UNIVERSITY OF DAR ES SALAAM

DAR ES SALAAM UNIVERSITY COLLEGE OF EDUCATION

FACULTY OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY AND CURRICULUM STUDIES

SECONDARY EDUCATION SCIENCE AND MATHEMATICS METHODS

(CT108)

SEMINAR LEADER: MS. MBOWE, I.

SEMINAR DAY: THURSDAY

SEMINAR HOURS: 13:00-14:00

SEMINAR VENUE: NTH B

GROUP NO 13

PRESENTERS

No	NAMES	REG NO	PROGRAMME	SIGN
01	LYIMO, DIANA PATRICE	2022-04-05437	BSCE	
02	RAMADHANI JUMA H,	2022-04-11300	BSCE	
03	MOHAMED I MOHAMED	2022-04-08031	BSCE	
04	MFAUME R. MBONIA	2022-04-06953	BSCE	
05	ATHANASIUS GODFREY NJITA	2022-04-10421	BSCE	
06	BARAKA LOIN TUKAY	2022-04-13074	BSCE	
07	GREGORY EDIGAI NICODEMU	2022-04-02159	BSCE	
08	JESTINA ALBERT MLOWE	2022-04-07856	BSCE	
09	SALOME .Y.DUNIA	2022-04-01643	BSCE	
10	HAPPY M DUNIA	2022-04-01641	BSCE	

Question 13: Teaching science involves both theoretical and practical most teachers feel tired when it comes to the preparation of practical session; with examples of any subtopic show would design and teach practical session

According to (Gage,1963), Teaching is a form of interpersonal influence aimed at changing the behavior potential of another person. (Ormrod,2016) defines teaching as the process of facilitating learning by engaging students in acquiring knowledge, skills, values, and attitude through various instruction and guidance.

Teaching is a dynamic process that involves both theory and practical application to effectively impart knowledge and skills to learners. The combination of theoretical principles and practical experiences creates a comprehensive learning environment, allowing students to grasp concepts intellectually and apply them in real-world situations. This essay explores the significance of incorporating both theory and practical elements in teaching, highlighting the benefits it offers to both educators and learners. (John Dewey, 1916), a renowned educational philosopher, once said, "Education is not preparation for life; education is life itself." Dewey's words emphasize the importance of education as an active and immersive experience that goes beyond the mere transmission of information. In line with this perspective, integrating theory and practical components in teaching ensures that students not only gain theoretical knowledge but also develop essential skills and competencies necessary for their personal and professional growth.

Theoretical instruction forms the foundation of learning, providing students with the necessary conceptual framework to understand complex ideas. Theoretical knowledge equips learners with the fundamental principles, theories, and models that underpin various subjects and disciplines. It helps them develop critical thinking skills, analytical reasoning, and the ability to synthesize information. However, theoretical knowledge alone can be limited in its application if not complemented by practical experiences. **Practical application** bridges the gap between theory and real-world scenarios, enabling students to apply what they have learned in practical settings. Through hands-on activities, experiments, simulations, and fieldwork, learners gain valuable experiential learning opportunities. They can explore concepts in a tangible way, engage with real-life challenges, and develop problem-solving skills. Practical experiences also foster creativity, collaboration, and adaptability, as students learn to navigate and adapt to different situations. The integration of theory and practical elements in teaching provides a holistic learning experience that caters to diverse learning styles and preferences. It acknowledges that individuals have varying aptitudes and strengths and that a balanced approach can accommodate

different learning needs. By combining theory and practical application, educators can create a dynamic and engaging learning environment that promotes deeper understanding, retention, and application of knowledge. So the following are the ways how to design and teach practical sessions, starting with designing.

By starting with Communicating the intended objectives is an important principle in designing effective laboratory activities because it helps to ensure that students understand what they are supposed to learn from the activity. When objectives are clearly communicated, students are more likely to be engaged and motivated in the activity, and they are more likely to be able to perform the necessary tasks and understand the concepts being taught. communicating intended objectives helps to promote student understanding, engagement, and learning, as well as support effective assessment and evaluation of laboratory activities. One source that discusses the importance of communicating intended objectives as a principle for effective laboratory activity design is the book "Designing Effective Science Instruction" by Anne Tweed and Keith (Sturges,2005). In the chapter on laboratory investigations, the authors state that "clearly stating the objectives of each investigation can guide students' inquiry and help them stay focused on appropriate scientific objectives"

