Inquiry Based Learning Method Of Teaching In Education: A Literature Review

Victoria Joseph[1] , Dr. Irfan Sheikh[2] , Salman Rajani[3]

[1]HOD, Dept of Education, Greenwich University, Karachi.

[2]Assistant Professor, Dept of Education, Greenwich University, Karachi.

[3]Lecturer, Dept of Education, Greenwich University, Karachi.

ABSTRACT

The study aimed to explore on the elements, importance and implementation of IBL in the teaching learning process. The study discloses the background information, aims, scope, objectives, and the researchers' interest in selecting inquiry-based learning. Three elements which fall in the broader umbrella of IBL such as project-based learning, problem-based learning and case study method of teaching students were also discussed. The study further informs the responsibility of teachers and educators to implement IBL in classrooms to improve 21st century skills such as creativity, critical thinking, collaboration, and communication among the learners. It presents and discusses in detail how the traditional teaching methods hinder the learning of the students in comparison to inquiry-based learning. The literature review brings light to the project-based learning and problem-based leaning which aid the learners to learn life skills to become decision makers, problem solvers and independent thinkers. The literature review concludes by humbly encouraging the implementation of IBL in Pakistani schools, colleges and universities.

Keyterms: Inquiry, project, critical thinking, attitude, knowledge, problem-solving.

INTRODUCTION

Inquiry based learning (IBL) is one of the leading strategies utilized in student centered approaches. It is the perfect way of locks in learners as more significant way to learn rather than the transmission of actualities (Smith, 2006), learning by doing experientially (Dewey, 1933).

Perceptions or realities to translate challenging real-world issue, inquire about and ponder the data or issue they make a require for confirmations, forms and the directing standards (Ma, Xiao, Wei & Yang, 2011). Kember (1997 as cited in smith, 2006) states that Inquiry based learning sets the base for learner centered approach, which becomes the center on understudy learning instead of sharing the well-defined bodies of content knowledge or subject matter. IBL makes an dynamic learning environment because it includes learning by doing and

may contain of discourses, addressing and solving issues (Ruler & Felder 2006). IBL encourages the improvement of self-directed learning.

BACKGROUND OF THE STUDY

Traditional teaching methods in Pakistani schools are quite common and the most concerning educational issues to date. Traditional teaching methods are teacher centered approaches and passive in nature, which promotes to the rote learning techniques and further leads to cheating in the examinations. Students are often bored, and distracted during the teaching sessions as they are not actively engaged in the teaching learning process. This concern in schools has become a frustrating and challenging problem for teachers, parents and students all around Pakistan. Based on researcher's experience, the traditional teaching approach is mostly accepted by both teachers and parents. The researcher thought of bringing a change in the Pakistani educational set-up by introducing Inquiry Based Learning (IBL), which is different from traditional and conventional teaching methods as it includes the student centered teaching approaches (Nunaki et al., 2019)

Pakistani educational system entertains traditional teaching that is talk and chalk which encourages in meaningless rote learning and cheating during examinations. Even the tests and examinations are theory based which comprises of factual information rather than conceptual learning and reflective critical thinking (Rehmani, 2003). This kind of teaching and assessment system coerces students to meaningless rote learn and replicate information to get good grades in the examinations. Siddiqui (2007) further explains on rote learning and examination are the only focus. The researcher certainly had the similar experiences during the teaching tenure in various schools and wished to bring a change to the traditional method of teaching to the modern, student centered method of teaching through Inquiry Based Learning.

Objectives of the study

The literature review formulated three objectives

- ❖ To highlight the characteristics and IBL methods of teaching
- ❖ To highlight the importance of IBL
- ❖ To recommend strategies and IBL methods of teaching for better learning outcome of students.

Limitation of the Study

Considering the scope of this literary research, the findings are limited to lack of empirical research studies in the area.

IBL Methods of Teaching

IBL in its widest sense can be seen as an umbrella term, which covers a range of approaches to learning process through inquiry, as it would include Project Based Learning, Problem Based Learning, Case Study, fieldwork, and so on (Healy & Jenkins, 2009).

