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LOCAL AND GLOBAL PROGRESS AND CHALLENGES**

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Learning practices toward sustainability Conceptual Framework for Blended and active Constructive Learning in the Classroom to Engage Students

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Introduction

Active Constructivism is one of the ways that can be used to design education that will effectively contribute to a sustainable future.

Constructivism is an important learning theory that educators use to help their students learn. Constructivism is based on the idea that learners actively construct or build their knowledge. Learners use their previous knowledge as a foundation and build on it with new things they learn. (Jean Piaget 1973). Educators find different types of Constructivism useful: cognitive Constructivism, Social Constructivism, and Radical Constructivism.

Cognitive Constructivism - focuses on the idea that Learning should be related to the learner's stage of cognitive development (learners' ability to think and reason). These methods

help students learn new information by connecting it to things they already know, enabling them to modify their intelligence to accommodate the new information.

Social Constructivism - focuses on the collaborative nature of Learning. Knowledge develops from how people interact with each other, their culture, and society at large (Lev Vygotsky, 1968)

Radical Constructivism focuses on the idea that learners and the knowledge they construct only help us function in our environment (Glaserfeld 1974).

In education, teachers apply Constructivism in their classrooms to create a unique learning environment for students by creating a collaborative environment where students are actively involved in their Learning. Teachers are more like facilitators of learning.

Blended Learning is another way of teaching and Learning. Blended Learning can help educators cater to the needs of a greater diversity of students, which can help the students be resilient and competitive.

Blended Learning is an instructional methodology, a teaching and Learning approach that combines face-to-face classroom methods with computer-mediated activities to deliver instruction (Bonk and Graham,2006). In other words, blended Learning is a mixed mode of Learning, using both online and in-person learning experiences.

Massive changes have occurred in educational institutions worldwide in the past few years. The recent outbreak of covid 19 has caused a shift in how educators work; even though the changes may be transient, blended Learning will be beneficial.

Integration of Pedagogy

There are several schools where children assess an education that does not guarantee a minimum level of foundation skills. Despite the recommended active constructive approach (NCF, 2005), the teaching method continues on the premise of rote memorization. Most teacher education centers lack opportunities for teachers to upgrade their teaching skills.

Pedagogy is a teaching method that helps improve the overall quality of teaching by making the student more receptive during lessons. It enables the students to get a thorough understanding of the subject. It helps them apply that Learning in their daily lives outside of the classroom, which enhances the student's level of participation during the learning process.

To sustain the learning practices, the Science department at Mukatangan follows a well-structured organizational culture that has evolved to work best with its educational philosophy and learner-centered approach. We in the science department have opted for a blended learning style of teaching and active Constructivism for better student engagement and to achieve the desired learning outcome. It is both a toolkit as well as application-based Learning.

Best Practices of the Science Department

The active constructive approach follows the 5E model, blended Learning, tracking tools, innovative lesson plans, differentiated Learning, assessment tools, problem-based Learning, Feedback, curriculum modification, analogies, games, and EMS devices.

5E Module in The Science Classroom

The 5E Model is based on the constructivist theory of learning developed by Roger Bybee of Biological Science Curriculum Study (1987). The model suggests constructive approaches that can be effectively used in teaching science.

In the classroom, the teacher plays the role of a facilitator, guiding students as they learn new concepts through exploration and asking questions. The 5E represents five stages of a sequence for teaching and Learning: Engage, Explore, Explain, Elaborate, and Evaluate.

Engage - The purpose is to elicit students' prior knowledge, to create interest, to find out about the skills already developed in them and to provide them an opportunity to make connections between what they know and new learnings.

Explore - Students actively explore the new concept through observation and questioning.
Explain - To support students in developing scientific explanations drawn from observations. It helps them to gain new knowledge by asking questions for further clarification and sharing and demonstrating their understanding of what they learned before the teacher gives complex concept information in detail.

Elaborate - The elaboration phase gives opportunities to students to apply what they've learned and helps them to develop a deeper understanding of the new concept.

Evaluate - Provides an opportunity for students to review and reflect on their Learning, understanding, and skills.

Based on the above approach, science teachers make creative lesson plans for each topic. They introduce the lesson by planning an activity or a story related to the topic students will learn and engage in. The outcome is that students develop curiosity and become eager to find the answer.

Blended Learning

The science department has opted for blended Learning in 2019, which is face-to-face Learning in the classroom based on the active constructive approach. The Learning continues on the Google platform. The Google Classroom is available for every standard from grades 3 -10. The entire day's teaching, instructions, and activities along with videos, podcasts, reading material for each chapter are uploaded in the Google Classrooms by teachers, which is accessible to students and helps them study at home at their own pace. Google Classroom is also used to post quizzes and assignments.

