PROJECT-BASED LEARNING IN 21ST CENTURY

Mr. Abhijeet Ghosal
M.A in Geography and Applied
Geography (North Bengal University)
M.A in Rural Development (IGNOU)
M.A in Education (IGNOU)
ADDRESS: Tikia Para, Railway Coloney, Q.No-T/163A, Siliguri, West Bengal.

Abstract*:** The world we live in today is vastly different from that of our ancestors. A wealth of technology surrounds us. We now live in a society that is ***rapidly changing and has an ***advancing knowledge base*** and we are constantly called upon to ***solve complex issues on a daily basis***. As a result, employers are looking for individuals that can adapt to new situations and develop innovative solutions to problems that we have never seen before. Thus, our youth need to be trained to think differently and cultivate skills that have traditionally been ignored in the school setting. These new skills are being called **"21st century competencies"**, and are highly sought after in the working world. In order to teach our students 21st century competencies, we must move away from traditional modes of teaching. One such method is through the use of **Project-Based Learning** (PBL) within the classroom. PBL is currently advocated as a powerful means for facilitating students' attainment of the high-level competencies and transferable skills increasingly being demanded by government, commerce, and industry. This mode of teaching enables teachers to prepare students for the high demands of our constantly evolving society. This complex method was first used by **John Dewey** and **William Heard Kilpatrick**, in the United States and it implied replacing the classical study subjects with the performance of practical activities, having a real purpose(learning-by-doing), starting from the pupils' spontaneous interests. It was believe that by doing so, by solving real issues, knowledge could be acquired and abilities could be built. PBL integrates knowing and doing. Students learn knowledge and elements of the core curriculum, and also apply what they know to solve authentic problems and produce results of that matter. PBL is essential in teaching students ***"critical thinking, communication, collaboration and creativity"***. The outcome of PBL is greater understanding of a topic, deeper learning, higher-level reading, and increase motivation to learn. So using PBL, we will not only help students to gain valuable skills that will enable them to succeed in the classroom but will also help them to succeed in the working world.

***Key words*: 21st century skills, critical thinking, creativity, advance technology, collaboration.**

1. INTRODUCTION: Project-Based Learning, or PBL as it is commonly referred, is not a new concept in the world of education. It has been utilized for decades in a variety of content areas and in a variety of settings. Project based learning provides students with practical applications of concepts that allows for them to make connections between the content being learned and the real world. The connections produced allow students to see there are opportunities for them to use information gathered in the real world, especially in the realm of Business and Marketing Education. Students are more likely to retain material and understand abstract concepts due to the more hands on environment that project based learning create. Project based learning also provides students with multiple opportunities to enhance skills that will be needed in the future. Students learn how to collaborate and bounce ideas off of each other. They will develop their critical thinking and problem solving skills. This allows them to learn different ways of thinking and how to come to conclusions more efficiently and effectively. Skills gained through project based learning and Business and Marketing Education are those that employers look for. With ample project based learning opportunities students, can succeed in multiple content areas in the classroom, along with building upon and honing skills that they can utilize to be successful.

2. DEFINITIONS OF 21ST CENTURY SKILLS: Umbrella term that includes the following skills: critical thinking, collaboration, communication, creativity and innovation, self-direction, global connections, local connections, and using technology as a tool for learning.

2.1 Autonomous Learning: The process by which students have a choice in what and how they leer (Chalupa and Haseborg, 2014:pg. 56).

2.2 Critical Thinking: Describe forms of learning, thought, and analysis that go beyond the memorization and recall of information and facts. In common usage, critical thinking is an umbrella term that may be applied to many different forms of learning acquisition or to a wide variety of thought processes (Great School Partnership, 2015).

2.3 Constructivism: A paradigm or worldview posits that learning is an active, constructive process. The learner is an information constructor. People actively construct or create their own subjective representations of objective reality. New information is linked to prior knowledge (Learning Theories, 2017).

2.4 Differentiation: Wide variety of teaching techniques and lesson adaptations that educators use to instruct a diverse group of students, with diverse learning needs, in the same course, classroom, or learning environment(Great School Partnership, 2015).

2.5 Extrinsic Motivation: Being motivated by an external stimulus to achieve a specific outcome, reward, or standard (Sib old, 2016, pg.79).