Characteristics of Inquiry Based Learning

Inquiry based learning is one of the best methods used in inductive approaches of learning process. It is the ideal way of engaging learners in more meaningful manner to learn rather than just rote learning the facts (Smith, 2006), learning by doing experientially (Dewey, 1933). It involves observation of facts to interpret the challenging real-world problems (Ma, Xiao, Wei & Yang, 2011). Kember (1997 as cited in smith, 2006) states that inquiry-based learning sets the base for learner centered approach, which becomes the focus on student learning rather than sharing the well-defined bodies of content knowledge or subject matter. IBL creates an active learning environment as it involves learning by doing and may comprise of discussions, questioning and bring solution to the problems (Prince & Felder 2006). IBL facilitates the enhancement of self-directed learning skills of the students. (Khalaf & Zin, 2018). This kind of learning is one of the approaches of inductive methods also applying collaborative or cooperative learning. Essential characteristic of I B L is that there is no one right answer , it specifically focus on students learning, promotes and encourages critical thinking, most specifically make the learners responsible and integrate disciplines and connecting real world situations (Eysink et al., 2015).

BENEFITS OF IBL

IBL is one of the brilliant strategies utilized in inductive approaches of learning prepare. It is the perfect way in learners as more important way to learn rather than the transmission of realities (Smith, 2006), learning by doing experientially (Dewey, 1933). Perceptions or truths to translate challenging real-world issue, investigate and ponder the data or issue they make a require for confirmations, forms and the directing standards (Ma, Xiao, Wei & Yang, 2011). IBL makes openings for giving environment past the classrooms so as to familiarize them different genuine life circumstances and settings (Walia, 2012). Instructors must be a role model to demonstrate for how to contribute and expand thoughts, how to examine and how to discover imaginative ways to present students to thoughts and to subject matter that's of incredible esteem. Following are the different teaching methods of inquiry-based learning and limitations of IBL.

DIFFERENT TEACHING METHODS OF INQUIRY BASED LEARNING

I B L method of teaching is a broader umbrella which covers many aspects. This review discusses on Project Based Learning, Problem Based Learning and Case Studies method of teaching.

LIMITATIONS OF IBL

IBL serves numerous benefits however, there are also few issues which the instructors and the students confront. Learners' ought to be adequately persuaded as the I B L require higher level of motivation to perform the request. Understudies must too know how to perform the assignments that their investigations requires, must get it their objectives of the hone and be

able to translate the results appropriately (Soloway et al., (1994). Learners who take part in I B L are basically learning how to memorize, which can be exceptionally challenging errand for teachers as the instructors have to be spend sufficient time and exertion in planning and arranging the exercises and be caution all through (Flick & Lederman, 2004). The teachers require be comfortable and the teacher's attitude directly influence the understudies state of mind because it does understudies intrigued, sentiments of connectedness and relevance of the fabric (Witt & Ulmer, 2010).

1.PROJECT BASED LEARNING (PBL)

Project Based Learning (PBL) can be accepted as an guidelines methodology that comprises students' examinations of compelling issues that comes full circle in bona fide items.

The center thought of PBL is that genuine world issues that pull in learners intrigued and disturb a genuine considering prepare among them, because it proposes that the understudies procure and apply the modern information in a issue understanding setting (David, 2008). PBL creates the child's capacity to work with his or her peers, building cooperation (Shillman, 2005) while, Chard (2005) affirms PBL moves forward the understanding which is the genuine information, whereas the learners investigate and make judgments, translate and synthesize data in significant way. One of the major rewards of extend work is that it positions the school more like real life which is an in-depth examination of a real-world subject well-intentioned of children's consideration and exertion (Chard, 2005).

Key Features of P B L

Key highlights of PBL include the significance of the learner. The critical highlights of PBL is that ought to be of genuine world issue and learning by doing. Instructors must be as direct on the side, and there ought to be intrigue, collaboration and gather work, inspiration, satisfaction and motivation of the learner (Dunn, 2014)

Real world problem in PBL

PBL helps students to practically apply what they understand to real-life encounters that leads to inspiring learning. The students are involved thoroughly when learning relates straight to the world they live (Dunn, 2014). Perfectly created PBL has been demonstrated to result in inspiring education which encompasses both participation and self-direction. PBL permit the students to be lifelong learners and help them to think critically in their classroom (Dunn, 2014).

