Application of Problem-Based Learning (PBL) Strategy in History Class to Enhance Critical Thinking Skill of 8th Standard Students

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Original Research Article

ABSTRACT

This action research was conducted in Thimyul Lower Secondary School in Lhuentse, particularly for class VIII students in History classes. It was done with the action research question, "how can the integration of Problem-Based Learning (PBL) strategy in History subject enhances the critical thinking skill of the students?" The very school has encountered the issue of low critical thinking skill resulting in the cases of low academic performance and less interest in the classroom learning of History subject. Researchers' surveys and examinations record of the school showed the deteriorating ranks of history subject after failing to obtain good marks from the higher order thinking skill. So, the purpose of this action research is to enhance the critical thinking skill by incorporating Problem Based Learning (PBL) strategy in teaching the history lesson. This intervention educational action research was done with descriptive research with focused on the constructivism research paradigm. It engaged mix method research methodology and used quantitative method by employing the data from class test and survey questionnaire. To support the authenticity of the quantitative data, researchers employed qualitative method by using researchers' observation on the students' progress and participants' feedback on the intervention programs. Case studies, debates and pictorial presentations were used as the main intervention program to integrate the PBL strategy while teaching the history lesson. Stratified and voluntary

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sampling method were deployed for the collection of data from the student-participants. By this action research, implementation of the PBL strategy in the history lesson has witnessed radical improvement in critical thinking skill of the students. Thus, this action research definitely proved that PBL strategy is the effective method for learning history lesson to improve the critical thinking skill of the students.

Keywords: Thimyul lower secondary school; mix method; PBL; students' critical thinking.

1. INTRODUCTION

Most research has pointed out that critical thinking skill is very essential intellectual skill for cognitive development of the students. Critical thinking skill harmonies students to solve their problems through independent comprehension on the problem. The learning outcomes of the students who have high level of creative and critical thinking skill will be more of satisfying because having the ability to think creatively will have a fast way of thinking and finding the most appropriate solutions to the problems (Agustina & Noor, 2016; [1]).

The ability to solve problems is a basic life skill of human beings and very essential for the development of human values. The ability to solve basic problems in life is generated by the ability to think critically. As stated by Tan et al. [2], creativity is progressively considered as the indispensable competence in this age of information. Moreover, the role of education in fostering creative competencies has received larger emphasis globally. By this, traditional methods of classroom teaching have been carped for their inadequacies in preparing students for the present world of innovation.

In this context, class eight students of Thimyul Lower Secondary School encountered with the issue of low critical thinking skill resulting to the cases of low academic performance and less interest in the classroom learning of History subject. While checking the efficiency rates of the students by the Bloom's Taxonomy six levels of cognitive domain from midterm examination marks, 25.5% scored in Remembering. 19.4% scored in understanding and 18.3% scored in the applying domain. While analyzing domain efficiency was 15.3% and decreased in evaluating domain to 11.2%. The students failed badly in creating questions as the efficiency rates was just 10.3% in the particular domain.

The students who were lacking behind in the critical thinking skill also participated less in the teaching and learning activities in the classroom. In the past few years, Thimyul has been continuously experiencing a decrease of in students' academic performance in the history subject. Researchers' surveys and examinations record of the school showed the deteriorating rank of history subject. The mean mark of the history subject in the academic year of 2016 was 64.8% and had decreased to 62.6% in the academic year of 2017. Further, in the academic year of 2018, the average mean mark of the very subject was 54.8% and decreased to 52.8% in the following year.

Problem Based Learning (PBL) is the scientific learning model that gives learner a freedom to plan learning activities and to do the works actively in group and enhances the critical thinking skill. According to Beishline [3], PBL refers to a specific teaching method that is popular in medical schools. Normally in PBL small groups of students work as team to solve a problem and the instructor provides guidance. PBL does not starts with a textbook rather textbooks and other reference sources are referred on a need-to-know basis.

Having the belief that critical thinking status affects the performance of students in history subject; the interventions were designed to improve the critical thinking skill of class eight students in the history class through incorporating problem-based strategy. Helping students to grow in critical thinking skills from the low ability will help them in reaching their optimal potential in their academic performance.

2. RECONNAISSANCE

As defined by Maxell [4], the reconnaissance comprises of three components. They are situational analysis that includes the realities of the situation in terms of resources, analysis of the competence of the people involved and literature review, linking with the previous work done on the field.

2.1 Situational Analysis

Bhutan is a small landlocked country situated in between the two giant culturally diverse nations of the world in Asia: in the northern part, China with the ideology who strongly believes in communism and in the southern part allied with the northern boundary of Indian's privatism. "Traditional literatures, however do not mention the size of the country and even modern records give varying figures. School students were taught just a few years ago that Bhutan is over 47,000 sq. km and many sources still have this figure but the official Bhutanese version today is 38,394 sq. km. the variance is no doubt mainly due to the lack of exhaustive and accurate surveys and clear demarcation of the border with China" [5]. Within these square kilometers Bhutan has 20 districts which are further divided into 205 Gewogs (sub-districts).