2.6 Experiential Learning Theory (ELT): The process of learning where knowledge is created through the transformation of experience (Kolb & Kolb, 2005:pg.194).

2.7 Higher-Order Thinking: Takes thinking to higher levels than restating the facts; understand them, infer from them, connect them to other facts and concepts, categorize them, manipulate them, put them together in new or novel ways, and apply them as we seek new solutions to new problems(Thomas & Thorne, 2009).

2.8 Intrinsic Motivation: Being motivated by an internal stimulus to perform behaviour because it is personally rewarding, interesting, and satisfying (Sib old, 2016: pg.79).

2.9 Meta-cognition: Ability to think about your thoughts with the aim of improving learning (Wilson: 2014).

2.10 Project-Based Learning (PBL): Methods in which students gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging and complex question, problem, or challenge (BIE, 2015).

2.11 Scaffolding: A variety of instructional techniques used to move students progressively toward stronger understanding and, ultimately, greater independence in the learning process (Great Schools Partnership, 2015).

2.12Self-Determination Theory: Examines social and environmental factors that affect and Sub-sequently lead to optimal and sustained human motivation (Sib old, 2016: pg. 79).

2.13 Social Constructivism: Level of potential development is the level at which learning takes place. It comprises cognitive structures that are still in the process of maturing, but which can only mature under the guidance of or in collaboration with others (Berkley University, 2017).

3. LITERATURE REVIEW: Many theorists are credited with the development of project based learning, most credibly Piaget, Vygotsky, and Dewey. A mass of information has been gathered to develop key features and aspects of project based learning for it to be implemented in a variety of classrooms. However, here we discuss about some theoretical frameworks

3.1 THEORETICAL FRAMEWORK:

There are multiple theories that reside at the base of project-based learning (PBL). The main theories are embedded throughout are Piaget's theory of Constructivism and Vygotsky's theory of Social Constructivism. John Dewey's Pedagogical Creed played a major role in development as well.

Piaget's

In Piaget's *The Child's Concept of the World* (2007), he discusses that an individual is born with schemas in their brain. These schemas are what allow one to go through the processes of both accommodation and assimilation. Through the process of assimilation new information is added and adapted to existing schemas. Therefore, unless schemas are being reshaped or new ones are formed the student will only understand the information as the existing schema. Piaget's theory has been adjusted and adapted by many constructivist theorists. However, one thing remains a constant: students construct their knowledge by building up existing knowledge and through experiences. Although Piaget's never directly associated his theories with education, it is easy to see where it can be applied. One way constructivism can be applied to education is through discovery learning. Discovery learning is the idea children learn best by actively exploring and physically doing (McLeod, 2015). The practice of constructivist theories allow for the creation of an environment that is conducive for project-based learning.

Vygotsky

One thing that Piaget's theory did not account for is the social aspect of the learning environment. The addition of the social aspect would lead to the further development of constructivism into social constructivism by Vygotsky. Vygotsky believed in learning by experience and doing through social and interpersonal interaction. Vygotsky led the development of the Zone of