Teachers and educators can generate real-world problem-solving situations by crafty questioning, case-studies and tasks that match to two different outlines of inquiry-based teaching learning (Vega (2015). PBL is about working on challenges which does not require a student perfect product or artifact. Rather this type of inquiry based approaches involve the learners in creating, questioning and reviewing the information (Barron et al., 2008). Condiffe as cited in(Vega, 2015) informs that the projects employed in PBL support fairly with the objectives which help in preparing the learners for higher academics , reflective thinking, and both and personal and social skills.

Collaboration and Group Work in PBL

PBL not only incorporates and connect real world problems but also lays the foundation for the collaboration and group or team work. Many teachers believe that PBL is truly beneficial for the students, the teachers use PBL in the classroom believe PBL teaches aptitudes for academic content and 21st century skills such as collaboration and presentation techniques (Ravits, 2008). PBL aims to create culture of collaboration and team work (Ertmer & Simons 2006). Students work in group and participate in the projects to explore their interest, bring possible multiple answers and engagement, which help them to understand the content and address misconceptions while encouraging reflection (Etmer & Simons, 2006). Furthermore, PBL delivers a unique opportunity to help students preparation for critical thinking, collaboration, communication, creativity and enhance the environment for teamwork in the classroom.

Teacher as Guide

The teachers in the PBL classroom are skilled and challenging as it demands additional training, assistance and being creative and resourceful. A teacher is a mere facilitator and a mediator in a PBL classroom than an instructor in any classroom (Morgan, Lehmann et al., 2008 & Otake et al., 2009). Here the teacher takes the position of a manager of process to support students in acquiring the necessary information (Stauffacher et al. 2006, p. 255). Meehan and Thomas (2006).

Interdisciplinary and Increased Self-direction

An additional characteristic of PBL is a stress on multiciplinary (Danford, 2006; Lehmann, 2008; DeGraaf & Kolmos, 2009; Otake et al., 2009; Hanney & Savin-Baden, 2013). Mostly the Projects are of amalgamated disciplines as the combination within natural science and social sciences (Lehmann, 2008).

Students incline to responsible learning as they are trying to find out answers for the problems. The students select resources such as journal articles, research materials, textbooks, and other online properties comparing to the traditional teaching methods (Albanese & Mitchell, 1993). These types of progressions and understanding skills help out students become more knowledgeable in knowledge-searching abilities.

BENEFITS OF PROJECT BASED LEARNING

According to Spratt (2015) the learners experience differently in PBL classrooms unlike the traditional classrooms where students learn passively. Students in PBL classrooms experience and work in groups using creativity, imagination while applying inquiry based and problem solving where collaboration, communication and critical thinking are in practice. Chard (2005; and Boaler (2002) inform that PBL enhances the learners to acquire life skills which will incorporate technology and information unlike the traditional teaching method. PBL projects are essential components, not secondary to the curriculum. Both curriculum and teaching strategy are all

become the essential components of the project (Thomas, 2005). In PBL, the teachers are the creators or inventors of learning as there are good experiences as the teachers generate well planned experience which are customized, interacting socially, which are suitable for the earners. PBL also helps the slow or weak learners' academic performance , self-efficacy, value of the task, group dynamics, and effective interactive teaching strategy (Bogdan, 2011; Eric, 2010). PBL welcomes and encourages the learner's choice, abilities to think, their skills of presenting, communication, and their capacity to interact in a team or a group towards a given project (Neo & Neo,2009).

LIMITATIONS OF PROBLEM BASED LEARNING

There are many benefits of PBL. However, there are also limitations in implementing PBL in the teaching learning process. In show disdain toward of being an enhanced classroom action, PBL may   not   be exceptionally viable on   the   off   chance   that learners   are not fortified to total their ventures. Need of intrigued or inspiration will lead them distant within the World Wide Web and the learners may get occupied.

