Technology-based learning using project

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Abstract

Technology has always fascinated human being towards itself. The modern period is seeing a tremendous change in technology. Education is one of the fields that has always been tempted towards revolutionary technologies. Continuing enthusiasm for new and emerging technologies is unlikely to diminish as innovative technologies offer new teaching and learning opportunities (Chan et al. 2006). To make technology an agent of education change, the field needs to understand the kinds of learning outcomes that technology can enhance and the circumstances under which that enhancement will be realized in practice. (Barbara Means, 2010). Technology enabled learning is one of the ways that can change the dimensions of learning. Previously so much research had been done over the emphasis of technology on learning. So, in this research, we have tried to show how a supportive environment together with aid of technology can bring a positive effect on learning and studying pattern. In modern time our emphasis is moreover self-learning, cognitive-learning, collaborative learning. But providing a sustainable environment to promote all these factors is important. Our project takes a step towards providing a sustainable environment for programming language learners and keeping them motivated in the learning field.

Keywords: Technology Enabled Learning, Project based learning, Technology-Based Learning.

1. Introduction

Technology and education are the two most important factors that help in shaping the society and make their living better. In this era, technical education is the most prominent one that one should learn. For students those are new in the technical field, it is difficult to make them study from scratch. And it is more difficult when it comes to offline studying as there are two categories of student, one who got inspired by themselves and there is no effect of environment on them, one who required a more interactive environment with a lot of motivation. Efforts with second category students are considerably higher than first. To reduce these efforts this system helps them study in an interactive way with some inner motivation by providing them more and more information about many things on a single platform. This system is most appropriate for those students who are learning the programming languages and with programming learning they also want to give a try to web designing, this platform provides them not only some source of learning by videos but via a new and mostly considered approach of studying pre-written code deeply and efficiently with some built-in libraries for website designing projects on focusing project-based learning.

When it comes to studying of pre-written code, it is easier to understand the basics of the code, especially for the naive programmers. In this project, we categorized the different programmers according to their skills and did research on them. This research paper follows the following sequence: firstly, there are some basic approaches explained related to the project, followed by the section that explains the research methodology followed by the section of analysis of the testing that had been done on different categories of programmers (categorized after the first testing) followed by the discussion and conclusion of results.
2. Literature Review

In this section, we described the basic approaches using the standard definitions used in this project that includes technology-based learning and project-based learning(with their benefits and features).

2.1 Technology-based learning:

Technology-based learning refers to the intention of constructive learning with help of technology. In today’s world, we are totally dependent on technology. “The current education systems are facing unprecedented challenges. Traditional education systems alone, despite the essential role they have played and will continue to play, in learning, are simply not capable of serving the world’s growing and changing needs”. (John Chambers, Chairman & CEO, Cisco Systems). Technology is doing wonders in the field of education. Today we are involving technology to improve and enhance our productivity in the field of education. In our project, we have given technical assistance to those who are interested in learning thus encouraging the concept of self-learning. To give a real-world experience we have tried to involve as much assistance that we could have given like videos, pre-written codes, information on various functionalities of language.

2.2 Project-based learning:

Project Based Learning (PBL) is a teaching based technique where students acquire knowledge and gain skills by working for a prolonged period of time to investigate and respond to an authentic, engaging, and complex question problem or challenge (Buck Institute for Education). PBL is a prototype that basically focuses on learning through projects. According to the definitions in PBL handbooks for teachers, projects are complex tasks based on challenging questions or problems, that requires the involvement of students in design, problem-solving, decision making, or investigative activities; also give students the opportunity to work entirely over prolong periods of time; and culminate in realistic products or presentations (Jones, Rasmussen, & Moffitt, 1997; Thomas, Mergendoller, & Michaelson, 1999).

