

CONVERGENCE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) TOOLS IN PROJECT BASED LEARNING (PBL)

By

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ABSTRACT

Rapid technological advancement influences the communication and information management as well as knowledge construction. Within the context of new challenges, lifelong learning emerges a fundamental element for the constant development of professionals. So that it dynamically adapts to change and retain a state-of-the-art identity. At present, Computer Science Education, Information and Communication Technology (ICT) are becoming one of the most important elements which are defining the basic competencies of students. Information technology integrates medial, informative and computer science education, but also all the educational subjects mentioned in the curriculum basis of general education. In Science education, there is an increasing concept of integrated teaching, which shows the students, the world in a holistic manner. The principle of universal activity of students in cognitive, emotional and motivation, as well as in practical sphere is preferred. More and more often attention is paid to the fact that the contemporary problem is not so much lack of information, as its surplus and crowd of information as well as its unnecessary excess of details may be an effective tool of disinformation. Hence it forms such skills with students as selection, evaluation and organizing of information and forming its structure seems to be justified. So that, they can serve the drawing conclusion. In this article, the author has briefly outlined and taking into account the various manners of didactic transformation of teaching contents. Selected ICT tools have been presented in the light of teaching principles and cognitive activities model.

Keywords: Project Based Learning (PBL), Information and Communication Technology (ICT), Convergence.

INTRODUCTION

Education involves teaching people on various subjects, usually at a college, or school, or being taught. It brings the all-rounded development of an individual. Before educators adopted the word, the term "project" was used by engineers and surveyors in reference to their plans. People find the term in current use of educational thought during the early years of the last century. Probably, it originated in Columbia University, as the name of a procedure that came into being in revolt against current methods and practices of teaching manual arts. It was an outcome of the pragmatic educational philosophy of John Dewey, the well-known American philosopher and educationist. However, it was developed by William Head Kilpatrick (1871-1965) of Columbia University. It was the expression of widespread dissatisfaction against the bookish, encyclopaedic passive method, whereby

children as obedient masses are carefully drilled and spoon-fed with fact and information. Kilpatrick gave a definition to the term "project" as "whole hearted, purposeful activity proceeding in a social environment, or more briefly, in the unit element of such activity and the hearty purposeful act". Stevenson gives a definition that tends to the point of view of project in the teaching of agriculture in the earlier years. He states that "a project is a problematic act carried to completion in its natural setting".

The recent ICT revolution influenced all realms of our life including the entire aspects of education. Open Source Software (OSS) can provide an open-to-many environment and learning management, complying with current socio-cognitive theories of learning. According to these, knowledge is gradually constructed on interactions, that encourage the formation of new schemata in a social

context. The incorporation of synchronous and asynchronous communication tools provides the environment for collaborative content creation, sharing and refinement, thus contributing to the new paradigm of collaboration, collective intelligence and community building. This new reality challenges existing systems, creating new potential for effective learning to take place. Das, S.K. (2005)

Project-Based Learning (PBL) as an alternative to traditions in Education

Project-based Learning (PBL) is considered as an alternative to paper-based, rote memorization, teacher-led classrooms. Proponents of project-based learning cite numerous benefits to the implementation of those strategies in the classroom including a greater depth of understanding of concepts, broader knowledge base, improved communication and interpersonal/social skills, enhanced leadership skills, increased creativity, and improved writing skills. John Dewey (1859-1952) initially promoted the idea of "learning by doing." In the Pedagogical Creed, Dewey (1897) enumerated his beliefs regarding education as "The teacher is not in the school to impose certain ideas or to form certain habits in the child, but is there as a member of the community to select the influences which shall affect the child and to assist him in properly responding to these.....I believe, therefore, in the so-called expressive or constructive activities as the center of correlation." (Dewey, 1897) Educational research has advanced this idea of teaching and learning into a methodology known as 'Project-Based Learning.' Research has demonstrated that, students in project-based learning classrooms get higher scores than students in traditional classroom.

Markham (2011) describes project-based learning (PBL) as: "PBL integrates knowing and doing. Students learn knowledge and elements of the core curriculum, but also apply what they know to solve authentic problems and produce results in that matter. PBL students take advantage of digital tools to produce high quality, collaborative products. PBL refocuses education on the student, as not the curriculum, but a shift mandated by the global world, which rewards intangible assets such as drive, passion,

creativity, empathy, and resiliency. Those things cannot be taught out of a textbook, but must be activated through experience."