Getting   to unacceptable and unseemly fabric may   be posture an issue. Instructors must be prepared and define for   all   sorts   of these issues and   possibilities, counting approaches to induce understudies back   on   track. Moreover, appraisal would   be amazingly subjective. The foremost important problem is the restrictions postured by the medium of the web. One may be able to see a You Tube video on cultivate creatures, but it still is no comparison for the esteem of going on a field trip to the cultivate and seeing, hearing, and noticing the real area. This too applies   to   science   labs, intrigue exercises,   playing   sports,   or   putting   on   a live theater generation. The momentary and intelligently nature o

2. PROBLEM BASED LEARNING (PBL)

Problem Based learning is one of the Inquiry Based Learning approaches of educating which s understudy centered in nature. It energizes the learners to be enthusiastic to display certainty, self-awareness,   and frequently a   sense   of assurance in   which   they wants to memorize around a point by tackling open finished issues. Problem Based   Learning makes   a difference the learners to internalize learning and leads to more noteworthy understanding. Since there has been an alter within the world view in instructive setup towards learner centered approaches. It is genuine that when understudies are locked in within the learning handle, they can learn, comprehend genuinely and retentions can be progressed. Trop & Sage (2002) educate that the learners must   comprehend   the   complexity   of the inclining handle so   that   they   can be included effectively in subjects through maintained considering, crawl interior thoughts and in -vestigate and uncover misinterpretations amid the instructing learning prepare.

Organizing a Problem Based Learning (PBL) Class

A   PBL class is very assorted from   the conventional address classroom   (Rangachri, 2001). Teachers within the PBL course create a list of subjects and ask the learners to choose few

of them. The understudies at that point are assembled concurring to their interface and choices to work collaboratively. Allen, Dutch and Groh (1996 as cited in Stanford bulletin 2001) recommend that issues or problems are presented at the starting of the course or the conclusion of the past course through a smaller than expected address, which may give a few settings for the understudies to recognize the issues and identify the conceivable trouble. The understudies can work in bunch inside the classroom or exterior the course to unravel the issue. The issues are written and printed at that point given to each bunch and each part of the bunch. The teachers are asked to take care sufficient to degree advancement at standard breaks and can intercede to rectify misguided judgments, or to bring bunches up to comparability with one another.

Steps of PBL

There are six steps in organizing and actualizing the PBL (Genareo &Lyons, 2015). In the first step includes the showing of issues to the bunch of understudies. The second step involves the understudies begin analyzing the given address and attempt to pool in data. The third step is to concur on the additional data which the students have collected whereas within the fourth step, the modern information is shared, and the understudies attempt to endeavor to begin with solution to the given issue which they concur within the fifth step. The 6th step contains the gather reflects on the method by which they illuminated the given issue. When the understudies are presented with the issues, they try to streamline and clarify the given issue and work together to arrange and discover the points of interest which are required.

Essential Soft Skills learned through PBL

Fundamental Delicate Aptitudes learned through PBL Soft abilities are individual qualities that empower somebody to connected viably and

concordantly with other individuals in any setup. Instructing through PBL makes a difference as the learners to get various delicate aptitudes such as social and passionate abilities, cognitive aptitudes, issue tackling abilities, basic considering abilities, autonomous learning or self-directed learning aptitudes, data innovation abilities, communication aptitudes and so on.

Group Dynamics

Group movement in PBL according to Becker (2015) claims that elements is concerned around how the group is shaped, their structure and most critically the method in working which is the interaction of the group individuals and the way the group or team individuals associated inside the group. Group flow can be characterized as a framework of behaviors and mental forms happening inside a social gather.

ASSESSMENT IN PBL

The assessment should be student centered and should benefit every student as it proves their learning and holistic development. Assessment in problem-based learning may include the use of practical data on students' learning to improve programs and advance students' learning (Allen, 2004). The two types of assessments which are direct and indirect assessment (Allen, 2004); projects, papers, exhibition, performances, case studies, portfolios, interviews, and oral examinations in which the learners validate what they know, or what they can do are of direct assessment. Whereas indirect assessments involve self-report measures such as surveys and so on. Assessments initiate to inquire about instructional methods, how the students are learning and accomplishment of objectives.

