CHAPTER- III

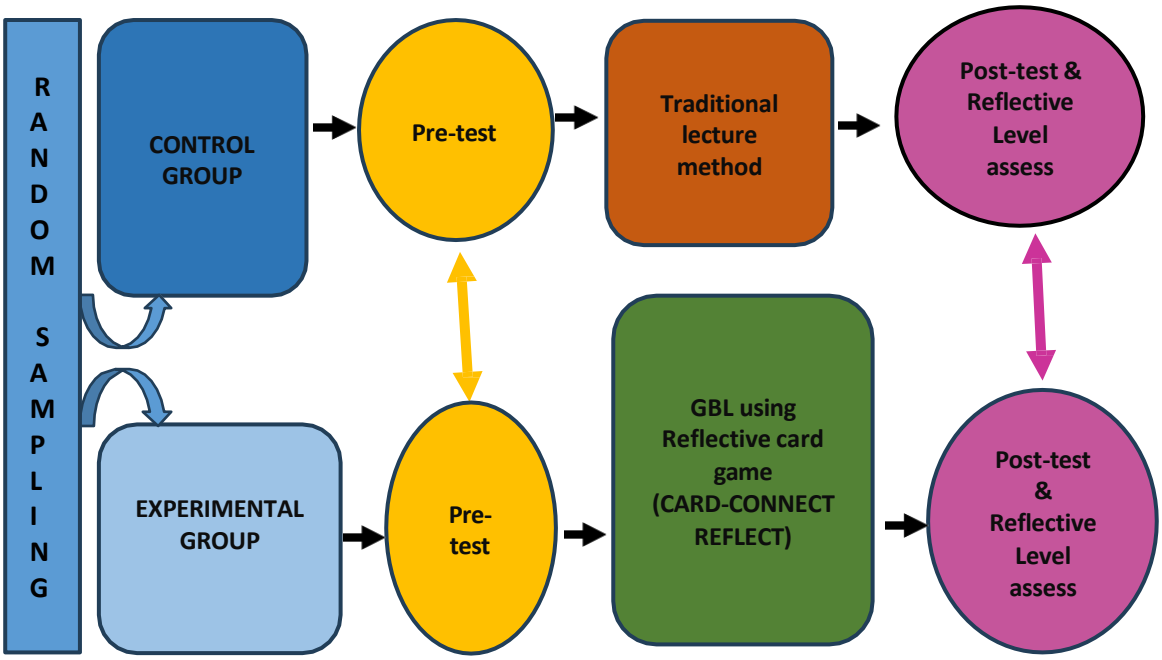
CHAPTER III

RESEARCH METHODOLOGY

3.1 Design of the study

Present study had been carried out by using **Experimental Research design (pre-test post-test control group design)**, which aimed to study the effectiveness of the reflective card game with traditional lecture method in reinforcing biological concepts and enhancing reflective thinking skill of students. This study aims to analyze the effect of the independent variable (reflective card game) on the dependent variable (reflective thinking level). Two group of students were formed, one for the control group and other for the experimental group by randomisation process. Pre-test was administered on both control group as well as experimental group before exposing to traditional method (lecture method) and treatment respectively. Afterwards post-test was administered to check the effectiveness of the intervention. The experimental group was given special intervention in the form of gaming, using reflective card game in learning.

3.2 Conceptual Framework



(Figure 3.1: Schematic Diagram presenting the conceptual framework of this study)

The present study seeks to compare the effect of GBL with traditional lecture methods of teaching Biology on reflective thinking level of middle stage students. The conceptual framework presents the flow of actions in the present study. **Figure 3.1** represents the conceptual framework of this study which seeks to measure the effectiveness of Game Based Learning compared with traditional learning. This study comprises two groups: an experimental group and a control group. Pre-tests were conducted for both experimental and control groups in order to measure their existing levels of knowledge or skill. After that, the experimental group was taught using Game Based Learning methods, while the control group was instructed using traditional lecture method of teaching. Later, a post-test was administered on both the groups in order to assess knowledge or skills proceeding the intervention. The framework therefore allows for a comparison of data obtained in the pre-test and post-test within each group to determine the effect of the intervention. Also, by comparing the results of the post-test of experimental and control group, the study looks to assess the relative effectiveness of Game Based Learning compared to traditional instructional approaches. That comparative investigation provides an insight into where game elements could benefit mainstream education as well as reflective aspects of students.

3.3 Variables

There are two variables in this research; independent variable and dependent variable. Independent variable is use of Reflective card game and dependent variable is Reflective Thinking level of students.

3.4 Population and Sample

The population for this study consists of middle stage students studying in class VIII of Kendriya Vidyalaya, sector-6, Rourkela, Odisha. Students of all the three sections, each consisting nearly about 50 students were considered as population. Thus, the total population comprised of 150 students. Present study includes 120 students, randomly categorized into two groups, each consisting 60 students.

3.5 Sampling technique

For finalizing sample for the present study, total 150 students, aged between 12 to 14 years of age, were exposed to Cattle culture fair, scale-2 IQ test.

Students falling between the IQ range from 70 to 130 were assigned to control group and experimental group through randomization.