The early modern education system and the school curriculum in Bhutan were greatly influenced by the Indian education system. The students of secondary level were tested, assessed, and awarded academic certificates by the Indian Certificate of Secondary Education (ICSE) and the Indian School Certificate (ISC). However, with the advancement of the education system in recent years, the development of curriculum, textbooks, testing, and certification is done by different divisions under the ministry of education, Bhutan. The 21st century teaching and learning demand skill-based education to prepare students to fit in this technology-based world. Of all, critical thinking skill is of utmost importance and it can be taught through all most all the subjects.

As of 2017 general literacy rate of the country was 71.4% and adult (15 years and above) literacy rate was 66.6% (Population and Housing Census of Bhutan, 2017). Today education plays an important role for the development of the country.

2.2 Thimyul Lower Secondary School

Thimyul Lower Secondary School is located 10 kilometers away from the Lhuentse Dzong towards the way to Dungkar Gewog. The school was established in the year of 2000 as the community school and upgraded to lower secondary school in the year of 2004.

Researchers were the teachers, teaching History and other social science subjects in the very school. Throughout these years of teaching in various grades, the biggest concern raised to the researchers was lack of students' creativity while facing problems, answering the questions and while doing their daily academic activities in the school. Most students failed to think critically and resulted in low academic performance to the higher order thinking skills as per the Bloom's taxonomy cognitive domain. As stated in "Higher Order Thinking: Bloom's Taxonomy" (n.d), Bloom's Taxonomy is a cognitive domain framework which starts with remembering and understanding domains as important bases for pushing our brains to other higher order levels of thinking.

The problem of low creativity in critical thinking can be attributed by the lack of boarding facilities for the students in school. Since, students have to walk more than 1 hour to reach school every day. Secondly, students lack the reading habits and they have very less time to visit school library. As soon as school gets over students have to rush back to home, if not they have to walk their way back to home in the darkness. As a result, students failed to develop critical thinking skills. This problem effects the academic performance of the school and encourages the students' drop out from school, if not students became so much dependent on the teacher's classroom teaching with less innovative environment from the students' side.

2.3 The Participants

The researchers had chosen class VIII students to conduct this research and the lead researcher has taught History subject for two consecutive grades to that particular class. The class had total of 18 students at the range of 13-18 years of which three were males. They were well versed in English language. This action research was done in the month of August and September, 2021.

2.4 Competence

The lead researcher is currently a teacher, teaching history subject in the current school. During this action research time, researcher was teaching history subject to class VIII students and during two years teaching in the school, lead researcher has coordinated the research activities to the colleagues in various capacities. As a teacher, the researcher has always tried to promote critical thinking to the students by

employing various teaching/learning strategies to the students.

The co-researcher of this action research is a principal of the school for at least ten years in the very school. During his service in the school, he observed that students in the school lacked critical thinking skill to answer the questions being asked to them. So, this action research was aimed to shift the paradigm of long ongoing practices of teaching/learning strategies of history teachers from teacher to students' domination to student dominant and to promote the independent learning by students to enhance the critical thinking skill incorporating the problem-based learning strategies.

3. LITERATURE REVIEW

The literature review of this action research was done in two thematic backgrounds. Although critical thinking and PBL were found inter-dependent in history subject, the very nature of the thematic relationship is like South Pole and North Pole. So, understanding the basic question of "what it means?" was answered by delivering the reviews separately on critical thinking and PBL.

3.1 Critical Thinking

The very concept of critical thinking is the oldest and most powerful approach expressed by Socrates over 2500 years ago. His questioning style was in a logical and systematic form of inquiry with each question allowing for further inquiry into a topic with deeper thought (Foundation for Critical Thinking, 2009). Many experts including great philosophers have examined the concept of critical thinking ever since being introduced by Socrates. Plato and Aristotle were among the many who had given the insight into the concept of critical thinking [6].

Critical thinking involves act of thinking and generating new ideas to the problems. Cossette [7], expressed critical thinking is a physical act of articulating or a thought process which is showcased in writing by displaying the ability to think through problems. He also expressed that critical thinking skills and creative thinking skills are two sides of the same coin by challenging the brain to insistently work through many factors in order to assume a rational conclusion.

The basic idea of critical thinking involves asking critical questions and answering of it. According to Browne & Keeley [8], cited critical thinking as awareness of a set of interconnected critical questions; ability to ask and answer critical questions and desire to actively use the critical questions. Savich [9], further explained that having viewpoints from different angles on the same topic provides valuable critical thinking strategies to students.

There are various theories and approaches shared by different researchers affirming the importance of critical thinking for students. Students who can eloquently understand the situation have a better chance of successfully developing their own set of critical thinking skills but, without nurturing these skills in the classroom, students have less opportunity to develop their own way of thinking critically when complete memorization is the expectation of the teacher (Tiwari et al. 2006; Baildon & Baildon, 2008; Cossette, [7]). Moreover, the importance of critical thinking was quoted by Irfaner [10], if the critical thinking skills is not being employed within the classroom teaching, it will significantly diminish the students' chance for achieving academic success.