Inclusive Classroom

This unique classroom setup is designed so that students of all levels, types, and abilities are in one classroom learning together. There are three separate groups, 15 -16 students per group

with a teacher. The groups are based on their competency levels. Each group of students receives tailored instruction from their teachers to meet their needs, with three different science teachers in the classroom with additional lesson plans relevant to the needs of diverse learners in their groups. This setup helps students to focus and participate at their learning levels. Every classroom has three television sets to show concept videos, slides for explanation, or classroom assignments or questions, which helps teachers focus on other efforts.

Problem-based Learning

As part of the integrated pedagogical approach, the department has collaborated with Renascence Education in their program called 'City as Lab' program to facilitate problem-based Learning by providing opportunities for students to think of a problem affecting their community, surroundings, and the city. This program involved grooming

students to conduct detailed research and submit their study outcomes as a research paper. The results were encouraging; students were engaged, and some were selected to present their research work before the panel of experts from Renascence.

Assessment

Assessment is an umbrella term that incorporates standardized tests and many other evaluation forms. It refers to a wide range of methods educators use to assess learners at different levels of Learning. It is an integral part of instruction. It tells whether or not the objectives and Learning outcomes are achieved. (Neha Joshi, 2020)

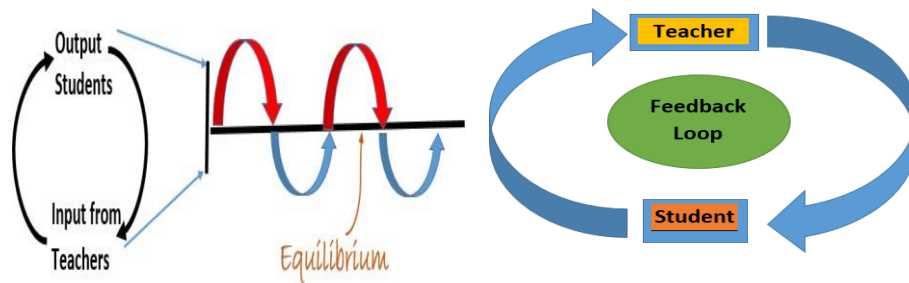
Assessment at all grades is done through formative and summative tests. The summative scores reflect the performance of the students tested through a written paper as mandated by the education board. One could interpret this as a test of the student's ability to transfer the cumulative knowledge of the concepts introduced for that grade on the test day. On the other hand, formatives are a form of continuous assessment and assess the student's ability to apply their Learning, express their creativity, and provide collaborative and peer-learning opportunities.

Our department focuses more on formative assessments as our goal is to monitor student learning to provide ongoing Feedback that can be used by our teachers to improve their teaching and by students to improve their Learning. Types of formative assessment used by our science department are - Google quizzes, open-book assessments, classroom discussions, and projects. The sum of the productive and summative scores is used to assign performance grades at the end of each semester and academic year, which helps the students to get motivated to learn and increases their participation.

Feedback

According to John Hattie and Helen Timperley (2007), Feedback is one of the most potent influences on Learning. It plays a significant role in student engagement. Feedback acts as a two-way street - it is both giving and receiving Feedback from teachers to students and from students to teachers, thus forming a feedback loop. The role of teachers in the loop is to plan for responsive teaching, and the role of students in the circle is to fill in the learning gap by

implementing specific suggestions and strategies the teacher gives, which is 'transformative Learning. Feedback raises the performance bar of the student.



Muktangan and the science department believe in Feedback as the most powerful tool that has enhanced student engagement. Our teachers are focusing on both task levels and process level feedback, which is helping the students to understand better. Based on the Feedback, Teachers are also reflecting on their teaching and are continuously making changes in their teaching strategies and lesson planning.

Student Tracking

Some students who fall behind in understanding may not feel motivated to keep up with their peers. The tracking tool gives opportunities to students for healthy competition that helps them to be better prepared for their future careers and other endeavors. The science department tracking tool is a prime example of our successful practices. It is designed to cater to students of all levels, with separate versions for grades 1-4, 5-8, and 9-10. Each version covers different domains, while some domains are shared across grades 5-10. The tool comprises elements representing 8-10 core skill domains across four levels (Levels 1-4) that reflect developmental

milestones in science. The tool has provisions to assess students as they progress from grade five to eight. Identifying each student's level allows teachers to personalize their approach and adjust their teaching strategies to help students advance from L1 to L2.

The core domains of std 1-4 are - exploring, inquisitiveness/curiosity, comparing and connecting, predicting, designing and making, recording and understanding data results, and participation, explaining, recording, and interpreting data.

The core domains of std 5-8 are - making observations asking questions; recording and interpreting data; understanding instructions; collaborating, correlating activity to the concept; planning an investigation, gathering and representing data, experimenting, reading and writing scientific vocabulary.

