

Trinket Integration in the Development of Problem-Based Learning Interactive Media on Python Programming Materials

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Abstract:- Interactive media for learning programming requires interpreter technology that can be embedded into the media so that interactive media can provide a relevant environment for learning programming material. The interpreter that can be used is Trinket. Trinket can be integrated into interactive media using iframe tags in HTML. Integrating Trinket into learning media allows users to run the program code provided in the material. So that users can find out the output of the program code and improve their programming skills. The effectiveness of interactive learning media is measured using student learning tests in the form of pre-test and post-test scores. The questions given at the time of carrying out the pre-test and post-test totaled 20 questions. The pre-test and post-test scores were analyzed using the normalized gain (N-Gain) test to determine the increase in student learning outcomes. Based on the test results, it can be seen that the average N-Gain score is 0.8 which is included in the high category. Based on the average N-Gain results, PBL-based interactive media in programming material can be said to be effective.

Keywords:- Trinket, Interactive Media, PBL, Programming.

I. INTRODUCTION

Learning media play a pivotal function within the intricate nexus of factors contributing to the attainment of academic excellence among students. According to their function, the types of learning media are currently divided into audio media, visual media, and projection media [1]–[4]. Meanwhile, media that combines and synergizes all types of media is called interactive media.

Interactive media denotes media equipped with a manipulable interface accessible to the user, thereby affording the users the capacity to exercise discretion in determining subsequent procedural preferences [5]. The genesis of interactive pedagogical resources is undertaken to ameliorate

the teaching and learning processes in the classroom, concurrently serving as an adjunctive instrument for autonomous erudition. This interactive media can respond to users directly so that it can trigger reciprocal communication activities between the two, which are two-way. Learning media that only occur in one direction are less likely to attract students [6], [7]. Users of interactive learning media will really help students' learning process in understanding learning [8]–[13].

Interactive media for learning programming requires interpreter technology that can be embedded into the media so that interactive media can provide a relevant environment for learning programming material. The interpreter can translate the code directly [14]. The interpreter that can be used is Trinket. Trinket can be integrated into interactive media using iframe tags in HTML. Integrating trinkets into learning media allows users to run the program code provided in the material. So that users can find out the output of the program code and improve their programming skills.

II. LITERATURE REVIEW

Programming is doing a computer program by giving a set of instructions using a programming language [15]. In interactive media for learning programming, technology is needed to run the program in the form of an interpreter. Python is a programming language that uses an interpreter to run its program code [14], [16], [17]. There are several interpreter technologies that can be embedded into interactive media for learning Python programming, including JDoodle, InterviewBit, and the main one is trinket. JDoodle is an online tool for editing, compiling and running programs [18]. InterviewBit is a programming learning and technical interview preparation platform that focuses on the fields of information technology and programming. Even though JDoodle, InterviewBit, and trinket can both be embedded into interactive media, JDoodle and InterviewBit have a weakness, namely that the place to receive input from the user is separate

from the running program, thus potentially confusing the user. Meanwhile, trinket can receive direct input from the user on the running program display; this advantage is what made researchers choose trinket to be integrated in the development of interactive media.

Trinket is a coding environment designed for education [19]. Trinket is open source built by the trinket team [20]. Trinket is an online IDE that supports the Python language and can be run directly without needing to log in, download plugins, or install any software [21]–[23]. Trinket can be freely accessed from any web browser on any device [24]. This platform makes it easy for teachers and students to create and store codes [25]. Trinket was developed in the United States as a tool for code sharing [26]. An illustrative code snippet crafted utilizing the Trinket platform can be effortlessly integrated into a webpage as an iframe element, affording students the capability to amend and execute the code in an interactive manner [27]. This trinket program is indeed used specifically to make it easier to learn the Python programming language with an attractive appearance [21], [28].

III. METHOD

Trinket integration in interactive media is done by embedding a trinket. By embedding the Python interpreter into the media, it would provide an environment that is expected to support learning Python programming because the interactive media would provide learning materials, program code samples, Python interpreters, and questions to test student understanding. The first thing to do to embed trinket was to access the trinket official website at <https://trinket.io/>, after that, look for the Python interpreter that has been provided. If it has been found, the sidebar button is pressed and look for the embed feature; after that, an HTML code would be obtained with an iframe tag in which there is a trinket Python interpreter. The code in the interactive media being developed can be entered, and then the online Python interpreter can be accessed directly in the interactive media.

Trinket embedded in interactive media functions to run the program code provided in the example program. The hope of using trinket is to improve students' programming skills and knowledge, which can be measured from the exercises and quizzes that will be presented. To find out the effectiveness of the media as a whole, a pre-test was carried out before using the media and a post-test after completing learning with the media.

IV. RESULT

A. Trinket Integration Results

The following is the result of trinket's integration with interactive media. The trinket on interactive media is placed on a pop-up on the right which is hidden and will be displayed when the user presses the "Try Your Own Code" button, that can be seen in Figure 1.

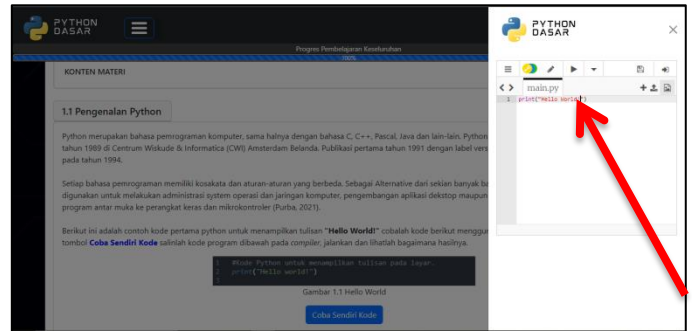


Fig 1 Trinket Integration in Interactive Media

The stages for embedding trinket in interactive media are as follows:

- Go to the trinket website at <https://trinket.io>.