Critical thinking skills help students to solve problems. The very skill itself focus more on solving the problem by finding how to solve rather than what to solve. It was cited by Snyder & Snyder [11], that critical thinking skill teaches students primarily on how to think seeing what to think on the issue as the secondary solution.

3.2 Problem Based Learning (PBL)

Many students today do not have an interest in history nor do they comprehend the complexity of history lesson [12]. But after introduction of PBL in history class it has proven to be very useful in introducing the critical thinking skill by many academicians. As cited by Maxwell [13], If we were to apply PBL method in the social studies context with a real-world application, this may include examples such as historian, geographer, lawyer, or politician, as they use many of the elements of PBL activities daily in work situations.

Problem Based Learning is not a common learning strategy but very important strategy to enhance the critical thinking skill of the students. As expressed by Hallon [14], it is originally designed in late 1960s at medical school of McMaster University in Canada, that showcased

the nature of active learning for the students. The very strategy focuses more on student-centered and self-directed learning approaches. The goal of PBL is to help students think critically as they answer to the question of their own assumptions (Enhancing Education, 2012; Seghi, [12]). Further, PBL has been encouraged as a different but more progressive approach to the teaching and it offers opportunities for exercising the creativity and offers the development of critical thinking skill for the students (Tan, 2000; Barak, 2006; Tan et al. [2]).

The PBL process designed in the teaching strategy allows the students to possibly come up with end solution in terms of trying to answer a problematic question associated with their topic, it also attempts to be specific in design to incorporate some other active learning methods through the process and achievement of the final result [13]. PBL allows students to find the solutions to the problems independently from the teacher with the process of active learning among themselves in the students' group. Teamwork and group collaboration are built with the minimal involvement of teacher's direction and helps in development of critical thinking skill among the students.

4. ACTION RESEARCH QUESTION

How can the integration of Problem-Based Learning (PBL) strategy in History class enhances the critical thinking skill of the students?

4.1 Sub-Question

What is the interaction effect of PBL strategy on students critical thinking skill?

5. ACTION RESEARCH DESIGN AND METHODOLOGY

"This part of the proposal outlines the entire research plan under synopsis, method, sample population, tools and statistical analysis technique and described in view of testing the formulated hypothesis. It describes just what must be done, how it will be done, what data will be needed, what data gathering devices will be improved, how sources of data will be selected, and how the data will be analyzed and conclusions be drawn" [15].

This intervention educational action research was done with descriptive research with focused on the constructivism research paradigm. Constructivism paradigm according to Adom et al. [16], it is a philosophical paradigm that avows people to erect their own knowledge from their understanding of the world by experiencing the things and reflecting on those experiences. It engaged mix methods research methodology and engaged quantitative method by employing the data from class test and survey questionnaire. Survey questionnaire was designed with 4-pointsLikert scale; excellent, good, average and poor. The quantitative survey questionnaire and test questions were distributed among the students (baseline data and post data collections) to collect the raw data. The class test questions were designed with the Bloom's taxonomy cognitive domain with the bell shape design. To support the authenticity of the quantitative data, researchers employed qualitative method by using researchers' observation on the students' progress and participants' feedback on the intervention programs.

The stratified sampling from the probability sampling method was employed in this action research for the collection of class test data and voluntary sampling from the non-probability sampling method was also deployed for the collection of quantitative survey questionnaire. The data gathered were further analyzed using the computer software Microsoft Excel. The results and findings are presented in the simple tables and graphs with the brief explanation on it.

6. GENERAL AIM OF ACTION RESEARCH

Being as education contributor, the biggest concern was how to make students develop critical thinking skill to solve the daily problem in the present world of information. As the researchers of this particular paper, this action research aimed at enhancing the critical thinking skill by PBL strategy through history subject learning.

7. BASE LINE DATA

The baseline data were collected by employing two quantitative tools. Firstly, class test question paper with the Bloom's taxonomy design was distributed to the students. And then survey questionnaire with the three main topics; Evaluating pre-information on critical thinking skill, connection of critical thinking skill with

history subject and critical thinking skill practices by teacher in the classroom was shared to the student participants.

7.1 Class Test

The baseline data of the history class test was collected from the participants. The questions of the test were designed producing the normal distribution curve as per the Bloom's taxonomy cognitive domain. As expressed by Hyder [17], human intelligence is genetically and analytically distributed in the bell curve shape, which shows there are very few people who have very high or very low intelligence but majority of the people have intelligence that lies in the middle.

As shown in Fig. 1, student-participants did very well in the remembering domain by securing 21.4% followed by understanding and applying with 18.4% and 17.2% respectively. However, comparing between analyzing 14.4% and evaluating 15.3%, participants were doing better in evaluating domain, resulting in undermining the Bloom's taxonomy Cognitive Domain's consideration of evaluating domain demands higher cognitive level compared to analyzing domain. As stated in "Higher Order Thinking: Bloom's Taxonomy" (n.d) Bloom's Taxonomy as the cognitive domain framework starts with remembering and understanding domains and pushes to higher order thinking skill. It helps us to think beyond remembering and recollecting information.

From the baseline data collected, researchers concluded that student-participants of school had done better in the answering the questions which demand less critical thinking skill and failed to answer that demanded the higher critical thinking skill.

