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# An Expedition through the Conceptual Structure and Implementation of the Experiential Taxonomy in Science Teaching

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**ABSTRACT: Educational taxonomies offer frameworks of classifications to organize educational goals and distinguish the appropriateness of learning outcomes [1,3]. Numerous unique educational taxonomies have developed with the objective of stretching the teacher-pupil interaction beyond the four walls of the classroom [7] [8]. This paper is an outcome of the profound analysis of the major educational taxonomies framed and developed by prominent educators. Among the major educational taxonomies, the 'Experiential Taxonomy' developed by Norman W. Steinaker and M. Robert Bell in 1979, was comprehensively studied, and an infographics based on the Experiential Taxonomy was designed. The investigator framed the phases as well as constructed lesson templates based on these phases, for each of the major educational taxonomies, including Experiential Taxonomy, to make them well- suited for classroom instruction. Also, the practical difficulties in the implementation of the Experiential Taxonomy in actual classroom situations were identified through a Frequently Asked Question (FAQ) Generation Session.**

**Keywords:** Educational Taxonomy, Experiential Taxonomy, Frequently Asked Question (FAQ) Generation Session, Infographics, Lesson Template.

## I. INTRODUCTION

There are numerous distinct educational taxonomies proposed by prominent educationalists, each of which is complete in itself. Among them, Bloom's taxonomy has created a remarkable impact in the entire educational practices. But Bloom's Taxonomy had often been misapplied and misinterpreted by educators. It failed to acknowledge that learners might perform at varying levels of proficiency within each type of higher order thinking skill. In practical contexts, it gave emphasis to the attainment of the cognitive domain objectives alone [2,4]. These are all the problems with the implementation of Bloom's taxonomy in actual classroom situations and not the theory itself. Ample educational taxonomies evolved subsequent to Bloom's taxonomy with the intention of thrusting the classroom instruction beyond rote learning. Each one of them was outstanding with regard to its spotted traits. They provide a transparent depiction of the fashioning of the classroom instruction to gratify the requisites of the existent generation [5]. Also, each of these taxonomies has a strong theoretical backup and is relevant [7].

## II. RATIONALE OF THE STUDY

The timeline of the various taxonomies of educational objectives evolved is shown in Figure 1.

### *About Experiential Taxonomy (1979)*

The Experiential Taxonomy was developed by Norman W. Steinaker and M. Robert Bell in 1979. It is supported by the experiential learning theory, which itself is reinforced by constructivist thoughts of teaching and learning. Although it does not presume to offer an answer to the question of what is good teaching-learning experience, it responds to it by offering a tool for planning, sequencing, implementing and particularly evaluating the human experience of teaching and learning through use of taxonomic teaching strategies. It is therefore easier for teachers to:

- Plan objectives appropriate to the needs of an individual learner or group of learners as the teacher can deal with needs in a crisp and logical manner (curriculum development)

- Recognize and understand where students are in terms of a particular experience, thus enhancing their ability to develop new strategies and activities designed to help each individual through additional levels of experience (engaging students)
- Self-evaluate their professional development (self-evaluation) [10].

