing students to study. If after the test run, the teacher is satisfied with the process and there are no errors for students learning with AI Chatbot. If not satisfied, then correct the errors in the above steps.

Step 6: Follow and update

Each student has different interests, learning styles and abilities, not only that, the way they use words and ask questions is also different even though they have the same purpose, teachers need to monitor students' learning progress. with Chatbot to promptly make adjustments to suit each student. Besides, the knowledge on the Bot also needs to be continuously updated, especially practical knowledge. Therefore, teachers need to regularly monitor, update, edit and supplement sample sentences and knowledge through the Chatbot History section so that the Chatbot can understand users better (smarter).

Teachers should focus on the Intents that learners are most interested in and request the most to add Model Sentences to that Intent, so that the chatbot can best serve students' requests, thereby supporting Each individual learns according to their own abilities, interests, needs and learning style.

3. Conclusion

The article presents a process for designing AI Chatbots that teach according to self-regulated learning to help teachers use Chatbots in teaching. With the benefits that AI Chatbot brings, AI Chatbot is not limited to just one subject but should be used for many subjects and at different educational levels. Although AI chatbots are getting smarter, they cannot completely replace a real teacher. Therefore, teachers need to support students by chatting and directly helping students with abstract and in-depth content that Chatbot cannot support for students.

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