Features:

To understand the features of PBL it is better to focus on the project, project design & its elements. Projects are focused on students learning goals and include essential project design elements i.e. key knowledge, understanding and success skills; challenging problem or question; sustained inquiry; authenticity; student voice and choice; reflection; critique & revision; public products (Buck Institute for knowledge). Five criterions for "what must a project have in order to be considered an instance of PBL?" are centrality, driving question, constructive investigations, autonomy, and realism (John W. Thom, 2006). Each project had to include the essential components of an essential question—driving the whole project; significant academic content built in; multiple drafts of work and critique on work provided by peers, teachers and others; a student-created final project; public exhibition of the work created; and an authentic audience to view and to comment on the work created (Victoria Menzies, Catherine Hewitt, Dimitra Kokotsaki, Clare Collyer and Andy Wiggins; Durham University 2016).

One of the important features that differentiate project-based learning from traditional education approaches is that it's student oriented. In project-based learning, students define the problems, discuss the views or predictions, collect information, evaluate the collected information, make conclusions, combine views and create a product (Blumenfeld et al, 1991).

Benefits of project-based learning:

• PBL help students in learning by performing not by saying.
• It’s an easier way to see the engagement of students, as they solve the real-world problems that directly affect or heavily interest them (Marcus Guido, 2006).
• A great project can be transformative for students. Seeing a real-world impact gives them a sense of agency and purpose (Buck Institute for Education).
• Knowledge in a practical way via projects.
• PBL allows students to control their study according to their suitability.
• Students actively engage themselves with PBL projects which provide them with a real-world relevance for learning. Students can solve problems that are important to them and to their societies (Buck Institute for Education).
• PBL encourages students to analyze a problem, correctly adjust them and apply knowledge to forage the solutions (Jelani Payne, 2017).
• PBL helps students to apply their theoretical

3. Research Methodology

The goal of this research was to determine the engagement of students, their efficiency, learning via this application. When it comes to the online environment provided for learning it becomes quite difficult to engross the students with the environment. This application includes so many approaches to capture student's interest like pre-written codes study helps them not only in understanding the code but also gives them idea behind the logic. The main goal of this research was to determine the helpfulness of this application on naive programmers, after getting these many learning approaches and environments on the same platform is helping them or exaggerating them by the excessive amount of sections accessible on the same time. Sometimes the project also does not help in learning as the students get trapped in the same environment and thinking of is not self-productive anymore. This research was to analyze all these factors for naive programmers as well as for programmers. For this three case studies had been done for six months on three different categories of programmers. One who knew nothing about programming and required to learn everything from scratch, second who had basic knowledge about programming, third who had been doing programming from earlier.

3.1 All accessible environments:
It is the advantage of this application that students can access so many resources at the same time for their learning but there was also a problem behind that advantage that students don't get exaggerate after seeing so many resources. For this, we divided the sources into categories according to the level of programming, according to the language of programming so that the different categories of students don't get mixed up with each other and also they don't get confused for different languages provided to them on the same platform.

3.2 Categorizing web projects:
To don't let all programmers get mixed it was essential to divide the projects according to the level of programmers So that they can learn according to their levels. Those who don't have previous knowledge of programming can do the projects for basic learning to just understanding the importance of programming. Those who have basic knowledge of programming can improve themselves by doing projects. Those who are doing programming from earlier can learn new concepts of programming with the help of advanced level of projects. In-built projects provided on the application for learning them the different categories of concepts of different languages. Also, the feature of self-made project environment is provided to make them test their skills. Categorisation of projects according to different languages on the same platform according to their level of programming, So that they don't get confuse about the different languages and can't be exaggerated from the different levels of learning sources for the different level of programmers.

