CONFLUX
JOURNAL OF EDUCATION

Volume 11, Issue 2, June 2023
https://cjoe.naspublishers.com

# DISCIPLINE-BASED OUTCOMES THROUGH FLIPPED EXPERIENTIAL LEARNING STRATEGIES IN SCIENCE: AN EXPLORATORY STUDY

Sujisha E.P.[1] and Dr. M. Jesa[2]

**Abstract**

*Science discipline provides a systematic and organised study of the natural world in order to develop scientific knowledge and to apply this knowledge to address real-world problems. The present study used strategies based on Kolb's theory of experiential learning and philosophy of flipped classroom. The objectives of the study were to identify the scope of discipline-based learning outcomes in secondary level Chemistry course books and source books (SCERT, Kerala) and to develop lesson plans with course outcomes based on discipline-based learning strategies through flipped experiential learning approach. Content analysis based on criteria for scientific temper development was carried out and developmental stages of lesson transcript based on flipped experiential learning Strategies were designed.*

***Keywords:*** *Discipline-based outcomes, Experiential learning, Flipped classroom, Flipped experiential learning strategy, Lesson transcript.*

## INTRODUCTION

"All of Science is nothing more than the refinement of everyday thinking" (Einstein, 1936). Science discipline provides a systematic and organised study of the natural world in order to develop scientific knowledge and to apply this knowledge to address real-world problems. The attainment of scientific temper - one's attitude of scientific, logical, rational thinking - is one of the most important effects of science education along with the discipline-related outcomes. Fostering scientific temper entails encouraging inquiry-based learning, emphasizing evidence-based thinking, promoting scientific skepticism, using experiential learning, and providing opportunities for scientific research. Among these, experiential learning proves an effective way of promoting scientific temper.

### Experiential learning

Learning by experience is not a novel concept. The foundation for learning theories that highlight 'learning by doing' or 'learning by experiences' was established by eminent

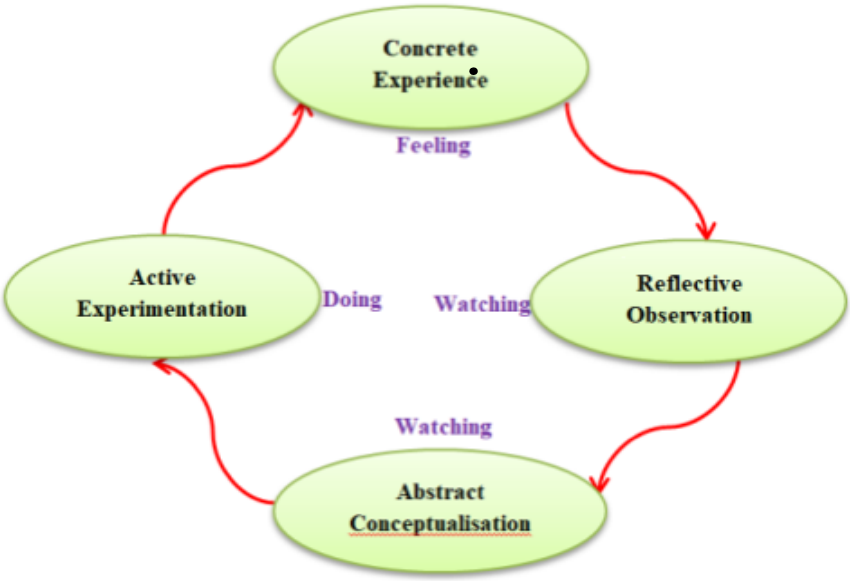
[1] Research Scholar, Farook Training College, Kozhikode

[2] Associate Professor, Farook Training College, Kozhikode

educational psychologists such as John Dewey, Carl Rogers, and David Kolb. Kolb (1984) defined experiential learning as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combinations of grasping and transforming the experience." Learning necessitates the acquisition of abstract concepts that may subsequently be applied flexibly in a variety of settings. As a result, knowledge is formed through transforming experience.

**Figure 1**

Kolb's Experiential Learning Cycle




Kolb's learning cycle is a four-stage cycle that describes how individuals learn and develop new skills. Concrete experience involves learners directly encountering the skill or concept being taught by doing or having an experience, while reflection enables them to analyse and evaluate that experience. Abstract conceptualization involves concluding or learning from the experience, while active experimentation entails testing those ideas in new situations. By engaging in this cycle of learning, learners can develop a deeper understanding of the skill or concept being taught, which can enhance their ability to apply that knowledge in future situations.

## OBJECTIVES OF THE STUDY

1. To identify the scope of discipline-based learning outcomes in secondary level Chemistry course books and source books (SCERT, Kerala).
2. To develop lesson plans with course outcomes based on discipline-based learning strategies through flipped experiential learning approach

## METHODOLOGY

### Research Design

The study adopted qualitative research methodology. Content analysis based on criteria for scientific temper development was carried out and developmental stages of lesson transcripts based on flipped experiential learning Strategies were designed.

### Variables

***Discipline-based outcomes:*** Discipline-based outcomes refer to the scientific behaviour, specific knowledge, skills, and attitudes that students are expected to acquire in a particular field of study.

***Flipped experiential learning strategy:*** Strategies based on Kolb's theory of experiential learning and philosophy of flipped classroom.

### Content Analysis

To identify the discipline-based learning outcomes, a qualitative content analysis has been done on secondary level Chemistry course books and source books (SCERT, Kerala). For this, Chemistry course books and source books of standard IX were selected. The structuring of chapters are in the order of; introduction with pre-requisites, explanation of the concepts with examples if needed, evaluation questions and follow-up activities. The results revealed that, there are only a few areas like 'surface area of solids and rate of chemical reaction', which provide examples and explanation of daily life incidents in connection with the concepts to be learn and also the development of higher order thinking skills.