7.2 Survey Questionnaire

The second tool for the collection of baseline data was employed survey questionnaire. The survey questionnaire contained twenty items and categorized into three main groups; evaluating pre-information on critical thinking skill, connection of critical thinking skill with history subject and critical thinking skill practices by teachers in the classroom. The survey questionnaire employed 4-points Likert scale;

excellent, good, average and poor. While evaluating the pre-information on critical thinking skill with the student-participants, there were only 2.2% participants with the excellent knowledge on critical thinking skill. 17.8% participants however supported that they have good information on the critical thinking skill. 56.7% participants just have average information on critical thinking skill. This range of the participants also showed that they were unsure of what really meant by critical thinking skill and 23.3% participants at all never heard of critical thinking skill. For this statement, researchers concluded that student-participants were at all not introduced with the idea of critical thinking skill.

The second category of the survey questionnaire item was connection of critical thinking skill with history subject. From the baseline data collected, 9.7% participants knew without any pin of doubt that history subject and critical thinking are so much connected to each other.19.4%participants supported that they knew history subject and critical thinking are so much connected. 45.8% participants with the average range showed they were unsured of connection between history subject and critical thinking skill and 25% participants at all never believed on the connection of critical thinking and history subject.

The last category of the survey questionnaire item was the frequency of the critical thinking skill practices by teacher in the classroom. The raw data from the survey questionnaire found out that teacher never used the technique that enhances the critical thinking skill for the students. 7.1% participants somehow found out teacher using the techniques to enhance the critical thinking skill in the classroom. 23.7% participants have supported that sometimes teacher used the techniques to enhance the critical thinking skill in the classroom. However, majority of the participants in the class pointed out that teacher never used the techniques that enhance the critical thinking skill of the student. 39.9% participants listed that teacher never used the critical thinking skill techniques and other 29.3% participants bravely protested that teacher was poor at using the techniques to enhance the critical thinking skill in the classroom.
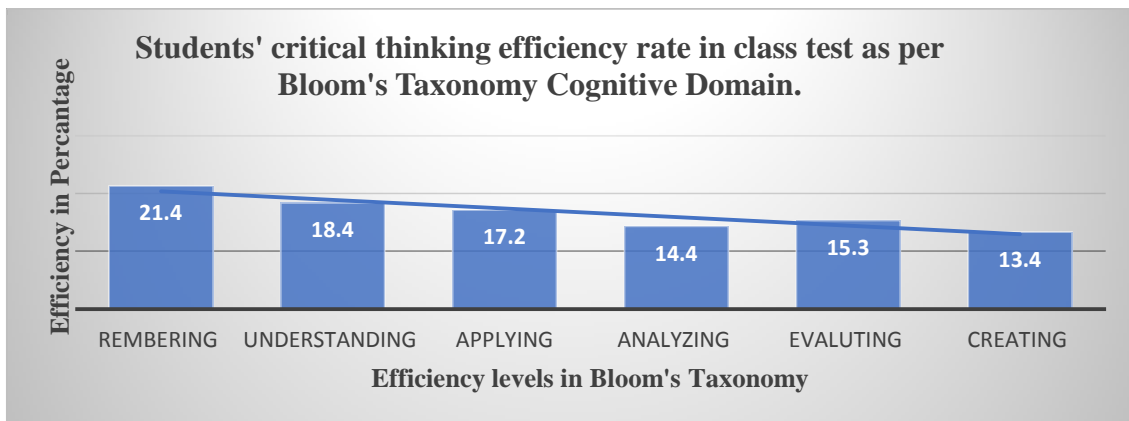
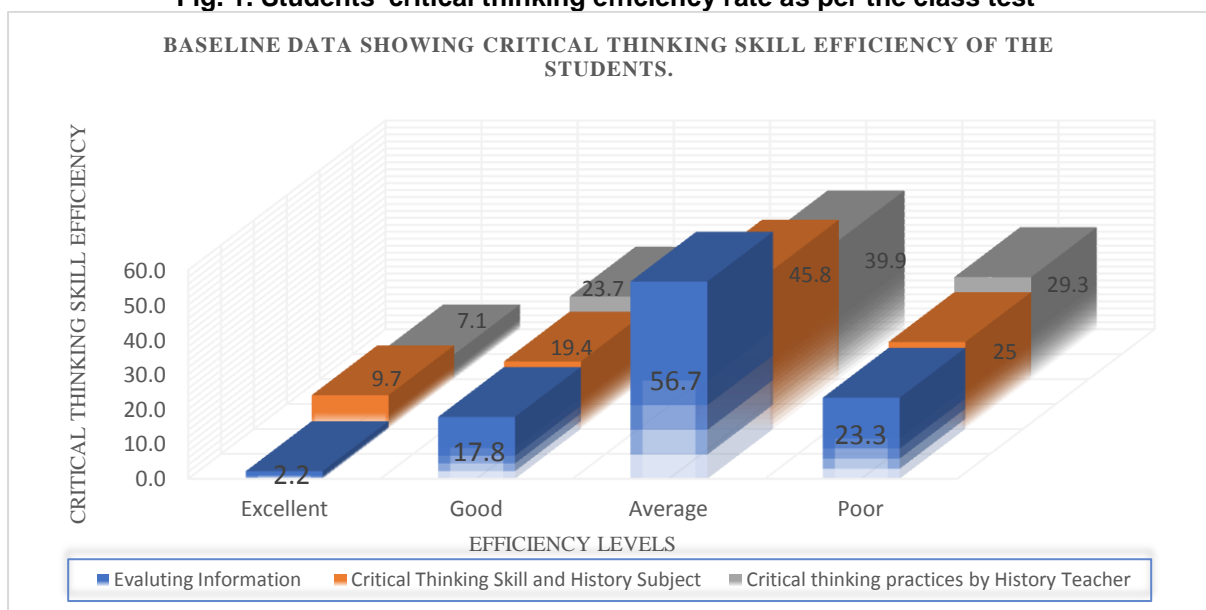**Fig. 1. Students' critical thinking efficiency rate as per the class test**