PBL has been associated with the "situated learning" perspective of James G. Greeno (2006) and on the constructivist theories of Jean Piaget. A more precise description of the processes of PBL given by Blumenfeld says that, "Project-based learning is a comprehensive perspective, focused on teaching by engaging students in investigation. Within this framework, students pursue solutions to nontrivial problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analyzing data, drawing conclusions, communicating their ideas and findings to others, asking new questions, and creating artifacts." (Blumenfeld, et al., 1991). The basis of PBL lies in the authenticity or real-life application of the research. Students working as a team are given a "driving question" to respond to or answer, then directed to create an artefact to present their gained knowledge. Artifacts may include a variety of media such as writings, art, drawings, three-dimensional representations, videos, photography, or technology-based presentations. PBL is not without its opponents, however, in Peer Evaluation in Blended Team. Hye-Jung & Cheolil (2012) describe social loafing as a negative aspect of collaborative learning. Social loafing may include insufficient performances by some team members as well as a lowering of expected standards of performance by the group as a whole to maintain congeniality among members. Those authors said that because teachers tend to grade the finished product only and the social dynamics of the assignment may escape the teacher's notice. (Hye-Jung Lee & Cheolil Lim 2012)

Project Method and Activity Curriculum

Much of the confusion concerning projects arose with the growth of the 'activity curriculum'. The movement should not be confused with the extracurricular activities of the school. The 'activity curriculum' may be said to be the logical fusion of the project method as defined by Kilpatrick and others. It conceives the curriculum in terms of tasks to be performed rather than as the lessons to be learned. (Richards, C. A 2000).

Principles of Project Method

The Principle of Purpose.

Knowledge of purpose is a great stimulus which motivates the child to realize his goal. Purpose motivates learning. Interest cannot be aroused by aimless and meaningless activities.

The Principle of Activity

Children are active by nature. They love activity. The instincts of curiosity, construction and herd make them active by nature. Therefore, such opportunities should be provided to them which make them active and learn things by doing.

The Principle of Experience

Experience is the best teacher. What is real must be experienced. The children learn new facts and information through experience.

The Principle of Social Experience

The child is a social being and people have to prepare them selves for social life. Training for a cooperative life must be given to the child in his childhood. In the project method, the child works in groups.

The Principle of Reality

Life is real and education should be meaningful and must be real. A child who is to live in a life of reality must be trained through his education. The project method also must be real. The real life situation must be presented to the students.

The Principle of Freedom

The child should be free of impositions, restrictions or obstructions so that he may express himself fully and freely. He must be freed to choose an activity and to do an activity according to his interests, needs and capacities.

The Principle of Utility

Knowledge will be worthwhile only when it is useful and practical. The traditional system of instruction has very little utility. The project method develops various attitudes and values which are of great significance from a practical point of view.

Types of Projects

Kilpatrick classified four types of projects which are

explained as follows,

The producer type

The producer type means that the emphasis is directed towards the actual construction of a material object or article.

The consumer type

The consumer type means that the objective is to obtain either direct or vicarious experience, such as reading and learning to stories, listening to a musical declaration etc.

The problem type

The problem type means that the chief purpose is to solve a problem involving the intellectual processes, such as determining the density of a certain liquid.

Drill type

Drill type means that the objective is to attain a certain degree of skill in a reaction - as learning a vocabulary.

Steps in a Project Method

Project method in teaching is completed through the following steps;

Providing a Situation

It is not right to force a project on unwilling students. The students themselves, should define the state and choose their problems. Of course, the teacher's function would be to provide real and worthwhile situations. The teacher would discover the tastes, temperaments and needs of the students and would provide situations where students feel a spontaneous urge to carry out projects according to their felt needs.

Choosing and Purposing

The project must satisfy a definite need or purpose. The students themselves choose the project. The teacher should not be in a hurry in choosing the project. Many situations should be provided for children. Decision should be always democratic. The teacher should be merely a guide and not thrust his opinion. The children must feel the project as by their own choice.

Planning

The teacher should draw the attention of the students to the need of planning before undertaking the activity. The task of planning is quite difficult. Good planning leads to better

result. Different proposals should be discussed and alternatives considered. Students should be asked to write down the plan in their project diary.

Executing the Plan

This step is the longest of all and requires a lot of work. The whole project is to be executed through the cooperative efforts of all students. The various activities of the project should be divided according to the individual interest and abilities of the different children in the class. The teacher should give sufficient guidance to students. He should not dictate them.

Judging

The work is to be reviewed when it is completed, lessons must be learnt from the mistakes that have been made in the various steps of a project. The students must learn to criticise their own work. Self criticism is a valuable form of training. The students should find out what things they have learnt from the project.