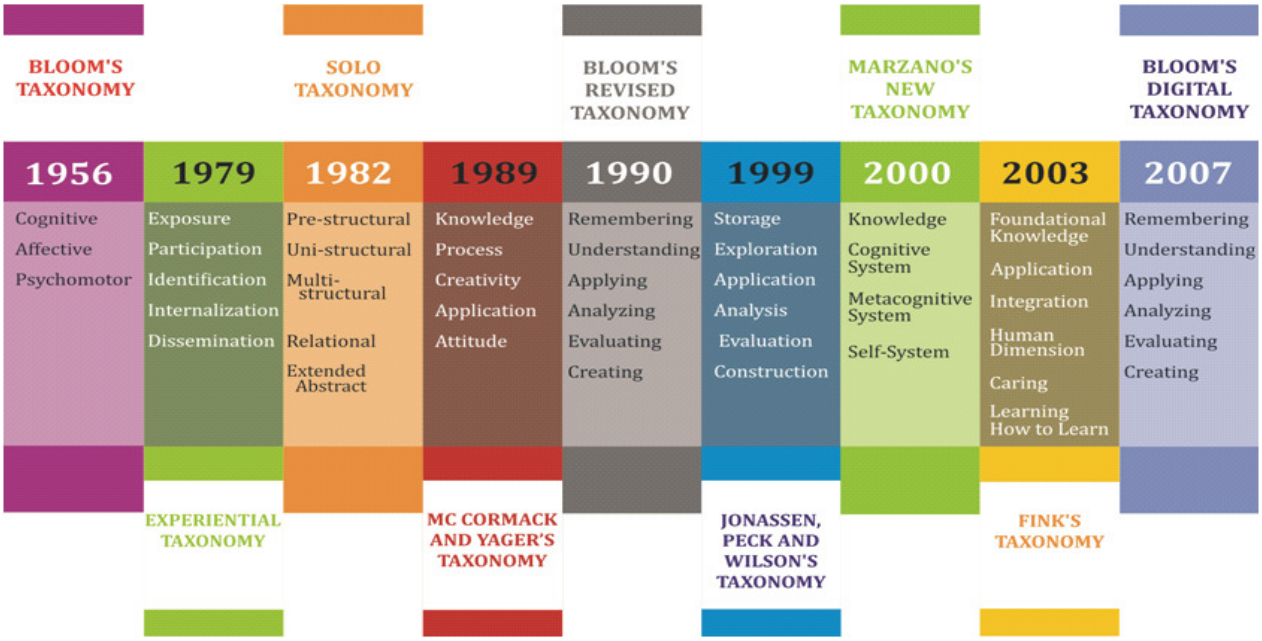


**Fig. 1.** Timeline of major Educational Taxonomies.

The Experiential Taxonomy proposes a sequence to the learning-teaching act, which begins when a learner is first exposed to a learning experience and continues to the point where the learner has internalized it and is disseminating to others. The process is sequenced into 5 levels (Exposure, Participation, Identification, Internalization, Dissemination), each of which has a number of sub-categories and progress across these is associated with the development of deep/self-regulated learning.

The categories in the Experiential Taxonomy are described as follows:

**Exposure:** The student, who has observed a competence, shows willingness and ability to relate the practice observed and its underlying theory to his/ her own previous experience. He/ she is then able to analyse and discuss with the teacher why and how certain aspects were carried out, and identify the sources and types of information required to enhance further application of knowledge to the practice observed.

**Participation:** The student is able to participate under close supervision of a competent practitioner in carrying out the activity, having demonstrated knowledge by analysis. He/ she questions the teacher on particular aspects and its rationale, decision-making, practical skills, and means of acquiring further information and opportunities for practice. He also shows the ability to perform manipulative skills, and operationalizes communication and problem solving skills with guidance.

**Identification:** The student now shows the ability to participate in the activity under supervision on more sustained basis with less prompting and greater confidence. He/ she shows greater ability to communicate effectively, and demonstrates a wish to acquire further information and ability to analyse and interpret information. Besides, he applies problem solving skills and knowledge base to meet different situations.

**Internalization:** The student exhibits the ability to explain the rationale for the activity, and requires less supervision although he/she is able to transfer knowledge to new situations. He seeks and applies new knowledge and research findings, demonstrates ability to use problem solving skills, critical analysis and evaluation.

**Dissemination:** The student plans, implementation and evaluates the activity for a group under minimal supervision, and shows the ability to teach others. He also demonstrates critical analysis, evaluation and decision-making skills.

The process is not necessarily a linear/circular process. This means in the first instance that the starting point of a lesson does not necessarily need to be at the Exposure level (structured introduction to the topic, inviting the interest of the learners). Furthermore, it is not necessary for the learning experience to undergo each phase of the taxonomy to be effective and successful. It is therefore a dynamic process and progress can skip one or more categories [10].

## III. STATEMENT OF THE PROBLEM

'An Expedition through the Conceptual Structure and Implementation of the Experiential Taxonomy in Science Teaching'.

## IV. OBJECTIVES OF THE STUDY

1) To create and develop a fundamental structure in the form of phases for the Experiential Taxonomy, so as to make it compatible for classroom instruction.
2) To create an infographics based on Experiential Taxonomy.
3) To develop a lesson template on the Experiential Taxonomy, based on the phases developed.

## V. METHODOLOGY

The concept of Experiential Taxonomy has been theorized since 1979. But the practical application of this concept in actual classroom situations it rarely tracked. Through this study, the investigator creates and develops a fundamental structure for the Experiential Taxonomy in the form of phases, which facilitates its implementation in the real classroom settings [4,6]. Also, an infographics based on Experiential Taxonomy is created [6]. Besides this, a sample lesson template on the Experiential Taxonomy is constructed to illustrate the model, on the topic 'Organic Farming' from Science.