Fig. 2. Critical thinking skill efficiency of the students

8. INTERVENTION STRATAGEMS

The data collected from the baseline study revealed that the students' ability to solve the problem that demanded critical thinking skill was very poor. The students' class test data showed decrease in the percentage obtained by the students, as questions demanded more levels of higher order thinking skill. And the data collected from the survey questionnaire revealed that the student-participants were not familiar with the idea of the critical thinking skill. Moreover, teachers never even encouraged them with the techniques that encourage the students to learn critical thinking skill. As recommended by many researchers, without nurturing the critical thinking skills in the classroom, students will have less opportunity to develop the ability to think critically

(Tiwari et al. 2006; Baildon & Baildon, 2008; Cossette, [7]). So, the first step taken by the researchers was making the student-participants well aware of critical thinking skill. Making student-participants understand about the critical thinking is the essential part of this action research. As capitalized by Duron et al. [18], critical thinking as ability to analyze and evaluate the information. Students were given freedom to express their opinions with more of asking open-ended questions while at classroom teaching.

8.1 Implementation of PBL/Procedure

After the familiarization of critical thinking skill, student participants were introduced to the meaning and stages of PBL strategy. According to the previous study conducted by Narmaditya,

et al. [19], the learning of Problem Based Learning stages consisted of identifying the problem, organizing the students to learn in small groups, planning the tasks to be done, preparing a report on task, developing and presenting the report to the class and analyzing and evaluating the problem-solving activity. Further, as recommended by Marzuki & Basariah in Narmaditya et al. [19], PBL significantly affects the student's critical thinking ability and self-discipline in the civic education. The problem-based learning strategy was implemented and explored with different learning activities for the participants in the classroom teaching. The structure of the PBL procedure was implemented based on Moust, et al. [20], structure of the PBL

lesson which was coined in 7 steps as cited in Table 1.

After introducing the meaning and stages of PBL strategy, the student participants were organized into small groups. Student participants were divided into three groups with six members and called as sixer group. Further, each sixer was employed with two groups with three members each known as sub-groups of the sixers. All the learning activities of the lesson were given for the three sixer groups.

Further, the interventions strategies were employed incorporating PBL with case study, debate and pictorial interpretation. The application of the PBL strategy in case studies

Table 1. Seven steps of problem-based learning

Sl. No	Steps	Activities
1	Clarify terms and concepts that are not clear	Clear away the obstacles such as news words, unknown meaning, unclear concepts, difficult pronunciations, and etc.
2	Define the problem	Clarify the problem by formulating questions and sub-questions on it.
3	Analyze the problem	Create possible solution based on prior knowledge. No discussion or brainstorming just give solutions based on prior knowledge.
4	Discussion	Discuss the possible solution or explanation of the step 3. Make connection on it.
5	Formulate learning goals	Based on the outcome of the step 4, formulate learning coursework in the form of questions that have to he answered by the students.
6	Self-study	Look for literature and other sources of information to gain knowledge to produce the new knowledge or solution to the problem.
7	Evaluation	The evaluation is determined by the learning goals formulated. Checked whether the learning goals are being achieved or not.

Note. Adopted from Introduction to problem-based learning. A guide for students by Moust, et al. [20]

was proven effective by many scholars across the world. The one which was recommended by Belt [21] says that the use of case study in problem-based learning provides effective strategy for helping students to acquire the skills that are required for them. Further, stressed that case study involves problem solving skills connected to the real life or work-related work. The type of case study that teacher must give for the students was however focused by Tick [22], that case studies cannot be of written by teacher and easy case studies, but should be taken from journals, annual report, or periodicals. The topics of the case study were given that demanded the higher order critical thinking skills as per the Bloom's taxonomy cognitive domains.

Debate was also one of the important strategies used in this action research as the intervention program for implementing PBL strategy in the

history class. It involves the thought processing learning skill. It engages active preparation of human critical thinking skill to respond the issues with our own creative answers. The previous research done by Mumtaz & Latif [23], stated that learning through debate gives students an opportunity not only to identify the issue to resolve, but also reveal that there is need for deeper analysis, evaluation, review and reasoning on the issue to come out with the potential solutions.