Recording

A complete record of all activities connected with the project must be maintained. The project book should be maintained. Separately, all the details in the various steps should be noted down. The project book should give a comprehensive picture of the projects as a whole. Students should take the procedure of a situation and choose the project, duties assigned, difficulties felt and experience gained.

Qualities of a Good Project

- **Timely:** Project should be suitable to the lesson, vocational interest, mental and chronological ages of students. Environmental and seasonal factors should also be taken into consideration.
- **Usefulness:** It must fulfil a need. The learning experiences in a project must be capable of being applied in life.
- **Interesting:** Projects should be interesting and appealing to the emotional hungers of students.
- **Challenging:** It is an admitted fact that the students want to do tasks which are challenging in nature.
- **Economical:** The projects should be economical and

should be of least wastage time also.

- **Rich in experience:** Many experiences of nature should be provided in the project. The project selected should be capable of correlating different subjects and practical activities of life.
- **Cooperativeness:** The students should be allowed to think and plan independently as well as co-operatively.

Format of a Project Report

Project work is to be carried out in the whole hearted cooperation of the whole students or small group settings. From the very beginning of the planning stage, every step taken for the completion of the project is to be recorded and reported. This is called by the name of Project Report.

Principles of Teaching and their Computer aided Realization

The computer programs as a didactic aid are often described in didactic literature all over the world. It is not enough that they play. For instance, motivational, exercising, synthesizing or supervising function. They are to be made as independent sources of reliable, easily comprehensible information, given in a way that activates students. It is also not important to replace various functions and tasks of didactic aids applied in the process of teaching-learning with each other, but only to interfere skilfully. It is underlined that school practice requires methodically grounded application of those aids in the processes of teaching and educating. (Kumar, S and Noushad, P.P. 2006)

Learning is usually defined as acquiring knowledge and skills. Cognitive skills signify considerable increase in skilful performance of cognitive tasks as a result of practice. Cognitive analysis of tasks is a preliminary condition for effective teaching as it precisely identifies the skills that are to undergo teaching, and allows introducing effective computer-aided teaching curriculums, which may quicken the pace of learning. The computer programs as a didactic aid are often described in didactic literature all over the world. Whether it is called as project or problem-based learning, those technologies will help the students to get authentic experience in a blended environment - and help the teachers to track their progress.

PBL in classrooms

"When will I ever use this?" This cringe worthy comment is from a student in the sense of accomplishment felt by a teacher who has spent a week crafting a lesson that she thought would have staying power. If you cringe too, it may be time to lock onto the practice of PBL, which is variously referred to as project, problem or inquiry-based learning. Where blended learning gives some flexibility to students when they do their work, PBL offers them a choice of what they do. And when students pick the activities they're going to work on, how many of them will openly criticize their own choices? In PBL classrooms, students are not learning simply to pass a test, but applying creativity on job and taking ownership of their own education. As per a rework of the old sayings, teach a student through a quiz for the day; show him how to calculate profit and loss, and he'll be pitching his next new idea for a lifetime. Some technologies help you to implement PBL in your classroom.

Web-Based Career Readiness System

Teachers want their students to be 'life ready'. That means preparing students for careers to which they are well-suited. Web-based WIN(Career Readiness Learning systems) Learning Personalized Career Readiness System includes WIN Strategic Compass, which allows students to explore potential career paths, identify interests and put together a career plan based on employment trends for the next five to 10 years. An initial review measures a student's career readiness and identifies gaps in skills such as reading for information and applied maths. The goal is to help the student to see the relevance of his or her own education. The software also has lessons for soft skills such as communication, teamwork and critical thinking.

Collaboration and Course Management Tools

Google Apps for Education is enabling the students to collaborate on papers and presentations. For course management, Canvas by Instructure, is where teachers can put up assignments and students can access them. Baird has used the online service's asynchronous discussion forum and he is testing out the wiki feature; but since this is the first year, it has been in use, as he said, "we are still exploring its capabilities." Also, now the school is trying out SLATE (An Educational Application), from a start-up itself,

that promises to integrate applications which are already in use, such as Canvas and Google Apps and plenty of others through single-sign-on as well as APIs(Application Program Interfaces) and dashboards that enable the sharing and reporting of data across programs.