## VI. FINDINGS AND DISCUSSION

*A. Construction of Phases for experiential Taxonomy*

The phases constructed by the investigator for the smooth implementation of the Experiential Taxonomy of educational objectives in classrooms are described below [9]:

**Phase 1: Exposure.** The student, who has observed a competence, shows willingness and ability to relate the practice observed and its underlying theory to his/ her own previous experience. He/ she then analyses and discusses with the teacher why and how certain aspects were carried out, and identifies the sources and types of information required to enhance further application of knowledge to the practice observed.

**Phase 2: Participation.** The student participates under close supervision of a competent practitioner in carrying out the activity, having demonstrated knowledge by analysis. He/ she questions the teacher on particular aspects and its rationale, decision-making, practical skills, and means of acquiring further information and opportunities for practice. He also shows the ability to perform manipulative skills, and operationalizes communication and problem solving skills with guidance.

**Phase 3: Identification.** The student now shows the ability to participate in the activity under supervision on more sustained basis with less prompting and greater confidence. He/ she shows greater ability to communicate effectively, and demonstrates a wish to acquire further information and ability to analyse and interpret information. Besides, he applies problem solving skills and knowledge base to meet different situations.

**Phase 4: Internalization.** The student exhibits the ability to explain the rationale for the activity, and requires less supervision although he/ she is able to transfer knowledge to new situations. He seeks and applies new knowledge and research findings, demonstrates ability to use problem solving skills, critical analysis and evaluation.

**Phase 5: Dissemination.** The student plans, implements and evaluates the activity for a group under minimal supervision, and shows the ability to teach others. He also demonstrates critical analysis, evaluation and decision-making skills.

*B. Infographics Creation on Experiential Taxonomy*

The infographics of the Experiential Taxonomy created by the investigator is shown in Fig. 2 [11].

*C. Lesson Template Creation on Experiential Taxonomy*

A sample lesson template on the Experiential Taxonomy is constructed on the topic 'Organic Farming' in Science, based on the phases developed. This is attached as APPENDIX.

*D. Implementation of the Frequently Asked Question (FAQ) Generation Session*

A Frequently Asked Question (FAQ) Generation Session was conducted to identify the practical difficulties in the implementation of the existing major educational taxonomies. The session aimed at creating awareness about different educational taxonomies among the student- teachers and to extract maximum genuine doubts in the form of Frequently Asked Questions (FAQs). It was conducted among the student- teachers of Department of Teacher Education, Government College of Teacher Education and Mar Theophilus Training College.


**Fig. 2.** Experiential Taxonomy.

The difficulties identified in the implementation of the Experiential Taxonomy are represented in Fig. 3.

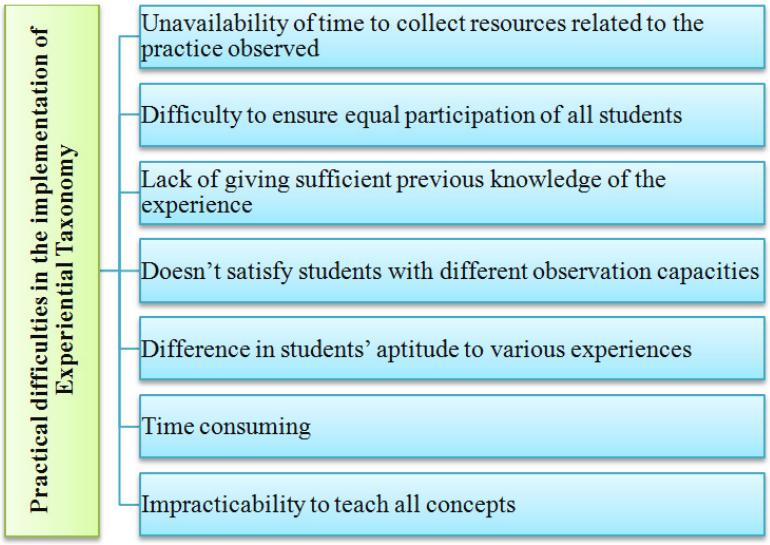


**Fig. 3.** Practical Difficulties in the Implementation of Experiential Taxonomy.

## V. CONCLUSION

The Experiential Taxonomy was chosen as a suitable taxonomic framework for coding the assembled data within the Learner-Teacher Interaction (LTI) research project. It was preferred to other creations such as the cognitive taxonomy by Bloom, the affective taxonomy by Krathwohl, and the psychomotor taxonomy by Harrow, as it is a more unified and broadly based taxonomy, which encompasses the broader human experience. The terms used are described more fully in terms of behaviour and skills that the student will demonstrate in the practical setting. It is important to recognize that students will develop at differing rates and will have unique experiences. Thus, the conception of this taxonomy as 'a functional vehicle for providing the complete classification of human activity from the moment the learner is exposed to the possibility of an experience to its highest level of completion', by Steinaker & Bell becomes appropriate.

