Abstract— As AI software tools become more commonplace, their potential to transform the student experience has greatly increased. By integrating these tools into a course, students can begin to receive real-time, around the clock, instructor moderated support. The potential benefits for students are significant. In addition to increasing their ability to work constructively on their schedule, it has the potential to engage students who might otherwise avoid directly interacting with another person. Before these tools can be meaningfully actualized into a course, work must be done to build a knowledge base about the course. For this research, the team sought to develop an intelligent chatbot interface for an introductory computer programming course. The interface had an initially limited knowledge base with the intent that it would be populated based on students' interactions with the chatbot. This model allowed the bot to evolve with the needs of the students. This paper seeks to present the methodology for how the chatbot was developed and integrated into the course, how the knowledge base was developed, the usage during the pilot, and the next steps for improving the chatbot's interface. Additionally, the paper will discuss the mechanisms added to handle issues such as false-positive responses and how faculty may be able to integrate such tools into their own courses as supplementary assistance.
Keywords—Chatbot, Innovative Pedagogy I. CHATBOTS A chatbot is a software platform that simulates an interaction between a user and the computer using natural language [1]. These tools are applied across many contexts with the purpose of the software answering users' questions within a specific domain of knowledge [2]. With the recent emphasis on personalized learning, as directed by the National Academy of Engineering Grand Challenges [3], platforms such as these, when standing alone or integrated with intelligent tutoring systems (ITS), have the potential to enhance student learning. When using the lens of social constructivist theories, the use of conversational dialogue (i.e., the back-and-forth nature of a chatbot interface) is a means of knowledge creation [4]. The ability for students to ask questions is a critical aspect of learning and can lead to increased student outcomes [5, 6]. A summary by Harper et al. [6] has shown that giving student the opportunity to ask question led to improved study skills, improved problem solving, and better retention of course material. Despite this, there is evidence that students do not readily ask questions due to fear of negative reactions from the James Pembridge, Ph.D. Engineering Fundamentals Embry-Riddle Aeronautical University Daytona Beach, FL, USA pembridj@erau.edu teacher [7]. When designed and implemented appropriately, a chatbot has the potential to allow students to ask questions without fear of social perception and allow them to develop skills associated within the specific domain. A. Research Questions This exploratory pilot study examines the usability of a chatbot when applied in the context of a first-year engineering programming course through the following research questions: RQ1. How do students interact with a chatbot in a first-year programming course? RQ2. What are student perceptions regarding the opportunity to use a ?chatbot in a first-year programming course

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