Feedback on the Run

Behavioural Management Application Class Dojo prepared a list of useful tools for PBL. Teachers are using the Web-based program to give points to students or stars for certain behaviours. Those behaviours happen to be aligned with good collaboration, critical thinking or communication-and those are being assessed as live by the teacher as they're being observed while the students are working in teams. That could be a great project tool that student or that team can get instant feedback from the teacher. Molnar, G (2003)

Grading Essential Questions

Tenth-graders studying world history may create iBooks on their school-issued MacBooks to synthesize the American and French revolutions and life under dictators into a format appropriate for children's story. They may create documentaries to explore how technology affects relationships among people. Those are not forms of learning that fit well into a standard grade book application. Acuity, adopted about two years ago from CTB/McGraw-Hill, was the first program that had come across suited to capturing achievements in the open-ended types of activities that students undertook as they moved through PBL units. Now Acuity has been updated to work with performance-based tasks, comparable to the Common Core online assessments. The benchmarks developed by the district ask the student to respond to essential questions which cover real-world situations, issues, questions that the normal person should have some knowledge of, some experience with, and be able to solve in their daily lives." To answer these questions, the student needs to apply the real-world skills and knowledge gained through PBL. The goal is to transform the district's assessment tasks to look more like the ones being introduced (Potyrala, K. 2001)".

Virtual Labs

It makes sense for the chemistry students to study water. As

residents of Kerala in Southern India have the ocean as a neighbour; and they're currently living in a drought situation, a teacher can run a three-week blended project, Water, water everywhere and not a drop to spare, to help students and put into the action of theories they have been studying in previous weeks. Rather than sticking to a chemistry book, it is better to use virtual labs and scientific equipment to help the students go deeper in their understandings of the concepts.

Virtual labs helps to perform experiments that help them to learn to identify acids and bases and also to detect and figure out how to remove substances dissolved in water and to become contaminants. It also explores the chemistry of ocean acidification and its impacts on sea creatures using interactive models, via a virtual lab bench and a microscope measurement tool (Vivitsou, M 2007).

Blended Learning Resources for High Schools

Blended School Network offers packages of online classes to deliver to students as whole classes, supplemental instruction or mix and match. The lessons can be run through Canvas by instructor or Blackboard, and teachers gain access to professional development via face-to-face, blended or online formats. The following are the resources for the blended learning.

- Khan Academy has more than just videos; 'coaching' resources which include planners, student progress tracking, mechanisms for personalizing lessons and ample reporting.
- Amplify and Education Elements can move into the school and help with the hard parts of implementing blended learning for PBL such as professional development, designing personalized curriculum, identifying vital learning resources and handling management and reporting.
- Scoop.it, Storify and paper provide ways for teachers and students to gather and curate content into meaningful compilations that can be shared with others.
- YouTube Education, Video Education and TED-Ed are the sites for informative lesson videos, inspiration and repositories for publishing what you and your students

are creating in class.

Innovative Teaching and Multimedia in Education

Multimedia is the combination of various digital media types (e.g. images, sound, video, text). They compile an integrated multi-sensory interactive application to present the information to an audience. Multimedia means an individual or a small group using a computer to interact with information that is represented in several media, by repeatedly selecting what to see and hear next. Using multimedia in education results in increasing the productivity and retention rates, because people remember 20% of what they see, 40% of what they see and hear, but about 75% of what they see and hear and do simultaneously. It means, by using multimedia tools, it can create a learning environment, where the communication of the information can be done in a more effective manner and it can be an effective instructional medium for delivering information. With multimedia technologies, students can create multimedia applications as part of their required project. This makes them active in developing their own learning process, instead of just being passive learners of the educational content. (Schaffhauser, D 1999).

Multimedia application design offers new insights into the learning process, and gives possibilities to represent information and knowledge in a new and innovative way. But technology alone will not result in higher achievement. The ideal classroom for the 21st Century calls for an amount of collaboration, conscious design and technological innovation to make the classroom into a place of positive learning environment.

Conclusions and Recommendation of the study

This paper has discussed how and why PBL provides a useful framework as well as suggested methods for more effective integration of ICT resources in school curricula. In contrast to the Webquest model, PBL provides a more flexible, comprehensive and diverse approach which includes and goes beyond the latter. PBL also provides a path for connecting the process of learning and assessment with content or even outcomes focused in terms of the various stages and aspects of practical and reflective learning. At a time when many educators are

pessimistic about the role of ICT in education and also about the future of education, a PBL approach thus represents a productive strategy of change for integrating ICT in and across the curriculum. In short, it provides a framework for reconsidering a number of everlasting issues - the role of the teacher, the function of assessment, and the changing nature of the student, which inform debates about the reform of school teaching and learning in the Internet age.

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