Limitations of problem Based Learning

Though PBL is relevant and useful it has some limitation for the students, teachers and for the institutions as well. Wood (2004) states PBL is not welcomed by the teachers as a method of teaching as teachers often find it difficult to implement PBL curriculum in the classroom. He further clarifies the students are quite familiar with the conventional method of teaching and feel threatened by the new approach of PBL. This kind of attitude may be due to different potential level of students within the group. Weimer (2009), expresses that PBL may need changes in the philosophy of the educational sector. It also requires a lot of time, preparation and planning before implementation, Group dynamics problem may require intervention of the faculty, there may be some problems on how and what to assess the students. It is also thought that very less content is learned through PBL.

3. CASE STUDY

Case study has been a common research strategy in psychology, sociology, political science, social work, business, and economics as well as in community planning. It is considered to be the popular research strategy, often used by researchers in education and other social sciences (Curtis et al., 2014). Case study is a qualitative approach, using methods such as interview, observation or focus group discussion which leads the researchers to focus on a unite of study known as bounded system that is individual teachers, a classroom, or a school organization (Gay et al., 2015 & Burns 2009). It helps to obtain a true and comprehensive picture of individuality as it is concerned with rigorous study and an examination of a complex causation which can of very useful in education (Sidhu, 2011). Case studies should be in-depth so as to get the good results for the naturally happening events or situations or problems (Swann & Pratt, 2008) A case study enables social researchers to perceive by observing the experiences of participants within an unambiguous natural environment in detail (Pacho, 2015).

NATURE OF CASE STUDY

Nature of the case study may vary from cases to cases, as the data may be collected under various heads (Sidhu, 2011). In the psychological examinations' visions, hearing, speech, neuromuscular

coordination related data can be obtained for case study. Similarly, in temperamental aspects; emotions, attitudes or sentiments, interests, character and complexes can be studied. In educational testing; reading, number, handwriting, compositions, appreciative mass, capacity for sustained application, attitude, special skills or knowledge, general information and culture. In the context of school history, one can study the kind of work done, mobility, promotions, quality of school attended, and relations with teachers. Similarly, family history about parents, siblings, home conditions, economic status and history, cultural resources, relations within home control, attitude of parents towards society can also be studied.

TYPES OF CASE STUDIES

There are many types of case studies depending on the nature of cases; Exploratory Case Studies, Critical Instance Case Studies, Prospective Case Studies, Cumulative Case Studies, Narrative Case Studies, Embedded Case Studies and Evaluative Case Studies (Levy, 2008)

In Exploratory Case Studies are done while exploring a trend or fact in context, applying one or more data collection option for studying and describing in depth. Critical Instance Case Studies analyze or investigate one or a few sites to research circumstances of distinctive importance / choice or to examine a general or collective purposes. This approach may specifically agree with solving cause-and-effect problems. Prospective Case Studies include the researcher formulates a set of theory-based hypothesis in respect to the evolution of the on-going social and cultural process. Cumulative Case Studies collect information from numerous sites gathered at various times. It may include data collected from the past or different times for constructing research in the future. Narrative Case Studies include the presenting of process and stages of the events by narrating it. Embedded Case Studies involve more than one unit, or a single object and it may not be restricted to qualitative approach alone. Evaluative Case Studies deal in in-depth inquiry and analysis of any specific instance or concept or program, project or anything related to reform or development according to the interest or choice of the investigator (Yin, 2002, as cited in Mistry, 2013).