Pictorial interpretation is one of the important teaching strategies that enhance students' critical thinking skill in the classroom. In pictorial interpretation, students interpreted the passage into artistic message and artistic presentation into statement message. The processes were guided with the instruction of PBL steps. As recommended by Kessler [24], allowing students

to create picture stories in the classroom that adds new level of involvedness. However, if given as collaborative group activities, they negotiate the sequencing of images that combine narration, dialogue, and even acting to produce the creative final product and students also write a story using the pictures.

9. DATA OVER TIME

The same methods of data collection were employed after the implementation of intervention programs so, any changes made with the student-participants could easily be identified.

9.1 Evaluating Information

After the implementation of intervention strategies in the classroom learning, student-participants' saw drastic changes to the learning environment of the classroom. As per the post data collection from the survey questionnaire, 64.5% of the student-participants perfectly understood what it really meant by the term critical thinking and creativity. 24.4% students of the class were also convinced with the meaning and application of critical thinking and creativity in their daily lives. The very impressing thing to the researchers' observation was that not even a one student in the classroom who was confused by the words critical thinking and creativity. Moreover, co-researcher observed that.
Before midterm examination, the students in the classroom only answered what teacher had taught them in the previous classes. They seldom share their understanding on the topics and never tried with the answers of their own. Students were even shy to try in their own way. But after the implementation of the PBL in the classroom, researchers were taken aback to see improvements in the way students constructs their own answer. Students never memorized the lesson instead used teacher's teaching as reference to their own knowledge. Try answers from the different angles in the classroom became the normalcy with the students.

9.2 Critical Thinking and History Subject

After the intervention programs in the classroom with the student-participants, while analyzing the data on the connection of critical thinking and history subject, 48.6% of the student-participants agreed strongly that history and the critical thinking skill are very much connected. These student-participants also conveyed that everything inside the coverage of history subject is more of connected to enhancing the critical thinking skill for the learners. 31.9% student-participants of the class, stated that they found history subject and critical thinking skill are very much connected, supporting the percentage of students who strongly agreed that history subject and the critical thinking skill are very much connected. However, there were 19.4% who could not find any connection between history subject and the critical thinking skill. And 3% of the student-participants were stating that history subject and critical thinking skill are at all not connected to each other. One of the student-participants bravely stated in feedback;

Though I concentrate so much in history classes, score good marks, and understand everything from your exemplary teaching. Internally I do not like history as a subject. The reason of my dislike for the subject could be because I am very much interested in learning science and my ambition of becoming doctor. But let me not underestimate your teaching sir, if not for your teaching, I would have been worst by the score for the history subject. After introducing to the critical thinking and PBL in history classes, I felt science subject is more of critical thinking invoking subject.

9.3 Critical Thinking Practices by Teacher

For the third category of the survey questionnaire, the post data analysis revealed that 64.1% of the student-participants strongly agreed that history teacher used critical thinking invoking strategy in the classroom for teaching the very subject. 26.3% supported the statement by choosing the good statement from the 4-points Likert scale. So, in total of 90.4% of the student-participants agreed that teacher practiced critical thinking development skills in the classroom teaching. However, there were 9.6%of the student-participants who felt teacher seldom used the strategy that enhances critical thinking skill in the classroom. These very percentage of the student-participants were connected with the average and poor rating of the 4-likert scale of both evaluating information and critical thinking and history subject category of the survey questionnaire. Nevertheless, analysis found out not even a single participant who stated poor category of the 4-points Likert scale, stating teacher never used critical thinking practices in the classroom.

10. DATA TRIANGULATIONS

As per the lead researcher understanding through research experiences, triangulation can

be explained as combining the data collected from the multiple sources to study the relationship between them. Here, multiple data can be contrasted and compared to examine the effects in relationship by different variables. In this research, researchers triangulated the data in two thematic backgrounds to comprehend effectiveness of the intervention programs.

10.1 Survey Questionnaire Data Triangulation

The questionnaire was distributed to the student-participants for the collections of pre intervention and post intervention data. The pre intervention and post intervention data of the survey questionnaire were triangulated as shown in Fig. 3. For each category of the survey questionnaire, after implementing the intervention stratagems, researchers observed the radical changes in the data collected from the student-participants. In the first category of the questionnaire which was grouped under the evaluating information of critical thinking of the student-participants, during preintervention data collection there was maximum number of student-participants who were uninformed of the meaning of critical thinking skill. 80% of the class students were insensible of the critical thinking skill, which indirectly has hampered the performance of academic achievement of the students. The previous research done by Fitriani [25] had found out that critical thinking can directly contribute to the academic achievement and has a correlation because critical thinking constitutes the highest cognitive abilities that can produce effective thinking in solving problems. However, after researchers' intervention, student-participants understood very well about the critical thinking and creativity. 88.9% of the students has supported that they know the meaning of critical thinking and creativity during the time of post intervention data collection. After knowing the basic meaning of the critical thinking, it has become much easier for the researchers to conduct the intervention programs for the improvement of critical thinking skill to the student-participants.