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**APPENDIX**

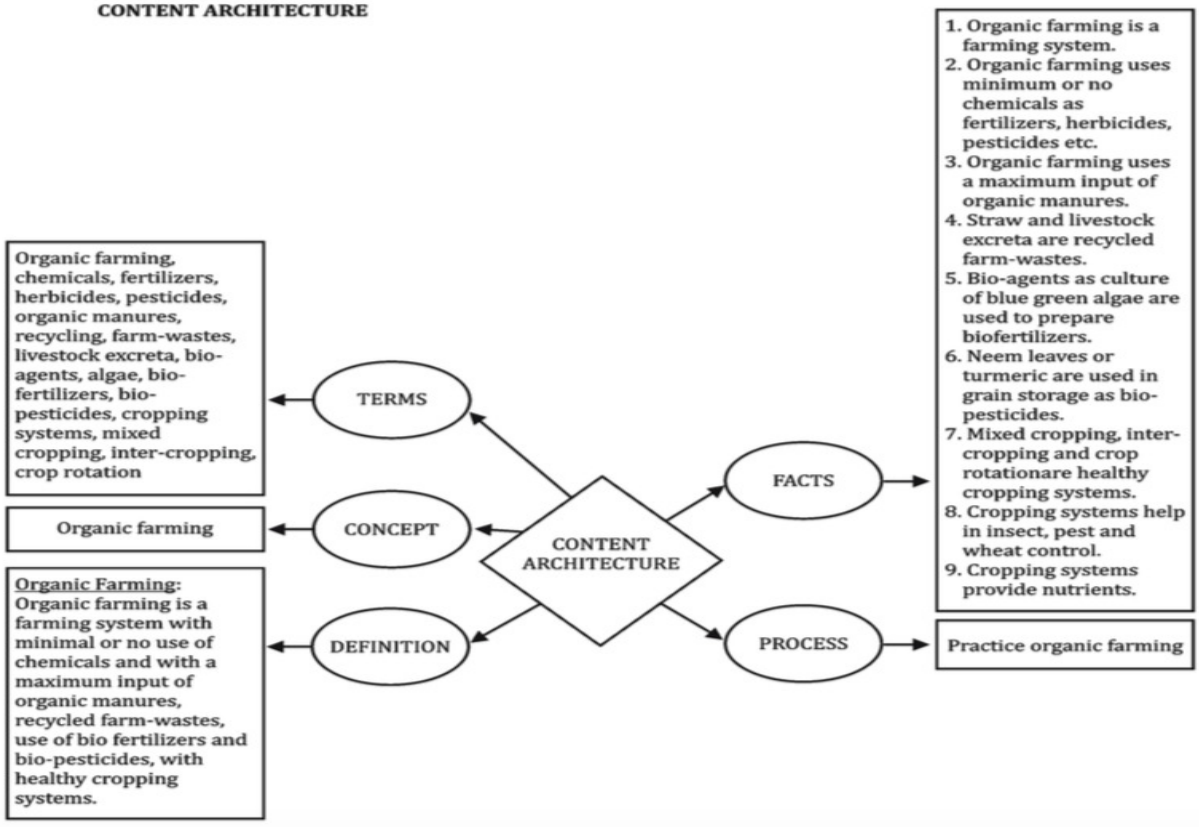
# EXPERIENTIAL TAXONOMY
(1979, Steinaker and Bell)

| | | | |
|---|---|---|---|
| Name of Teacher | : | Name of School | : |
| Subject | : Science | Standard & Division | : IX |
| Unit | : Improvement In Food Resources | Duration | : |
| Subunit | : Organic Farming | Date | : |

**STATEMENT OF CURRICULAR APPROACH**

Through pupil centered, activity oriented, experience based, deep learning approach, the students demonstrate the essential behavior and skills of organic farming in the practical setting.