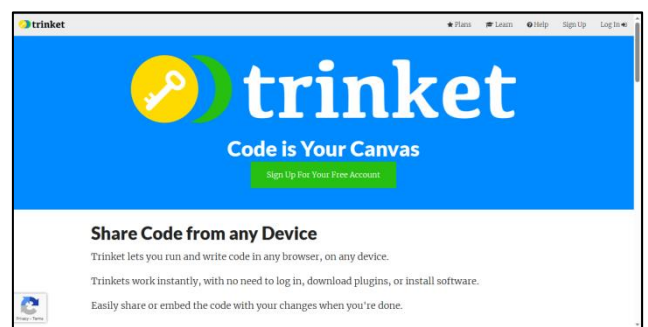


Fig 2 Trinket Website

- Scroll the page to find the provided Python interpreter and press the sidebar button as shown in the following image.

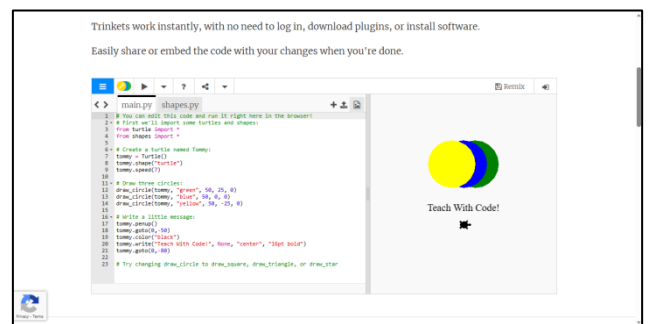


Fig 3 Provided Python Interpreters

- If it has been pressed, the embed feature will appear. Hit the embed feature to get the link from the trinket compiler.

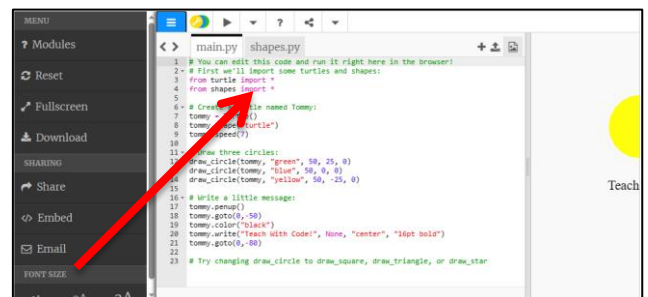


Fig 4 Embed Features

➤ Here is the display to get the embedding code. The code will be embedded into the learning media.

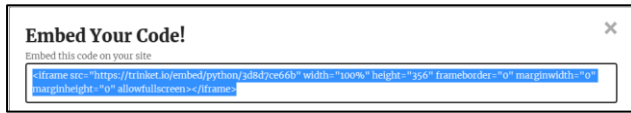


Fig 5 Embedding Code

➤ Finally, paste the embedding code that has been obtained into the interactive media program code that is being developed.



Fig 6 Embedding Code on Interactive Media

B. Trinket in Learning Media

Interactive media in programming learning that does not use trinket in its development will not be able to create an environment for learning programming material because students cannot directly try the program code provided, which requires them to use other applications outside of interactive media.

Interactive media incorporating trinket in the development has demonstrated to be effective and is amenable for educational purposes. The assessment of the effectiveness of such interactive educational media is quantified through the administration of pre-test and post-test evaluations, each comprising a set of 20 questions. The subsequent analysis of the pre-test and post-test scores entails the employment of the normalized gain (N-Gain) assessment, which serves to ascertain the increase in student learning outcomes. An analysis of learning outcomes can be seen in Table 1 [29].

Table 1 Results of the N-Gain Effectiveness Test

Pre-test Average	Post-test Average	Average N-Gain Score	Criteria
78,04	95,62	0,8	High

In Table 1, it can be seen that the average N-Gain score obtained is 0.8, which is included in the high category. Based on the average N-Gain results, interactive media based on problem-based learning in programming material can be said to be effective.

C. Problem-Based Learning on Programming Materials

Problem-based learning is a learning that emphasizes more on the cognitive aspects of students and student-centered learning [30]. Problem-based learning (PBL) in learning programming can be applied to practice questions and interactive media quizzes. Provided a problem in everyday life as a case of the problem to be worked on. Students will be asked to detail the problems they are facing, think about them, and create systematic algorithms to solve them. Next, students are asked to implement the algorithm into a program,

document the program created, and finally carry out trials or testing of the program.

V. CONCLUSION

Trinket integration in interactive media is done by embedding a trinket. The first thing to do to embed a trinket is access the official trinket website at <https://trinket.io/>. After that, look for the Python interpreter that has been provided; if you have found it, press the sidebar button and look for the embed feature. After that, you will get HTML code with an iframe tag in which there is a trinket Python interpreter. Enter the code into the interactive media that was developed, and then the online Python interpreter can be accessed directly in the interactive media.

The incorporation of trinket integration within interactive media yields a salient effect, culminating in an increase of student learning outcomes, as evidenced by the mean N-Gain score of 0.8, classified as the "high" category. Based on the average N-Gain results, the interactive media based on problem-based learning in programming material can be said to be effective.

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