The second category of the survey questionnaire; connection between critical thinking skill and the history subject, during preintervention data collection there was only 29.1% of the student-participants who believed that critical thinking skill and history subject are interrelated to each other. On the other side, there was around 70.8% of the student-participants who could not find any connection between history and critical thinking. So, this data revealed that critical thinking skill was not at all being practiced in the class by the student-participants. After researchers' intervention programs, during the post data analysis, the result was found out to the researchers' incredulity that 80.5% of the students found out history subject and the critical thinking skill are very much connected. Further, researcher observation in the classroom teaching shared that;

Students participated so much in the class just to answer what they felt of the questions being asked. The answers shared were also not the direct answer to fill the demand of the question but the analyzed answer mainly answered to provoke another question to quench the thirst of further knowledge related to the topic.

The last category of the survey questionnaire was critical thinking skill practices by the history teacher. In this category, pre intervention data revealed that teacher didn't used any strategy to enhance the critical thinking skill in the class. From survey questionnaire data, 69.2% of the student-participants showed that their teacher hasn't used any skill related to the critical thinking skill. However, after intervention programs incorporating with the PBL strategy, during the post data, student rectified that history teacher taught the lesson that invoked critical thinking skill to the students. The data shown in the Fig. 3. clearly stated that 90.4% of the student-participants strongly agreed teacher uses critical thinking skill in the classroom teaching. Further, the statement of the feedback reflected by the student says;
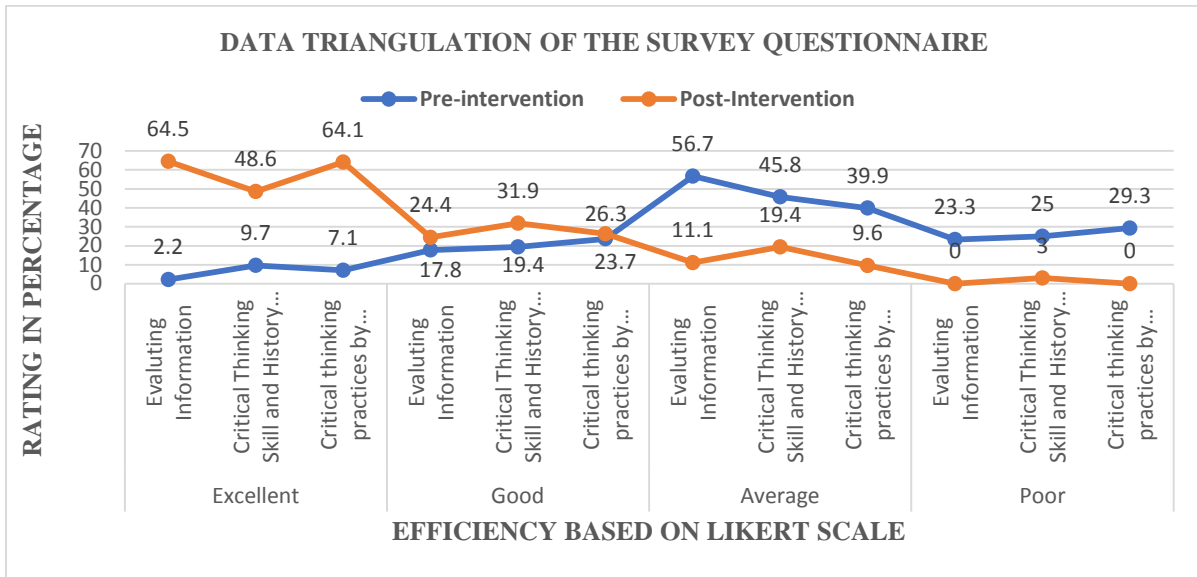
Fig. 3. Data Triangulation of the survey questionnaire

There were massive changes in the teaching of history subject by the teacher. Before midterm, it was more of teacher's explanation with less involvement of students. We enjoyed the different stories narrated and information shared on us. However, after midterm the learning of history was in the students' small group. The learning of history in PBL is much of fun and interesting.

10.2 Class Test Data Triangulation

The effectiveness of survey questionnaire was supported by the class test data triangulation collected from the student-participants. The questions were designed based on Bloom's cognitive domain taxonomy. The data from different intervals were presented in Fig. 4. The triangulated data of the class test collected from student-participants resulted in producing drastic changes. As cited by Kocakoglu [26] from Sage (1996) PBL started to implement in the secondary and elementary education. The researchers concluded that implementation of PBL in history lesson was showed effective in the secondary level of students in the school. As shown in the Fig. 4. The pre intervention data of the student-participants for the higher order thinking skill was very low. The analyzing domain scored of the student-participants was14.4% but after post intervention data the analyzing domain data raised to 18.5%. Further, the data comparison of evaluating domain has also seen massive change in the test performance. During preintervention, the scored of the evaluating

domain was 15.3% and aftermath of intervention programs, it has increased to 16.8%.

Not only in analyzing and evaluating domain, there was also a massive change in the data of creating domain. As per the bloom's cognitive domain taxonomy creating domain demand highest level of critical thinking skill. When the data was collected from the student-participants before the implementation of the intervention programs, the score was only 13.4% but after the intervention programs done by researchers in the classroom with PBL strategy the post intervention data score raised to 19.5%.

