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Application of Technology Integration Matrix (TIM) in teaching and learning of Secondary School Science subjects

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Abstract: This article introduces the Technology Integration Matrix (TIM) and its tools. It emphasizes the need to use the TIM in secondary level for teaching and learning Science subjects and reflects upon the implementation of TIM in conjunction with the TIM tools, by science teachers which helps them to integrate technology into lessons and additionally acts as a lesson planning tool and an evaluation tool. There exists a difference between traditional physics teaching and learning by incorporating technology at hand and application of TIM in teaching and learning Physics. Through this article, I intend to spread out the importance of using TIM in secondary school level for teaching and learning physics in the Indian sub-continent.

Keywords: Technology Integration Matrix (TIM), Professional learning, Technology Integration, Descriptors

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I. INTRODUCTION

With the digital era believed to be at its peak of our present society, the constructivists' only concern is to inculcate the use of technology among the teachers of secondary school level in teaching and learning physics. Despite global advancement in the span and availability of technology, schools rarely maintain the same momentum in access to equipment, educator professional development, and on-site educational support (Lee & Spires, 2009; Ritzhaupt, Dawson & Cavanaugh, 2012). With continued efforts of people at the Florida Centre for Instructional Technology (FCIT) the Technology Integration Matrix (TIM) was developed. According to the FCIT, the answer to what is 'Technology Integration Matrix' is something as follows:

The Technology Integration Matrix (TIM) provides a framework for describing and targeting the use of technology to enhance learning. The TIM incorporates five interdependent characteristics of meaningful learning environments: active, collaborative, constructive, authentic, and goal-directed. These characteristics are associated with five levels of technology integration: entry, adoption, adaptation, infusion, and transformation. Together, the five characteristics of meaningful learning environments and five levels of technology integration create a matrix of 25 cells. Developed by the Florida Center for Instructional Technology (FCIT), the TIM is in its second version.

The Technology Integration Matrix (TIM) was developed to ease the evaluation process of the technology integration in the classroom which is basically a very complex task to rather rate or judge a teacher's performance. TIM is, therefore, free of cost but the TIM tool is a paid application provided to the schools/districts upon yearly subscriptions. The TIM is a package that comprises of three Primary Tools which are as follows:

a) TUPS (Technology Uses and Perceptions Survey) which is a survey tool.
b) TIM-O is an observation tool.
c) ARTI is an action research tool.

The observation tool (TIM-O) consists of two versions: A lesson plan tool (TIM-LP) and a reflection tool (TIM-R).

II. THE USAGE OF TIM.

Today's students are being prepared for a future, rich in technology and requiring 21st -century learning skills (Newbill & Baum, 2013; Ritzhaupt et al., 2012). The student should be exposed to the new technology and gadgets which make learning more meaningful. Much of this depends on the stakeholders for providing the available resources in the classroom and the level of depth, the teacher wishes to engage with the students. Sheingold (1990) said, integrating technology in the classroom is not about teaching students to operate computers, but integrating technology is about helping teachers to use technology as a tool for learning. For effective use of technology integration, the coordinator and the teacher should be able to assess the present level

of the technology integration in their classrooms by keeping the 25 cell matrix of the TIM as a reference point and easily select a future professional learning goal. The teacher generally set these goals on the technology integration in the classroom.

There are some major shifts which can be seen clearly in the attitude of both teachers and students in the classroom when using Technology Integration Matrix (TIM).The students and the teacher trace their way on the continuum of technology integration from Entry level, Adoption level and all the way up to Transformation level in terms of some key improvements which are as follows:

1. Teacher-centered classroom to Student-centered classroom-The entry-level lessons are teacher-centric and as the level moves up to the transformation-level, it becomes more of student-centric where the students adopt new information, infuse it to select their choices and make decisions. Thus making the transformation level more of a student-centric. The students are let free to create their own versions of the solution in the form of videos, websites, audio, podcast etc.
2. Procedural understanding to conceptual understanding- This can be thought of as the blooms taxonomy where the students use their higher order thinking skills. At the entry level, the students simply understand the content at a very basic level, but the students will develop higher order thinking skills and will be able to apply their knowledge in new situations.
3. The conventional use of technology tools to complex use of technology tools-At the entry level, the teacher has the control on the technological resources accessed by the students, but at the transformation level, the student chooses the type of technology tool he wishes to. Students have an opportunity to connect to the outside world digitally.

III. TRADITIONAL PHYSICS CLASS WITH TECHNOLOGY VERSUS TIM ENABLED PHYSICS CLASS

We can clearly bring out the differences in the approach of doing a science lab activity (viz. to find the acceleration of a freely falling body) in a traditional classroom using technology at hand and a TIM enabled classroom. The TIM classroom extensively uses the electronic tools and software or Science based apps that have been verified by the panel of experts. The decision is made by seeing the present level of the technology integration and the level of the learning environment of the classroom.

In the traditional class, the students work in a lab having a very general setup and make use of the technology, depending on its availability. The students use a stopwatch to measure the time of a freely falling body. They calculate the velocity of an object and find the acceleration. Basically, the students have a very limited access to the technology tools in the class. The students augment their skills by using any available technology provided to them by the school.

In the TIM enabled Science class, it is, a one to one technology use, combined with the effective pedagogy used by the teacher. The students use their iPads to receive instructions from the teacher. The students calculate the velocity by using a physics app called as Video Physics (https://www.vernier.com/products/software/video-physics).To calculate the velocity, the students will take a live video of an object which is falling freely from a height and calibrate the reference height digitally to obtain the actual velocity of the falling object in 2 dimensions. The app also generates real-time graphs of position and velocity as a function of time. Now, the students calculate the acceleration and its magnitude using software called as Trig Pro. This boosts up the factor of experiential learning and helps them to move up the ladder of TIM. Technology Integration Matrix (TIM) is prepared before the class to decide, where to integrate technology and how to integrate technology. As a method of teaching, Technology Integration Matrix (TIM) takes an upper hand over traditional physics class using technology at hand.