## FLIPPED CLASSROOM

Flipped classroom is a student-centred, blended learning approach which refers to the "strategy of a pedagogical model in which the typical lecture and homework elements of a course are reversed. Short video lectures are viewed by students at home before the class session and in-class time is devoted to exercises, projects and discussions" (Bergmann & Sams, 2012)**.** Here the students are more active in the classroom than the teachers and the teacher acts as a facilitator to motivate, guide and give feedback to students. According to Missildine et al. (2013), the implementation of a Flipped Classroom results in the creation of a new learning environment that fosters the enhancement of students' practical skills, ability to transfer new knowledge, productivity, cooperation, interaction skills, and group work. In a flipped classroom, the lower levels of cognitive skills such as remembering and understanding are

practised by students at home by viewing the video lesson and also they try to connect the content with higher levels of cognitive skills such as applying, analysing, evaluating and creating by making use of the resources provided by the teacher. Class time is used to practise higher level of cognitive skills as activities along with the clarification of doubts related to the video lesson.

## FLIPPED EXPERIENTIAL LEARNING STRATEGIES

In a traditional classroom setting, learners typically listen to lectures and take notes; with limited opportunities for hands-on experience or active participation. The flipped classroom can be an effective approach to experiential learning. It allows learners to take control of their learning experience and engage in active learning. In a flipped classroom, however, learners are provided with instructional materials, such as videos or readings, to review prior to class. This allows them to come to class prepared with some foundational knowledge and understanding of the topic. In the classroom, learners can engage in activities based on daily-life situations that allow them to apply the knowledge and skills they have learned. This allows them to see the relevance of what they are learning and to develop a deeper understanding of the subject matter. The flipped classroom strategy can also promote more personalized learning experiences, as learners can review the instructional materials at their own pace and revisit concepts, they find challenging. Activities intending development of Higher Order Thinking Skills are also included. This can be particularly beneficial for learners with diverse learning needs and preferences. “Flipped classroom-based experiential learning model provides ample space for student s to develop their talents and abilities in the academic field” (Prasetyo et al., 2020). It can be explained through the Lesson Transcript format on discipline-based learning strategies through flipped experiential learning approach.

### Lesson Transcript format on discipline-based learning strategies through flipped experiential learning approach

### Preliminary Details

Preliminary details give the details on subject, unit, topic, standard and date of the class. Along with this, it gives the details of time requirements for the first exposure and incentive, in-class activities as well as post-class activities.

**Worksheet for preparing what students will do before during and after the lesson.**

*Step 1: Content, Learning outcomes and Instructional strategies*

Step 1 explains what contents are going to be discussed through this lesson, what are the disciplines-based learning outcomes which are expected to be developed in the students after the class, and what are the learning resources and strategies that the teacher used to transact the content. While stating the discipline-based learning outcomes, focus must be given on those which will connect the first phase of experiential learning. Concrete experience passing through reflection, leading to the habit of scientific observation, reflection and critical thinking on real life experiences.

*Step 2: Concrete experience: Students doing/ having an experience before class*

Students doing or having an experience as instructed by the teacher at home.

*Step 3: Reflective observation: Students watching new instructional material provided by the teacher before class*

In this step, the students are reviewing/ reflecting on the experience by watching the instructional materials and resources provided by the teacher with links to examples, fact and formulae to familiarize with the content prior to class and trying to solve the questions at the end of each video at home.

*Step 4: Abstract conceptualization: In class activities that consolidate the content of video lesson.*

This step takes place during the class time. During this stage, students share their doubts and difficulties, thoughts, or solutions to problems in class. Teacher facilitates the entire process and act as a mentor.

*Step 5: Active experimentation: In class activities that provide students opportunities to deeper understanding.*

Step 5 includes in-class activities where students discuss and solve more activities related to factual and life-oriented situations in class/laboratory which focus on the attainment of higher order thinking skills of the students. This will help the students to think scientifically and apply the concept learned in similar situations in the future.

*Step 6: Resources for self-learning*

In the final step, the teacher gives a list of science-based resources relevant to everyday life to students and instructions for self-learning. This approach is intended to facilitate the advancement of higher-order thinking skills, which, in turn, promotes the development of science behavior among students.

## REFERENCES

Bergmann, J., & Sams, A. (2012). *Flip your classroom: Reach every student in every class every day.* Internal Society for Technology in Education.

Einstein, A. (1936). Physics and Reality. *The Journal of the Franklin Institute, 221*, 349-382. https://doi.org/10.1016/S0016-0032(36)91047-5

Kolb, D.A. (1984). *Experiential learning: Experience as the source of learning and development.* Prentice Hall. http://www.learningfromexperience.com/images/uploads/process-of-experiential-learning.pdf

Missildine, K., Fountain, R., Summers, L., & Gosselin, K. (2013). Flipping the classroom to improve student performance and satisfaction. *Journal of Nursing Education, 52*(10), 597–599. https://www.researchgate.net/publication/256703922_Flipping_the_Classroom_to_Improve_Student_Performance_and_Satisfaction

Prasetyo, A.H., Degeng, I.N.S., Ulfa, S., & Hady, M.S. (2020). A review of experiential learning based on flipped classroom. *International Journal of Research and Review, 7*(12), 227-235. https://www.ijrrjournal.com/IJRR_Vol.7_Issue.12_Dec2020/IJRR0035.pdf

*****