Characteristics of Case Study

Gay and Arisians (2015) confirm that one of the characteristic of a case study is particularistic or heuristic in nature. Particularistic means that is focused on a particular phenomenon, namely situation or event. This criterion makes the researcher to particularly choose a particular instance of a phenomenon under investigation, furthermore, it characterized by the disciplinary orientation the researcher brings to the case study. Shahid (2006) states that increase of knowledge being the important characteristic of case study, he states that intensive investigation of singly case is made for the purpose of increasing one's general knowledge. Ritchie (2004) argues that the essence which makes a case study different is the defining features of it which makes it distinctive. The multiplicity of perspectives which are rooted in a specific context (More than one case) which comes from multiple data collection methods or single method where people had multiple perspectives on what is being observed. An educational case study is an empirical enquiry that is

conducted (Swann and Pratt, 2007). The outcomes must be trustworthy in case studies, with validity and reliability. The conduct of the enquiry and its report must be ethical, particularly in terms of respect for persons Shahid, 2006). Burns (2009) writes that a case study is a qualitative approach to studying phenomenon, which focused on a unit of study. Gay, Mills and Airasian (2009) report that the case studies can be characterized in terms of their overall intent. Finally Sidhu (2011) inform us that a good case study should be based on adequate, valid and complete data.

Designing a Case Study

Curtis, Murphy and Shields (2014) confirm that there is no single way of designing case study and are open to creative interpretation, and according to the researcher's imagination in how to construct their studies. Key concept or criteria may differ from cases to cases. Dependent on the goal they are meant to fulfill, cases can be fact-driven and deductive where there is a correct answer, or they can be context driven where multiple solutions are possible. Various disciplines have employed case studies, including humanities, social sciences, sciences, engineering, law, business, and medicine. Good cases generally have the following features: they tell a good story, are recent, include dialogue, create empathy with the main characters, are relevant to the reader, serve a teaching function, require a dilemma to be solved, and have generality. Curtis, Murphy and Shields (2014) suggest the following steps may need to design a case study. Most important in designing the case study will be defining the "case" clearly. They further instruct that there must not be any ambiguity and should be as specific as possible. Gay, Mills and Airasian (2015) and Curtis, Murphy and Shields (2014) inform that case has to be determined to see whether it is researchable or not. The good setting points of the cases could be the questions which addresses who, why, what and how the case can be studied. The number of cases and the range of diversity of case types are primarily important.

Strengths of Case Studies

The great strength of the case-study method is that it allows the researcher to focus on a specific case or situation and to identify, or try to recognize, the various interactive processes at work.. Case studies are very useful for examining educational advances, assessing programs, and notifying policy (Sidhu, 2011). If case studies are conducted systematically and critically, they can be aimed at improving education. Case studies are identified as effective mode of inquiry into the causal relationships of complex educational phenomena (Sidhu, 2011). Burns (2009) confirms that case study is preferred when relevant behaviors cannot be controlled. Case studies can be conducted and written with many different motives, including the simple presentation of individual cases or the desire to arrive at broad generalizations based on case study evidence (Yin, 2003). Case studies are extremely valuable when the researcher attempt to compare unique variation in individuals in different contexts and many researchers consider case studies as legitimate, independent, autonomous studies (McMurray et al., 2014). Case studies are common and popular

because they can be conducted at various points in the research process and are flexible (Curtis et al.,2014).

Limitations of Case Studies

Sidhu (2011) states that a generalization derived from a single case, single unit cannot be applied to all cases, for example: issues related to one particular school cannot be generalized to other schools. The case study method relatively appears simple, but a researcher must be thoroughly familiar with existing theoretical knowledge of the field of inquiry, and skillful in isolating the significant variables from many that are immaterial. While gathering evidence from records, documentations, etc., we have to accept data that are the product of errors of perception, fault, deliberate deception, unconscious bias, the subject desires. Over the years, case studies have been perceived as inferior method of research because of their lack of controls and it tend to take great deal of time to complete (McMurray). The data collected should have important features otherwise, it will lead to unreliability in the results

Conclusion

Introduction of IBL curriculum gives opportunity to the students to face real world problems

therefore makes them ready to face the challenging future. Teachers need to develop the children both holistically as well as gain a mastery of their learning and practice the skills which are needed for real life situations in their society. The IBL curriculum also give the teachers and the school administration the new vision, so that they can develop a balanced, healthy and creative nation by providing the young learners with the maximum opportunities of developing capacities in both intellectual, emotion and moral aspects. New horizons of understanding and importance of IBL are required so that teachers can be introduced as professional development agents in educational institutions especially in schools in Pakistan. Implementation of inquiry based learning will only be possible when the school provide the necessary resources, time and assistance needed.