III. REVIEW OF RELATED LITERATURE

Review of Literature makes the researcher aware of the current knowledge of the area in which he/she is going to conduct his /her research. It serves as a guide to the researcher with respect to some specific purposes. Such as to define, the limits of his problem, add knowledge in a meaningful way, from the positive findings, to understand the research methodology and recommendations of previous researchers for further research (Ridley Diana 2008)

Zucker, A., & Hug, S. (2008) conducted their study on the effective usage of technology tools in schools such as laptops, interactive digital textbook, internet-based simulations, digital drop box, graphic calculators and other physics related software and video cameras to define a goal, collaborate to form a scientific inquiry and to be able to deduce a hypothesis or a solution. Students visualize and represent scientific phenomena with words, graphs, and images, and learn scientific reasoning. The researchers administered the survey both qualitatively and quantitatively to the teachers and students and also conducted interviews at several stages to find the use of technology in physics classroom of 9thand 12^{th} grade (Senior-secondary school level) According to the data obtained, the study shows that the physics teachers effectively incorporated a variety of technology tools in teaching and learning physics.

Welsh, J. L., Harmes, J. C., & Winkelman, R. (2011) have brought out the importance of Technology Integration Matrix (TIM) which helps in guiding the teachers, administrators and other stakeholders to effectively integrate technology in a school irrespective of the school's location. The researchers have brought out in the document few technology tips on using TIM and the TIM tools, for a new teacher who is having issues in understanding and implementing the technology integration. According to them, each cell of the matrix has short videos and a detailed lesson plan on different subjects which will guide the teacher to set professional learning goals. Evaluating the use of technology within a given lesson is a complex task. TIM defines descriptors for student activity, teacher activity, and the setting for each level of technology integration (James Welsh, 2011).They have also shown the contrast between the entry-level descriptors and the transformation level which form as a continuum of technology integration in a classroom with respect to the teacher, student and the type of arrangement provided to the students as a classroom setup.

Liu, F., Ritzhaupt, A. D., Dawson, K., & Barron, A. E. (2017) came out with a study on Explaining technology integration in K-12 classrooms: A multilevel path analysis model, where they had used TIM and the TIM tools in designing a model of a multilevel path analysis and to test it in the K-12 schools. The designed multilevel path analysis model focused on the confidence and the comfort level of the teachers who use technology in their classrooms in Florida. The researchers tried to answer questions:

- Do factors such as age, gender, educational qualification, teaching experience influence the confidence or comfort of a teacher using technology in a classroom?
- Do factors such as grade levels or the number of students in a classroom influence teacher's use of technology in a classroom?

The teachers were administered using a standard 5 point Likert scale for data collection. A total of 1235, K-12 teachers participated in the study. The findings of the study revealed that, teacher's experience, qualification, school technology support and access to the technology had influence on the confidence or comfort of a teacher using technology in a classroom, whereas, the teachers having number of years of experience had no influence on the confidence or comfort of a teacher using technology in a classroom.

IV. CONCLUSION

Technology Integration Matrix (TIM) can be used in conjunction with the TIM tools in any school with basic technology tools or a school equipped with a state of art facility as it has a continuum of technology integration levels such as entry, adoption, adaptation, infusion, and transformation. According to the level of the school, technology integration can be implemented by the teachers and administrator so as to have a common language to determine a professional learning need. TIM can be used to measure growth in all areas, as we know that evaluating technology is a complex task.TIM brings out the students creativity to arrive at the results of a given problem. At the transformation level, the students are given the choice of using technology which aids them to identify their goals, plan a hypothesis, monitor their progress and finally reflect upon their results.

REFERENCES

[1]. Technology Integration Matrix. (n.d.). Retrieved December 04, 2017, from https://fcit.usf.edu/matrix/
[2]. Zucker, A., & Hug, S. (2008). Teaching and Learning Physics in a 1:1 Laptop School. Journal of Science Education and Technology, 17(6), 586-594. Retrieved from http://www.jstor.org/stable/41219454
[3]. Persin, R. (2002). Web-Assisted Instruction in Physics: An Enhancement to Block Scheduling. *American Secondary Education*, *30*(3), 61-69. Retrieved from http://www.jstor.org/stable/41064462
[4]. Resnick, R. M. (2011). School market size, growth and the shift to digital resources in K-12 classrooms. *Publishing Research Quarterly*, *27*(2), 169-177. doi:http://dx.doi.org/10.1007/s12109-011-9209-4
[5]. Liu, F., Ritzhaupt, A. D., Dawson, K., & Barron, A. E. (2017). Explaining technology integration in K-12 classrooms: A multilevel path analysis model. *Educational Technology, Research, and Development*, *65*(4), 795-813. doi:http://dx.doi.org/10.1007/s11423-016-9487-9
[6]. Welsh, J. L., Harmes, J. C., & Winkelman, R. (2011). Tech tips: Florida's Technology Integration Matrix. *Principal Leadership*, *12*(2), 69-71.Retrieved from https://fcit.usf.edu/matrix/research/
[7]. Sheingold, K. (1990). Restructuring for learning with technology. The potential for synergy. In K. Sheingold & M. Tacher (Eds.), Restructuring for learning with technology (pp. 9-27). New York: Center for Technology in Education.

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