Sequencing the practical works into the flow of instructions" refers to the principle of integrating laboratory activities with other instructional components such as lectures, readings, and discussions. This principle emphasizes the importance of sequenced instruction that leads students through a coherent and meaningful learning experience. This is an important principle for effective laboratory activity design because it helps to ensure that students have the necessary knowledge and skills to be successful in the laboratory and that laboratory activities build on prior learning and prepare students for future learning. By sequencing laboratory activities into the flow of instruction, instructors can connect abstract or theoretical information with concrete examples and hands-on experiences. This connection helps students see the relevance of the laboratory activity and motivates them to engage with the materials. Sequenced instruction also helps students retain more information because they are able to connect new material with existing knowledge. Instructors can sequence laboratory activities into the flow of instruction by Introducing concepts and ideas that will be explored in the laboratory before the laboratory

session begins, Providing students with clear instructions and expectations for the laboratory activities, and offering opportunities for feedback (National Research Council, 2012)

Integrating concepts and processes, it is important to integrate concepts and processes to ensure that students have a comprehensive understanding of the subject matter. According to the National Research Council (2000)," Students need to understand both the concepts and the processes of science in order to be scientifically literate". To integrate concepts and processes in practical sessions, instructors can design activities that require students to apply their understanding of both. For example, in Chemistry in preparation of a standard solution before conducting practical activities instructor should be able to teach different methods and formulas theoretically used in the preparation of a standard solution like the dilution formula.

Reflecting laboratory with real will situations is an important aspect of learning and should be considered when designing practical sessions. According to (Moon,2004), "reflection is a form of mental processing that we use to fulfill a purpose or achieve some anticipated outcome". It can help the student to consolidate their learning, identify areas where they need further development and improve their performance in future sessions. There are different ways to incorporate reflection into practical sessions such as encouraging peer feedback, using reflection as part of the assessment, providing time for reflection, and using prompts.

And that's how you can design laboratory activities, below is how can a teacher teach a practical session

Providing pre-laboratory discussion, it is important for a teacher to provide pre-laboratory discussion to the students before they engage in practical experiments, this preparation can include providing a detailed introduction which means giving students an overview of the experiments they conduct and their importance in a real-world application, explaining the theory behind the experiments discuss safety measures. (Khan and Ismail 2019), also, it involves giving them guide sheets, manuals workbooks, it must consider the problems and the objectives of the work as well as the plan of work to be carried out

Demonstrating clear procedures on how to do an experiment, when teaching laboratory work, the procedure explanation serves as a vital guide for students to navigate the practical

aspects of the experiment. Starting with an overview of the procedure, educators provide students with a clear understanding of the objectives, the scientific concepts involved, and the relevance of the experiment. This overview helps students see the connection between theory and practice, establishing a solid foundation for their learning. In a laboratory context, visual aids such as diagrams, models, or actual demonstrations play a crucial role in enhancing the explanation of procedures. Visual representations enable students to visualize the setup, the equipment arrangement, and the desired results. For instance, a diagram illustrating the apparatus and the flow of chemicals in a chemistry experiment can help students grasp the spatial relationships and the intended chemical reactions. Visual aids make the procedure more tangible and support students' comprehension of the underlying principles (Roth, W.M., & Roychoudhury, A.,1994)

Encourage Analysis and Reflection, After the experiment, facilitate a discussion or debriefing session where students can share their observations, measurements, and findings. Encourage them to analyze the data, identify trends or patterns, and draw conclusions based on their results. Discuss the limitations of the experiment and potential areas for improvement.

Assessing and providing feedback, Evaluating the student performance based on their lab reports, data analysis, and participation. The teacher should provide constructive feedback to help them improve their skills and understanding, also the teacher should encourage the student to ask questions or seek further clarification if needed, “Assessing student learning in science laboratory” Article by E.J Marbach-ad and J.LMcGinni

CONCLUSION

Generally, combination of theory and practical elements in teaching is essential for a comprehensive and effective educational experience. Integrating theoretical concepts with practical application enables students to develop a solid foundation of knowledge while equipping them with the skills and competencies necessary for real-world situations. As we delve deeper into this essay, we will explore specific strategies and examples of how theory and practical elements can be successfully integrated in different educational settings, demonstrating the benefits for both educators and learners. The preparation of practical session a teacher should establish the aim and intended learning outcomes for the session and link them to the wider program of learning. The preparation of practical session involves the following plan, organize materials, plan presentation and evaluation focus on learning. But most of teacher feels tired when comes to the preparation of practical session due to the following factors, Large number of students, inadequate of laboratory apparatus, chemicals and specimen

REFERENCES

Dewey, J. (1916). Democracy and education: An introduction to the philosophy of education. Macmillan.

Roth, W.-M., & Roychoudhury, A. (1994). Physics laboratory classes: Learning goals and tools for concept development. Journal of Research in Science Teaching, 31(9), 1057-1072.

Ormrod J.E (2016) Essentials of education psychology, Big ideas to guide effective teaching , 4th ed

Tweed, A., & Sturges, K. (2005). Designing effective science instruction: What works in science classrooms. Prentice Hall.

National Research Council. (2012). A framework for K-12 science education: Practices, crosscutting concepts, and core ideas. The National Academies Press.