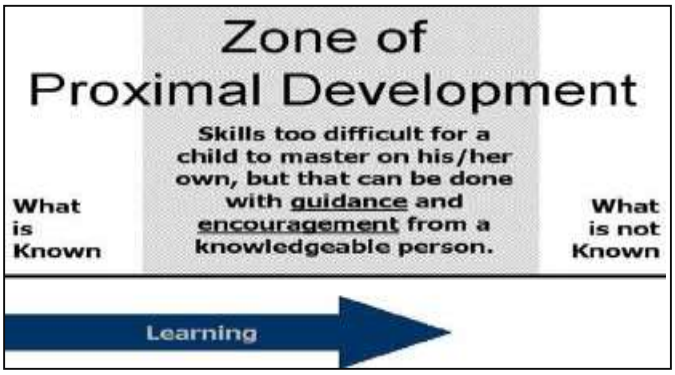

FIG-1- zone of proximal development

Proximal Development (ZPD). The ZPD is described as "the current or actual level of development of the learner and the next level attainable through the use of meditating semiotic and environmental tools and capable adult or peer facilitation". A student is only able to accomplish so much individually. They are able to accomplish a higher-level task, which may be on the outside of their ZPD, by collaborating with higher level peers or an adult. The next time this same student needs to accomplish this higher-level task, it will be within their ZPD and they will be able to accomplish it on their own. While the term was never directly used by Vygotsky in his writings, ZPD is the beginnings of scaffolding. Scaffolding, by definition, is the variation in instruction techniques which are used to assist students in developing a greater understanding of content so that, in the end, they will achieve more independence in their learning. When providing this type of assistance, a teacher will provide successive levels of temporary supports for a student. As the student gains the skills necessary for the task and begins to further comprehend the material the teacher provides less and less support allowing for the student to assume responsibility for their learning. It is often used when there are gaps in learning among students in the same classroom. A teacher can provide the supports needed at each learning level, allowing the higher level students to work independently. This can also feed into ZPD and Vygotsky's social constructivism by allowing higher-level students to work with struggling students. They can collaborate and while the higher level student is further engraining the information by explaining it to another student, the struggling student is able to accomplish a more advanced task with appropriate assistance. In all areas of the constructivist theory there is a reflection component. In order for the newly acquired knowledge to be applied to a learner's already existing knowledge based they need to have time to reflect on the new information. This allows for synthesis to occur and for the knowledge to be readily available for the learner to utilize in the future.

Dewy

It is often said that John Dewey is the father of project-based learning. He believed students should have opportunities to take part in their own learning. He believed that students would succeed in environments where they are able to have interaction, both socially and with curriculum, and are able to learn through experience. In is Pedagogical Creed, Dewey states there are two sides to the educational processes, psychological and sociological. While the psychological side is the basis, neither side is more important than the other. "Without insight into the psychological structure and activities of the individual, the educative process will, therefore, be haphazard and arbitrary" (Dewey, 1897). Dewey also discusses the sociological aspect of the educational process. This side of the educational process is there for the preparation of future life. A student is trained to be able to "…have the full and ready use of all his capacities…" (Dewey,1897). Many of the key points in Dewey's creed centre on the total development of the child. In order for a child to become successful and a functioning member of society they need to be well rounded and have experiences that allow for the full development of skills needed in the world after the completion of their education.

4.KEY FEATURES AND ASPECTS: According to the Buck Institute there are eight essential elements of project design, the basis for project-based learning. Theses essential elements are as follows:

4.1 Key knowledge, Understanding, and Success Skills

A project should be focused on student learning goals. It should also include standards-based content and skills. These skills include critical thinking, collaboration and self management.

4.2 Challenging Problem or Question

The challenge level of the problem or question should be appropriate for the student(s) working to solve it. The problem or question should also be meaningful to the student(s).

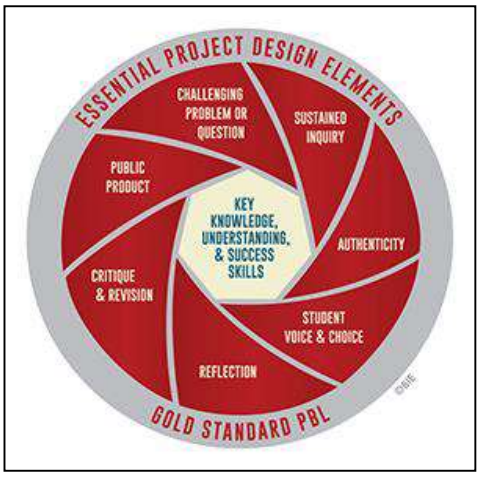

FIG- 2: essential project design elements
(larmer and mergengoller, 2015)

4.3 Sustained Inquiry
A continued process of students asking questions, finding resources to answer the questiosn and applying the new information.

4.4 Authenticity
A project should contain a connection to the real world. If there is no real-world connection, there should be an impact or relation to students own interests.

4.5 Student Voice and Choice
Students should have a say in what they create and how it is created.

4.6 Reflection
Students and teachers both reflect on the project. What was effective? What obstacles were encountered and how were they overcome?

4.7 Critique and Revision
Feedback is given and received by students. It is then used to improve the project process and product.