**CONTENT ARCHITECTURE**



**LEARNING OBJECTIVES**

| Process Skills → / Phases ↓ | Observing | Communicating | Using space/ time relations | Inferring | Predicting | Formulating Hypotheses | Controlling Variables | Interpreting Data | Experimenting |
|---|---|---|---|---|---|---|---|---|---|
| Exposure | ✓ | ✓ | | | | ✓ | | | |
| Participation | ✓ | | ✓ | | | | | | ✓ |
| Identification | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | |
| Internalization | ✓ | | ✓ | | | | ✓ | | ✓ |
| Dissemination | | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | |

(Note: The learning objectives are represented in the form of a grid with the phases of the experiential taxonomy along the vertical axis and scientific process skills along the horizontal axis. The list of the thirteen science processes advocated by the American Association for the Advancement of Science (AAAS) are given in the following reference:
http://my.ilstu.edu/~jdpeter/THE%20SCIENCE%20PROCESSES.htm)

**SUPPORTING RESOURCES**
Video on organic farming, sack, soil, organic vegetable seeds, water, cow dung

**ANTICIPATED VALUE BASE**
The students discover the need and importance of organic food consumption, and their affinity towards organic farming.

**SPECIFIC PROCESS SKILLS TO BE ATTAINED**
Observing, Communicating, Using space/ time relations, Inferring, Predicting, Formulating Hypotheses, Controlling Variables, Interpreting Data, Experimenting.

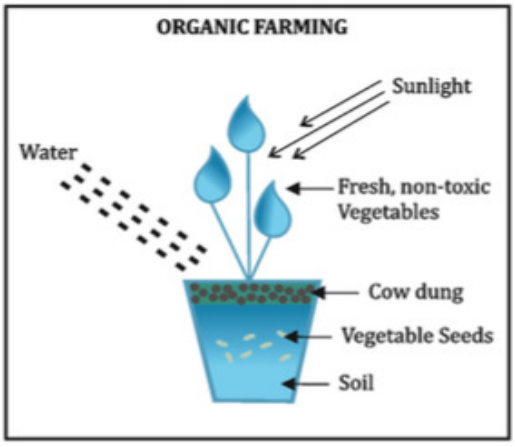
**PUBLIC UNDERSTANDING OF SCIENCE (P.U.S) DOMAIN**
Conscientization activities on the need for eating pure food, highlighting the health consequences of pesticide exposure, could be organized.

**SUGGESTED ARTIFACT TO BE EVOLVED**
Fresh, toxin- free vegetables

**PRE REQUISITES**
The students know about fertilizers, their effects on soil fertility, and the need for using manure for maintaining soil fertility.

| | *Phases Involved and Procedural Details* | *Expected Pupils' Response* |
|---|---|---|
| *Set Induction, Multi-sensory Approach* | ***Phase 1*: Exposure**<br>The teacher discusses with the students on what they already know about the need and importance of organic food consumption. Then he/she shows a video on organic farming, highlighting its various aspects, and asks the students to analyze it. | The students observe the video and recognize organic farming as a farming system with minimal or no use of chemicals and with a maximum input of organic manures. They discover their affinity towards organic farming and reflect on it. |

| | *Phases Involved and Procedural Details* | *Expected Pupils' Response* |
|---|---|---|
| *Co- operative Learning, Multi-sensory Approach, Learning by Direct Experience* | ***Phase 2*: Participation**<br>The teacher divides the students into task groups. After providing the essential resources, he/ she asks the students to practice organic farming, and supervises the activity closely. | The students sow the vegetable seeds in a sack of soil, put cow dung on it and pour water; under the guidance and close supervision of the teacher. |
| *Guided Discovery Learning, Constructivism* | ***Phase 3*: Identification**<br>The teacher asks the students to identify the positive and negative aspects of the experience, and develop ideas to improve and overcome the shortcomings. | The students write down the positive aspects of organic farming as cultivation of fresh, non- toxic vegetables, utilization of natural resources, usage of organic manures and non – usage of chemicals. They note down the negative aspects of organic farming as insect and pest attack, less fertile soil, less productive seeds etc. The students also suggest ideas for improvements as using bio- fertilizers, bio- pesticides and implementing healthy cropping systems. |
| *Learning by Doing, Multi-sensory Approach* | ***Phase 4*: Internalization**<br>The teacher asks the students to apply their improvements to their experience on organic farming and repeat it, with less supervision. | The students repeat the activity with accuracy by using bio- fertilizers, bio-pesticides and implementing healthy cropping systems. |

| | *Phases Involved and Procedural Details* | *Expected Pupils' Response* |
|---|---|---|
| *Correlation, Meaningful Verbal Learning, Multi-sensory Approach, Co- operative Learning* | ***Phase 5*: Dissemination**<br>The teacher asks the students to share their enriched experience on organic farming with others by means of a suitable poster. | The students draw posters in task groups and exhibit the expertise to share the experience and benefits of organic farming with others, with confidence. A sample poster may be as follows:<br>  |

**CLASSROOM EXTENSION**

Compare the use of manure and fertilizers in maintaining soil fertility.