# Conversational Agent Supported Incrementally Scaffolded Approach for Teaching Introductory Programming Course(s)

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## Abstract

Learning computer programming is a challenging task for most beginners. Demotivation and learned helplessness are pretty common. A novel instructional technique that leverages the value-expectancy motivational model of student learning was conceptualized by the author to counter the lack of motivation in the introductory class. The result was a frequency adherent scaffolded instructional technique called An Assignment A Day (AAAD). Instead of writing an assignment and a lab for each module/chapter, students were asked to complete one assignment a day, not exceeding four assignments a week. The assignments were incrementally difficult and had to be done almost every day. With the application of AAAD for two consecutive semesters, there was a meaningful improvement in the final grades. This technique, though initially encouraging, created a significant load on the instructor in terms of assignments graded and questions answered every day. A natural language processing (NLP) based conversational agent was designed and integrated with AAAD to counter this overload. The idea was simple – relay commonly asked course questions to an NLP based chatbot and let the instructor handle the complex queries. This integrated system was named Conversational Agent Supported Scaffolded Approach (CASSA). The main contribution of this work is the construction of a conversational agent and its integration with AAAD. The conversational agent is currently being assessed for overall efficacy, though preliminary results are discussed. The vision is to create a generic virtual assistant template that can be re-used across multiple courses to assist instructors.

**Keywords:** Conversational agents, NLP, introductory programming, pedagogy, value-expectation, student procrastination.

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