4.8 Public Product
Students work becomes public through display/presentation.

5. PROJECT-BASED LEARNING AND SKILL DEVELOPMENT:

5.1 21st Century Skills: There are many skills required in today's society that are not necessarily imparted through the use of traditional teaching methods. These skills are often referred to as 21st century skills.
A study that was published in 2012 looked at the impact of a professional development program that took place over the course of a week during the summer. This professional development was designed to assist teachers in developing effective project-based learning lessons that would emphasis the development of 21st century skills by the students. The study found there was a statistically significant difference in the amount of teaching and assessing of 21st century skills by teachers separated into three categories:
1. Do not use project-based learning,
2. Use project-based learning but have had limited professional development, and
3. Use project-based learning and have had extensive professional development.
While most believe that project-based learning is mostly a STEM (science, technology, engineering and math), or hands on content teaching technique, this study showed the teaching of 21st century skills through project-based learning is applicable in a wide variety of content areas. There is also further evidence to show that social learning provides ample opportunity for students to develop and become proficient in skills such as communication and collaboration. Project-based learning provides these students with the opportunity to take part in social learning situations. Collaboration and social learning also provides students with the chance to assume responsibility. They learn to be more independent and accountable for their work. In project based learning situations, students become accountable to their peers. When students do not follow through with their responsibilities to their peers they often experience greater consequences than if they just held a responsibility to the teacher. Students have a greater motivation to take responsibility because they do not want to let their peers down. There is a greater consequence to letting peers down than there is to letting the teacher down.

5.2 Higher-Order Thinking: Higher order thinking can be described in many ways. For the purposes of this literature review in the context of project-based learning we will look at that higher-order thinking in terms of how it applies to problem solving. Higher-order thinking is also often associated with the higher levels of Bloom's Taxonomy, both in the original sense and the new revised version. The process of higher order thinking occurs when a student analyzes, evaluates and then creates.

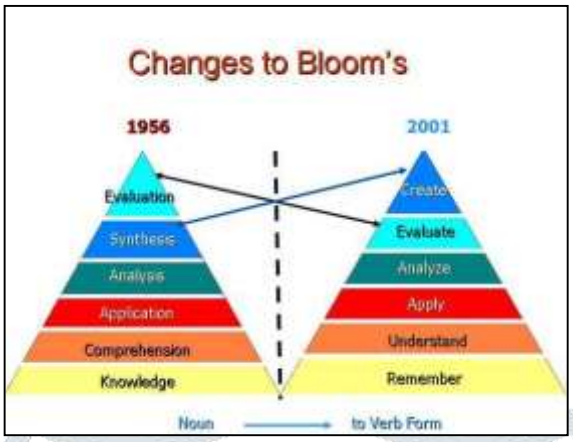

FIG- 3: changes to bloom's taxonomy (wilson, 2001)

Like 21st century skills, higher-order thinking skills are best developed in a project-based learning environment. Problems are solving by the students easily utilize analytical and creative thinking skills. The combination of the two, fostered in a project-based learning environment, allow for the best solutions to be created.

5.3 Metacognition: When achieving higher order thinking students develop their metacognitive abilities. The success of a student often relies on their ability to think effectively. Students are ones who rely less on teacher guidance and can learn independently. The ability to increase one's metacognition can be learned through being taught directly and when it is practiced. This can happen across content areas and in different contexts. Students will experience greater metacognition when they are genuinely interested in the material and motivated to learn, which more often than not occurs when they are able to take responsibility of their learning and make choices regarding how and what they will learn. A project based learning environment contains the necessary elements conducive to metacognition occurring. Part of developing metacognitive skills is the ability to recognize one's strengths and weaknesses. One needs to monitor how they learn and what tactics are most effective. Beside self-management is essential to project based learning, as it involves choice, motivation and autonomy.

5.4 Motivation: Motivation can be broken apart into two components, intrinsic and extrinsic. When it comes to project-based learning and learner autonomy intrinsic motivation is what is strived for, as opposed to extrinsic. In this context students are intrinsically motivated when they are interested in the content. Content needs a connection to the real world or their life for students to be intrinsically motivated which leads to them being more engaged in learning.