The core domains of std 9-10 are - developing an interest in science, critical thinking, memorization, questioning, and ideas; scientific attitude - Curiosity, responsibilities, creativity, numeracy, problem-solving, understanding problems, reasoning.

Curriculum Modification (from std 1-8)

The goal of developing a science curriculum is to help students develop basic scientific ideas, knowledge, and understanding of the biological and physical aspects of the world.

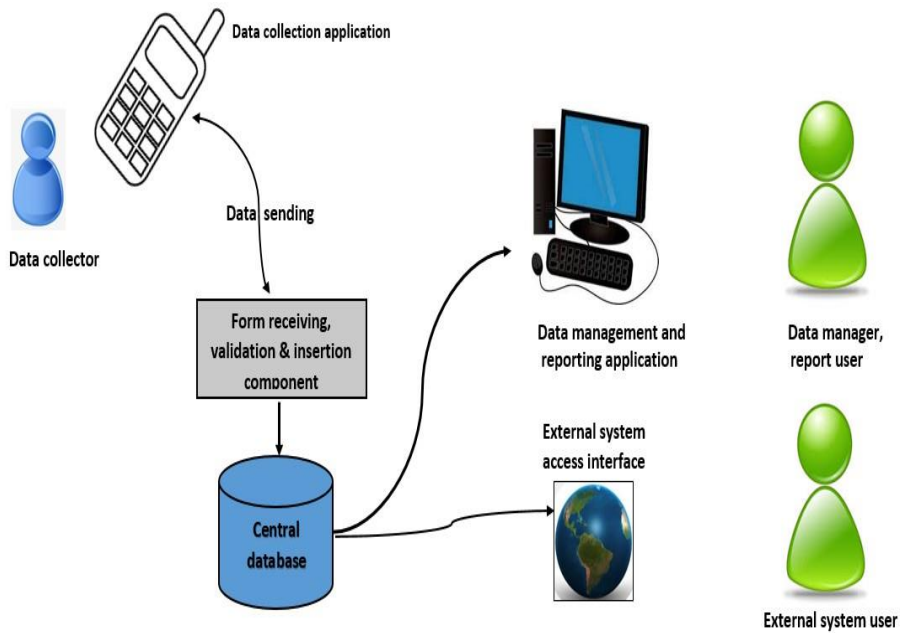
Our organization follows the SSC board curriculum. A concrete foundation must be built at the primary level to successfully transition from primary to secondary school and cope with

the secondary-level syllabus. Keeping the std 9 and 10 syllabi in mind, the science department has modified the syllabus for std 1 to std 8, taking it spirally up, developing the pedagogical skills, and giving them the basics that are required to understand the higher concepts that are more structured and to learn the portions that the state board has designed for secondary classes and will eventually help them to cope with the high school science curriculum. Modifying the syllabus has made a visible difference in our students, who are more interested in Learning. Students of std 3 and 9 have started coming forward and readily accepting challenges, participating in competitive exams like Science Olympiad exams, Homi Bhabha Balvaidnyanik competitions. Our students are performing well; some have been rewarded with bronze medals and reached the next level of competition. Our teachers have seen an overall attitude change in the students. They are taking more interest, asking questions, and attempting the questions in the examinations they are skipping.

Education Management System (EMS)

EMS is a software system, a centralized tool that provides a platform to collect, process, integrate, and manage data and information, monitoring, and management at all levels of an education system." Our objective is to have a repository of digital content for grades five up to ten, uploaded, and fully functional kiosks. Users have simplified access to the information needed to boost their work efficiency.

Since EMS allows for offline synchronization, the videos can be accessed without the need for an active internet connection.



It has been observed that the use of digital resources in a blended platform results in an improvement in a child's cognitive abilities. Digital Learning allows teachers to prepare versatile lesson plans, blending games and other audio-visual effects. The system will enable students to study independently and pace beyond classroom hours in our next stage.

The digital resources made by the science department faculty include lesson plans with formative & summative questions, videos, podcasts, reading materials, and essential key terms slides of each concept. In addition, teachers utilize technology such as iPads and televisions to supplement classroom instruction. For students, the entire classroom learning is on the Google platform. All materials like task sheets, assignments, key terms, and reading material for additional understanding and knowledge have been uploaded on Google Classroom, so students have access to all the required digital learning resources, giving them self-paced learning options and the chance to make up for missing assignments. Even the absent student can keep track of

what is being taught in the classroom and assignments along with the submission date. Students and teachers benefit by adopting this systematic and effective method of instruction and enjoy the leeway in developing lessons.