This literature review provided insights about various way of teaching students to develop interest and learning more easy. Teachers are the change agents who can curb the old lecture method and move to the most interesting inquiry based approaches which are student-centered in nature which actively involve students in the learning process.

Problem Based learning and Project Based Learning are not very luxurious to implement in Pakistani schools, it just requires a little more effort, dedication and thought for teaching the young children who are the future citizens of the country. Only through inquiry-based learning, the students can conceptualize and will eventually internalize.

References

Black, P., & William, D. (1998). Assessment and classroom learning. Assessment in Education: Principles, Policy & Practice, 5(1).

Bogdan. P. (2011).Student Centered Learning Environment: How and Why: Edutopia.3(2), 12-24.

Brew, A. (2010). Teaching and research: New relationships and their implications for inquiry based teaching and learning in higher education. Higher Education Research and Development 22, 3-18.

Chang, C. (2001). Comparing the impacts of problem-based computer-assisted instruction and the direct-interactive teaching method on student science achievement. Journal of Science Education and Technology, 10(2), 147-153.

Chard, S. C. (2005). Engaging children's minds: The Project Approach (2nd ed.). Stamford, CT: Ablex.

Chin, C., & Chia. L. (2004). Inquiry Based Learning. Problem-based learning: Using students' questions to drive knowledge construction: Science Education.

Curtis. W., Murphy. M., & Shields, .S. (2014).Research and Education. New York: Routledge.

Darling & Hammond, L. (1996). What matters most: Teaching for America's future.. New York, NY.

David. F. (2008).Project Based Learning in Science and Mathematics Education. An examination of race/ethnicity and organizational context. Social Science. 6(1), 45-60.

David. J. L. (2008). What Research Says About Project-Based Learning: Educational Leadership. 65(5), 80-82.

Dunn.J. (2014). This is the Difference between 'Projects' and 'Project-Based Learning: Daily Genius: U K.

Ertmer, P. A., & Simons, K. D. (2005). Scaffolding teachers' efforts to implement Problem-Based Learning: PDF

Eysink, T. H. S., Gersen, L., & Gijlers, H. (2015). Inquiry learning for gifted children. High Ability Studies, 26, 63-74. doi:10.1080/13598139.2015.1038379

Finkelstein, N., Hanson, T., Huang, C. W., Hirschman, B., & Huang, M.2010). Effects of Problem-Based Economics on high school economics instruction. 23(2), 30-40.

Flick. L .B.,& Lederman .N. G.(2010). Scientific Inquiry and Nature of Science: Implications for Teaching, Learning, and Teacher Education. Science& Education. 20(3):381-387.

Flyvberg, B. (2006). Five Misunderstanding about Case-study Research. Qualitative Inquiry.12 (1), 78-94.

Galand, B., Bourgeois, E., & Frenay, M. (2005). The Impact of a PBL curriculum on Students' Motivation: Humanities and Social Studies Education. 4(1), 32-40.

Gay, Mills & Airasian.(2015). Case Study Research Design. New York: Roultage.

Grant, M. (2011). Learning, beliefs and products: Students' perspectives with project-based learning. Interdisciplinary Journal of Problem-Based Learning, 5(2), 37-69.

Grant, M. M. (2009). Project Based Learning (6thed.). Australia: Pearson.

Hammond, Barren, and Darling, (2008) .Teaching for Meaningful Learning: A Review: Sanfransisco.

https://www.amazon.com/gp/reader/1422101584/ref=sr_1_4?p=random&ie=UTF8 &qid=1469598571.

https://www.cmu.edu/teaching/designteach/teach/instructionalstrategies/casestudies.html

https://www.thecommunicationtrust.org.uk/media/363742/examples_goodpractice casestudies.pdf.

Ma, C., Xiao, R., Wei, Y. & Yang, H.H. (2011). An Inquiry-Based Learning Approach on a Educational Technology Course. Proceeding of 2011 IEEE International Symposium on IT in Medicine and Education (ITME). pp. 422-424

Markham, T. (2011). Project-based learning: A bridge just far enough. Teacher Librarian, 39(2), 39-42.