6. PROJEC-BASED LEARNING AT DIFFERENT AGE-LEVEL:

6.1 Elementary: There are often arguments against project based learning due to its time consuming nature. Teachers are often not sure how to incorporate state learning standards into a project based learning curriculum. These arguments are often made at the elementary or primary school level. The teachers at this level have the responsibility of teaching all core subjects, instead of just focusing on one, like a middle school or high school teacher. They also argue their students may not be up to the challenge associated with project based learning, especially those with learning disabilities. This however, provides the perfect argument for project based learning. Even though it is time consuming to complete a project and to plan the project, project based learning allows teachers to combine subjects and to implement more than one set of standards at a time. It also allows for scaffolding to the different development levels. Students get the opportunity to interact and learn from each other. Project based learning allows for the closing of the gap between higher performing and lower performing students.
In an article published in the fall of 2016, Nell Duke discusses many studies that show the success of project based learning in elementary classrooms. She specifically mentions a study completed in 48 second grade classrooms in high poverty districts. The teachers were randomly assigned a project based learning curriculum with some addition of informational texts or the standard curriculum. Some of the teachers who were assigned the project based learning curriculum, even those with little to no prior experience with project based learning, experienced higher achievement from their students than the group that did not use a project based curriculum. The study also found that when a teacher placed more emphasis on the project students also experienced higher growth on reading and writing standards. The motivation of the students increased as well.

6.2 Secondary Education: Most commonly, project based learning is generally associated with STEM education and secondary schools, which overall are generally taught at the secondary level. Margaret Holm has done an excellent job in combining an overwhelming amount of research on project based learning and its effectiveness in the classroom. The research she analyzed was

from the first decade of the 2000s. She states the main goal of the methodologies associated with project based learning is to shift education. This shift will be towards student centered methods that provide opportunity for inquiry and active learning. However, for the optimum learning environment to occur, there needs to be guidance and involvement from the teacher. The students in these studies also claimed the
following:
1. Increase in content knowledge,
2. Increase in understanding,
3. More favourable attitudes towards the content and an interest in the subject matter, and
4. More positive views of working in groups and collaborating.

7. ADVANTAGES OF PROJECT-BASED LEARNING: The advantages of PBL are as follows-
1. Gives more personal investment into an activity,
2. Deeper understanding of material,
3. Helps develop independence, creativity, responsibility, self control, etc.
4. Learn to work with other children -learn to listen to other people's ideas and opinions,
5. Letting them teach themselves.

8. DISADVANTAGES OF PROJECT-BASED LEARNING: Beside the advantages there are some disadvantages of PBL too, these are-
1. Students may not feel encouraged to finish their projects,
2. There can be a lack of interest in their project subject which would lead them to not want to participate or get distracted,
3. Accidentally accessing inappropriate content,
4. Teachers could come into problems while they prepare/Have to think of ways to get students back on track,
5. Could be uncomfortable for students with disabilities.

9. ANALYSIS: Project based learning can be utilized in a majority of classrooms at practically any age level. There are, however, six key elements necessary for the implementation of project based learning. They are as follows:
1. A focus needs to be on student learning goals.
2. Along with learning goals, learning standards need to be kept in mind so they are met.
3. The problem or question at hand should challenge students' abilities but not be overly challenging so that students are set up to fail, or not find a solution.
4. The problem or challenge needs to provide a real world connection for the students.
5. At the conclusion of the project there needs to be a time for reflection and feedback. Reflection and feedback are done by both student and teacher. A focus should be on the process and the final product.
6. The teacher must support students throughout the process. They need to be available to provide encouragement and guidance.

10. CONCLUSIONS:

There are three main conclusions to be drawn based on the mass of information gathered on the topic of project based learning.
First, and foremost, it can be concluded project based learning works. Research shows students enjoy the opportunities for autonomy project based learning provides them. They are allowed to have choice in what and/or how information is learned. They are more motivated and they are improving their results.
Second, project based learning takes time. This time aspect is touch upon at many different stages of the process. It takes time for teachers to be trained in project based learning. It takes time to develop those trainings. It also takes time to write curriculum. When implementing project based learning, curriculum needs to be essentially re-written in order to accommodate the process. The process of actually completing a project based unit in the classroom also takes time. One project unit may take the time of one and half direct teaching units.
Finally, project based learning is flexible. Teachers can adapt a project to meet the needs of all students in a classroom. Project based learning can be adapted to be utilized at almost any age level. It can be implemented into any aspect of curriculum, or into any subject area.

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