3.3 Competition with others:
Ranking according to their learning has been done for their self-motivation but it was also having a disadvantage of suppressing low-level programmers' confidence so ranking is also categorized according to the level of their programming in different languages that help them to sustain their programming learning continuously.
3.4 The diversity of learning resources:
Instead of focusing on only one resource there are different resources for learning programming. These resources help the students to test their ability and to check the suitability of the resource. The motive behind providing different approaches to learning is to fulfil their kind of requirements as much possible and helping them according to their suitability. We divided the approaches of learning into three categories:
Video Lectures
Study of pre-written codes
Project-based learning

3.4.1 Video Lectures:
Each language covered on this application also has introductory lectures for basic to advanced concepts of those languages. These point to point lectures help to give students basic idea and implementation of that topic. This approach basically helps them to get introductory knowledge of different concepts of different programming language on the same platform. With these video lectures, students also get the best reference to study the concepts furthermore. These references are provided by doing the survey on different references.

3.4.2 Study of pre-written codes
This approach helps programmers to study the logic behind the code and to interpret the use of different functions, tags etc. with their definitions. This approach is not only time saving but also minimize the efforts for understanding the code. This saves a lot of browsing time for searching different languages functions as you get the definition of all the functions used in the code by simply clicking them.

3.4.3 Project-based learning
After getting introductory knowledge students can use their theoretical knowledge in a practical way using the projects provided on the platform. They can implement all the skills they learned and also with enhancing their skills so that many new skills can be learned by them using the different projects provided to them.

4. Results and Analysis
We tested our project at Jaypee University of Engineering and Technology over first-year students who were naïve to programming culture for three months continuously. We took 250 students from the first year most of them were unaware of the coding culture. First of all, we saw how were they doing initially and noted their performance. According to our expectation their approaches, time is taken to execute problem, understanding of the problem was not good. Then we included our project in their laboratory exercise and noted their performance. After 3 months we took the final results and saw a satisfactory elevation in their performance. Their performance during the initial and final time is given below. In 250 students we have shown a sample of 30 students and graph of all 250 students.

We have drawn our conclusion on the basis of three primary factors - 1) Time complexity 2) Optimization and efficiency 3) Number of the problems solved. The table contains the name of the students, an average time of execution before use of the project, time of execution afterwards, no of problems solved and review.
Review ratings are categorized as-
1-unsatisfactory
2-satisfactory
3-average
4-good
5-very good
First graph show variation between no of problems solved by 250 students before the use of project and problems solved after the use of the project. Grey colour lines denote the number of problems attended by the student of the first year before using the project while blue lines show a number of problems attended by students after using our project. The second graph shows the change in the time needed to execute a code. The second graph shows how efficient programs were written after using the project. Undoubtedly there is growth in performance of student which is visible in below-mentioned graphs. Here blue lines amount of time taken in a millisecond by students before using the project and grey lines denote the amount of time taken after using project.
5. Discussions

We started our research with the hope that we can deliver a better platform to students those who are interested in self-learning. We thought to encourage technology mixed environment to inculcate a habit of self-learning. Our project was related to the programming language. Though there are several numbers of projects available which encourage the idea of self-learning with the help of technology but we brought everything over the same platform eradicate problems faced by learners and simplify as much as we could have done.

Findings from our research say that technology-enabled learning has a glorious future not only in the engineering field but everywhere. During our project, we learned that mixing technology with our Old ways can bring efficiency, save time and a lot more. Above table shows that most of the students gave ratings between 4 and 5, means more students were satisfied by our work. Above table shows that there was a drastic change in time improvement and the number of the problem solved.

This gives of hopes that in future we can expect greater involvement and better results. It proves that these types of projects which not only enhance learning but also revamp idea of self-study are needed. During our research, we received greater engagement from students who were open to new ideas. During research, we came to know it really helped them in enhancing and improving their skills. Students those who used our project reported high involvement and were motivated throughout the studies that fade away the concern of demotivation which is highly suspected in these types of studies.
6. Conclusion
Technology is our future. Technology-based learning has a vital role to play in it. During our testing we found out most of the reviews given were above satisfactory level means students liked our project and it helped them in the understanding of language. The system serves the following purposes:

1-Students came out from a monotonous style of learning.
2-Their efficiency and understanding increased.
3-Motivation didn’t fade away as most of the time happens.
Though there are many challenges in programming field which we have to look forward to until now our project has served well.

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