However, in the given Fig. 4, researchers observed decreased in the score marks of the questions that demanded low critical thinking skill of the students. It was because post intervention data was collected without pre-informing about having the class test to the students to get the reliable data because low critical thinking questions demand serious revision and memorization through rote learning strategy on the topic.

From the data triangulation, researchers concluded that teaching history subject with PBL strategy has proven effective in enhancing the critical thinking skill of the students and students enjoy learning in small group. Further, researchers' integration of PBL application in the classroom teaching was proven as successful the improvement of the marks scored in the higher order thinking skill domains as per Bloom's cognitive domain taxonomy.
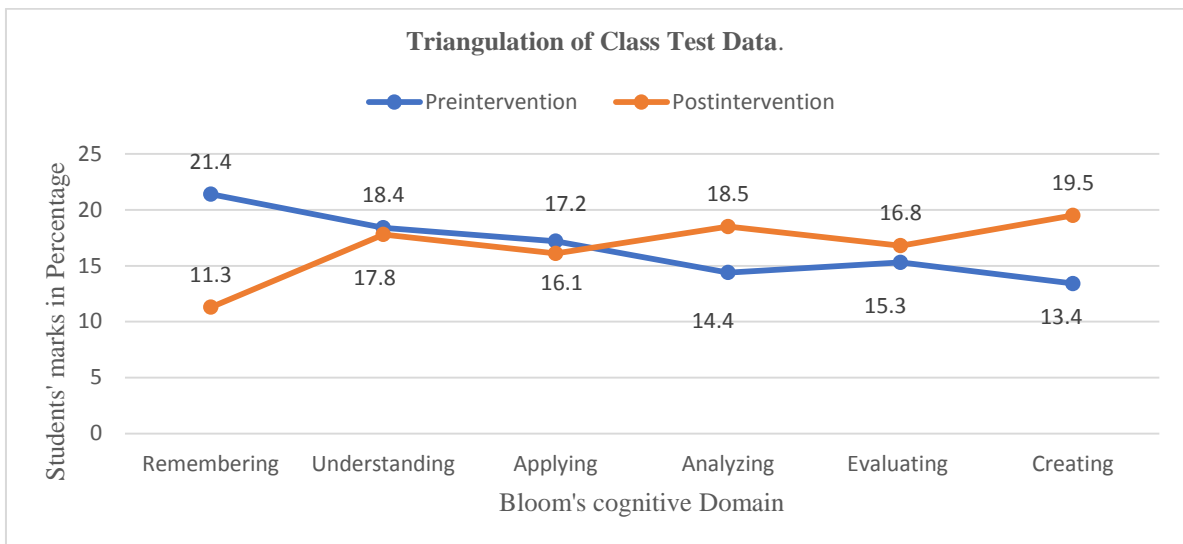
Fig. 4. Triangulation of class test data

11. RESEARCHERS' RECOMMENDATION FOR POSSIBLE SECOND RESEARCH CYCLE

This action research cycle was proven to be successful as it was evident from the result that the study has brought to the learning environment of the student-participants. This action research has further, confirmed that the application of PBL in history lesson has helped in enhancing the critical thinking skill of the class VIII students of Thimyul Lower Secondary School. Student-participants done very well in answering the questions that demanded higher order thinking skill. However, the data collected from the student-participants failed to do well in the applying domain of the Bloom's cognitive domain. Throughout our study period, we tried the best to improve the applying domain of the students by giving more of application works, letting students to apply in real world from what they had learnt in the classroom and reminding every instructional hour about the improvement of applying skill. We felt it as a serious problem and if this trend continues with the students, the consequences will be to the student's life as they wouldn't be able to do the questions with application domain. As stated by Zakrajsek, et al. (n.d) [27] applying new information in our daily lifestyle is very important strategy for real life problem solving and it must involve an individual effort. If a second research cycle had to be developed as an extension to this paper, it would be on how to help students perform well in applying domain as per Bloom's taxonomy cognitive domain.

12. CONCLUSIONS

This action research was successful as we could complete it with successful stories as per the researchers' goal. Researchers had assisted students to become more capable of producing critical answers while solving the problems of their daily life. While doing this action research, researchers didn't disturb the normal teaching curriculum but helped in adding different colours of beauty in learning the curriculum. In other words, this study was contextualized and goals were all achieved.

Macintyre [28] highlighted that research plan gets disturb by non-availability of resources, or visit of senior government officials during the research plan. However, while doing this action research we did not face any problem. All the plans designed in the action plan were carried out accordingly [29,30].

Prior to the study, most of students were not aware of what was mean by critical thinking skill. After the accomplishment of this research cycle, students could even talk that are not at all expected to be their answer. As the researchers, we were overwhelmed by the progress we saw at our students. From this action research, researchers concluded that amalgamation of PBL strategy in the history lesson really helps in enhancing the critical thinking skill of the students. Now, as we think back after the completion of the research study, we are fully satisfied and this action research taught us to be

better teacher and a competent researcher hereafter.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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