3.6 Sample size

For control group, N=60 (Male 30, Female 30),

For experimental group, N=60 (Male 31, Female 29)

Table 3.1: Presentation of the total collected sample size

<table>
<tr><th>School</th><th colspan="2">Section-A Students</th><th colspan="2">Section-B Students</th><th colspan="2">Section-C Students</th><th colspan="2">Students of class VIII</th></tr>
<tr><td rowspan="3">Kendriya Vidyalaya, Sector-6, Rourkela, Odisha</td><td>Total No. of students present</td><td>54</td><td>Total No. of students present</td><td>47</td><td>Total No. of students present</td><td>49</td><td>Total No. of students present</td><td colspan="2">150</td></tr>
<tr><td rowspan="2">Total No. of students included in sample</td><td rowspan="2">47</td><td rowspan="2">Total No. of students included in sample</td><td rowspan="2">42</td><td rowspan="2">Total No. of students included in sample</td><td rowspan="2">31</td><td rowspan="2">total Sample</td><td colspan="2">120</td></tr>
<tr><td>Control Group</td><td>Experimental Group</td></tr>
<tr><td colspan="6"></td><td>60</td><td>60</td></tr>
</table>

3.7 Research Tools

Selection of the tool is one of the important tasks of the researcher. Along with a self-developed Reflective Card Game, the investigator used the following tools:

3.7.1 Two Biological Science Achievement Tests (BSAT-1 and BSAT-2) were developed by the researcher. Former to be used during Pre-test and later during Post-test. Test items consist of multiple selective questions (MSQs) as well as short questions. In each test, questions are prepared in such a way that students will be able to answer through their experience and reflection over daily life.

For content validity, five faculty members were approached and after their reflection, the test items were further modified or deleted. Final version was selected as the revised test to be administered on students.

3.7.2 For determining Reflective thinking level, Reflective Thinking Instrument for Elementary School Students (RTIESS) tool was used, developed by Bilge Can and Cennet Gizem Yıldırım in 2014. It has a five-point Likert scale with statements requiring response that ranges from "strongly disagree" (1) to "strongly agree" (5). It is further modified and revised according to need of the study. After content validity reviewing process by the experts and pilot study, the tool was finalized. The Cronbach α coefficient of the developed tool is 0.86.

3.7.3 To assess the attitude towards developed game, a self-developed questionnaire Perception Towards GBL (PT-GBL) was prepared. This five-point rating scale questionnaire comprises of 25 items, requiring response ranging from "strongly disagree" (1) to "strongly agree" (5). The questionnaire has been validated by two faculty members of the Department of Zoology of S.G women's college who are specialists in Biology.

3.7.4 To assess student's engagement during game-based learning, a self-developed questionnaire; GBL Engagement Tool (GBL-ET) five-point Likert scale comprising 15 items had been developed. Experts reviewed the items to ensure scope validity, and a pilot study had been conducted. The questionnaire was then validated by two faculty members from the Department of Zoology at S.G. Women's College, who are specialists in Biology.

3.8 Procedure of data collection and organization

The data collection technique uses a pre-test to measure student skills before teaching strategy and a post-test to measure students' skill after treatment. For this, BSAT-1 and BSAT-2 scores of students were collected. To measure reflection level, Reflective Thinking Instrument for Elementary School Students (RTIESS) was used. To assess student's engagement during game-based learning, a self-developed questionnaire; GBL Engagement Tool (GBL-ET) was used. To assess the attitude towards the game, Attitude Towards GBL (AT-GBL) was used.

For data collection, the investigator went to selected school and met the principal of the school for permission. First the investigator explained the purpose. The principal gave permission to conduct the study. After getting permission, the investigator met with subject teachers as well as students and established connection with them.

She explained them the purpose and way of playing game as well as way of assessment of their reflective thinking skill. The doubts regarding the rating scale, game and achievement test were cleared by Investigator.

Before teaching in traditional lecture method or applying GBL (Reflective card game) as intervention, a Pre-test (BSAT-1) was administered to measure the prior knowledge of the students. As treatment, the researcher conducted game to be played as teams, which is a self-developed Reflective card game (CARD-CONNECT REFLECT) with rules. After giving the treatment, the students were given a Post-test (BSAT-2). Then comparison between Pre-test and Post-test of the control group and experimental group were done to know whether GBL was effective to improve the student's academic achievement and reflective thinking skill in comparison to traditional lecture method. Treatment was given for a time period of 4 weeks. Per day 4 periods were assigned each of 45 minutes and thus per week 18 hours were devoted for Intervention. The first week served as an orientation period and was meant for pretesting activities. The next two weeks were served as treatment period focused on game-based lessons (experimental) or equivalent practice drills (control). Each session was scheduled to include a brief orientation, game playing (treatment) and a final discussion summary. Reflective card game (CARD-CONNECT REFLECT) was used as intervention for the chapter 7 of class VIII, NCERT Science book "REACHING THE AGE OF ADOLESCENCE" covering essential topics like 'Adolescence and Puberty', 'Changes at Puberty', 'Secondary sexual characters', 'Role of Sex hormones', 'Menstruation', 'Hormones and Endocrine glands', 'life cycle of frog' and 'Reproductive health' etc. Utilizing equivalent pre-test post-test control group design, data collection was established. It further consists of pre-test (BSAT-1) conducted one week before the intervention. Post-test (BSAT-2) was applied within a week after the treatment had been completed. All the responses were coded and entered into an SPSS database, while the raw scores were doubly checked for accuracy. Data were organized according to treatment condition and entered into descriptive statistics for further analysis.

3.9 Statistical techniques used in the study

Descriptive statistics like mean, standard deviation, skewness, kurtosis and Inferential statistics like t-test and correlation have been used to analyze the collected data through SPSS.