Developing 21st-century Skills

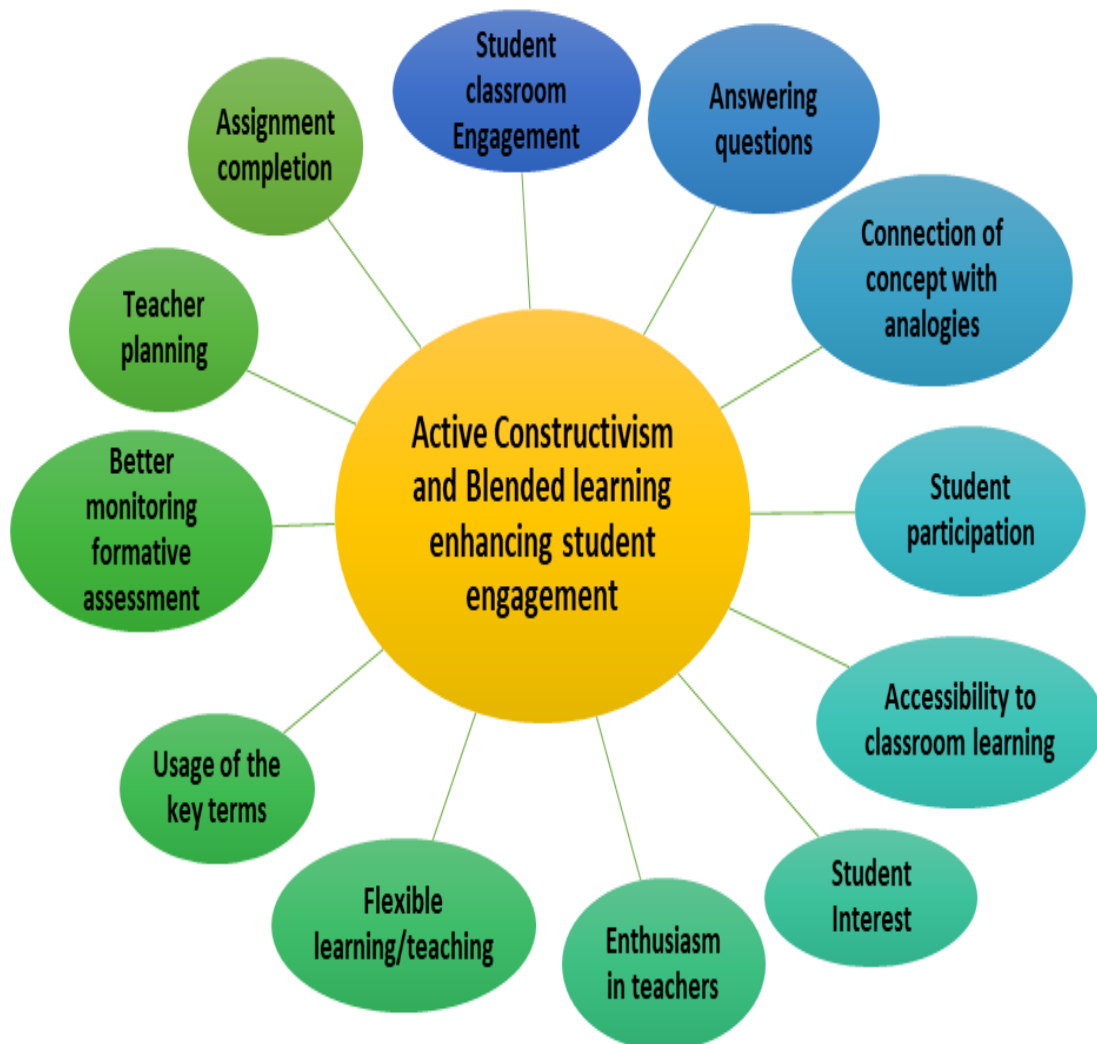
Since the department also focuses on building 21st-century skills. They learn critical thinking, problem-solving, communication, collaboration, creativity, and digital literacy skills. These skills are very important for students' academic development as they will help them face future challenges. They will be able to succeed in today's globalized and fast-changing world.

Based on the 5E approach of active Constructivism, the teachers plan their lessons creatively, selecting appropriate teaching resources and activities that help the students develop these skills.

Conclusion

Our methodology has taken us toward sustainability as it equips students with skills, capacity, and motivation. As blended Learning was introduced along with active Constructivism in 2019, the final exam results in science, even though they have not yet reached the expected level in the developmental milestone, have shown sturdy progress in each core skill domain in all grades. Students' curiosity to explore new things, willingness to participate, ask questions, and on-time assignment completion have increased. Also, science vocabulary has improved, and students now can access a broader range of digital resources to help them learn. For teachers, the

effects of blended Learning can be seen in better lesson planning and organization, more efficiency, and access to a broader range of teaching resources.



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