McMurray, K.(2014). Methodology of Research in Education. Australia: Pearson.

McMurray, K., Pace., D & Scott, (2014). Research Paradigms. Positivism. The use

Mergendoller, J. R., & Thomas, J. W. (2005). Managing project-based learning: Principles from the field. California: Buck Institute for Education.

Mistry, M., (2013). Educational Measurement and Evaluation. Jaipur: Sheetal Printers.

Nunaki.,J. H., Damopolii., I., i. Novri Youla Kandowangko.,N.,Y., & Nusantari.,E.,(2019). The Effectiveness of Inquiry-based Learning to Train the Students' Metacognitive Skills Based on Gender Differences. International Journal of Instruction: Vol.12 (2)

of Case Studies. Australia: Pearson

Piaget, J. (1972). The Psychology of the Child. New York: Basic Books.

Prince, M. J., & Felder. R. M. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. Journal of Engineering Education 95, 123-138.

Railsback, J. (2002). Project-based instruction: Creating Excitement for Learning. Portland: Northwest Regional Educational Laboratory.

Rangachari. P. K. (2002). Problem-based Learning: A Process-oriented Evaluation for Problem-Based Learning Courses in Basic Sciences. 30(1), 57-60

Ravitz. J. (2008). Project Based Learning as a Catalyst in Reforming High Schools. Novota C A: Buck Institute for Education.

Rehmani, A. (2003). Impact of public examination system on teaching and learning in Pakistan. ANTRIEP Newsletter, 8(1), 3-6.

Ritchie. J., & Lewis. J. (2003). Qualitative Research Practice. New Delhi: Sage Publications.

Santrock. J. W. (2009). Educational Psychology. China: McGraw Hill.

Shahid. S. M.(2009). Research Methods. Lahore: Majeed Book Depot.

Shin. N., & Jonassen. D. H., & McGee. S. (2002). Predictors of Well-structured and Ill-structured Problem Solving in an Astronomy Simulation: JRST.

Siddiqui., S. (2007). Rethinking Education in Pakistan: Perceptions, Practices & Possibilities. Karachi: Paramount Publishing Enterprise.

Sidhu , K. S. (2011). Methodology of Research in Education. New Delhi: Sterling Publishers.

Siraj, S (2002).Inquiry Based Science Teaching: An action research study. Agha Khan

Smith. K. A. (2000).Inquiry Based Cooperative Learning: University of Minnesota.

Solomon, G. (2003). Problem Based Learning, A Primer. Technology & Learning. The Resource for Education Technolog.techLEARNING.com

Stauffacher et al. (2006, p. 255).The benefits and challenging of Problem Based Learning. Plymouth: UK.

Stix.A., & Hibex.F. (2006). Project Based Learning. New York: Roultage.

Stripling, B., Lovett, N. & Macko, F. C. (2007). Project-Based Learning. New York: Pearson.

Swann.J. & Pratt. (2008).Educational Research in Practice. London: Continuum.

Thomas, J. W. (2006). Project Based Learning. Australia: Pearson.

Trop, L., & Sage, S. (2002). Problems as Possibilities: Problem-Based Learning for k-16 Education (2nd Ed.). Alexandria, WA: Association for Supervision and Curriculum Development.

    University: Karachi.

Vega (2012). Project Based Learning, A Research. George Lucas Educational Foundation: Edutopia.

Vincent. R., Genareo.V. R., & Lyons. R.,(2015).Problem-Based Learning: Six Steps to Design, Implement, and Assess. Faculty Focus: Clemson University.

wiki.mcmaster.ca/TAN/_media/biology_pbl.pdf.

Witt. C., & Ulmer. J. (2010). The Impact of I B L on the Achievement.Academia.24(1), 2-15.

Woolfolk. A. (2010). Educational Psychology. Australia: Pearson.

Yin, R.K. (2003). Case Study Research Design and Methods (3rd. ed). London: Sage Publications