

**INTELEC 2023**  
INNOVATIONS IN TEACHING & LEARNING COMPETITION

**DOMAIN-BASED SMART CHATBOT TO SCAFFOLD PROGRAMMING LEARNING**

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### Objectives

- To develop a chatbot that will assist students in the process of learning the Problem-Solving Approach to Programming using continuous scaffolding techniques.
- To determine the effectiveness of chatbot-based learning compared to traditional learning modes for learning programming problem-solving approaches.
- To examine how pupils perceive about using the chatbot.

### Added Value

- **Convenience:** The chatbot can be available 24/7, allowing learners to access learning materials and support whenever they need it, without being limited by time or location.
- **Engagement:** Chatbots can use natural language processing and other interactive features to create a more engaging learning experience, keeping learners motivated and focused.
- **Cost-Effective:** Compared to human instructors, chatbots can be a more affordable solution for providing programming education.
- **Scalability:** Chatbots can handle an infinite number of students simultaneously, making them a scalable solution for online learning.

### Abstract

To solve programming problems, it's important to know how to use syntactic, conceptual, and strategic knowledge. A great number of studies have investigated different ways in which students' programming abilities can be improved based on their knowledge of computer programming. Students make use of their metacognitive skills in order to solve problems that arise throughout the learning process. The primary objective of this innovation is to develop a chatbot that will assist students in the process of learning the Problem-Solving Approach to Programming while simultaneously enhancing their metacognitive abilities. In order to accomplish this objective, the Successive Approximation Modeling model will be utilized. This model calls for the development process to be guided by rapid refinement carried out across a number of iterations. The chatbot was developed using design elements such as special worksheets, explanations, and continuous scaffolding, with support from behaviorism learning theory, constructivism theory, connectivism theory, and multimedia teaching theory, with the goal of ensuring effective constructive alignment during the learning process. A quasi-experimental study was conducted to determine the effectiveness of chatbot-based learning compared to traditional learning modes for learning programming problem-solving approaches among 60 students, with 30 students in the chatbot mode and 30 students in the traditional mode. The primary finding indicates that chatbot-based learning enhances programming problem-solving approach learning achievement compared to traditional learning modes. Acceptance and Use of Technology (UTAUT) model, which demonstrates a positive attitude towards the use of the chatbot.

### Usefulness

- I intend to use IPO Chatbot when doing coursework.
- I predict I will use IPO Chatbot when doing coursework.
- I plan to use IPO Chatbot when doing coursework.

### Commercialization Potential

- **High Demand:** Programming is a valuable skill in today's world, and many people are interested in learning it. Therefore, there is a high demand for effective programming education tools, including chatbots.
- **Personalization:** Chatbots can personalize the learning experience by offering customized recommendations based on the learner's progress and individual needs.

