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**ABSTRACT**

One-Minute Paper, muddiest point, and exit ticket are formative evaluation techniques. One-Minute paper is used at the end of the lecture/lesson to check which concept is best understood by the students while the muddiest point is used to see which concept is not clear to the students at the end of the lecture/lesson. Exit ticket involves discussion and answering of questions from the explained lecture. The present study was conducted by the secondary school teachers (SST) of district Rawalpindi to evaluate the knowledge of SST about these methods and their utilization in daily classroom teaching. This paper presents a quantitative study where we surveyed 500 teachers using open-ended questionnaires and semi-structured interviews. The analysis of data shows that more than 290 (58% ) teachers were aware of these formative evaluation methods. But among these 290 only 57% of teachers used these methods in their classes. Also, those teachers who had completed their B.Ed. claimed that they had not studied these methods during their B.Ed. course. Based on the analysis of data, it is recommended that teachers' training courses should be updated and refresher courses should be arranged to train teachers to use new and innovative formative evaluation methods in their classes.

**KEYWORDS:** One-Minute Paper; Muddiest Point; Exit Ticket; Secondary School Teachers (SST)

## 1. INTRODUCTION

Formative assessment is used to check the progress of the students during the teaching-learning process. Different authors have defined the purpose of formative assessment differently. Formative assessment refers to assessment that is specifically intended to generate feedback on performance to improve and accelerate learning (Sadler, 1998). Black and Wiliam (1998b) define assessment broadly to include all activities that teachers and students undertake to get information that can be used diagnostically to alter teaching and learning. When teachers know how students are progressing and where they are having trouble they can use this information to improve them by applying different strategies and methods (Carol, 2002).

As formative assessment is carried out by using different strategies some strategies are one-minute paper, muddiest point, exit tickets, paper-pencil test, questioning with the students, etc. One-Minute paper is the technique in which near the end of the class or lecture teacher asks the students to write about the topic or concept which is best understood by them (Martin, 1999). While the muddiest point technique is just the opposite to it. Here at the end of the lecture teacher asks the students to write about the topic or concept which is not clear to the students from that day's lecture (Martin, 1999). Exit ticket or ticket to leave includes students answering, in writing, one to five questions concerning the important concepts that were discussed during class. Usually completed at the end of class, the ticket is provided to the instructor before a student can leave the classroom or move to another subject (Divoll & Browning, 2010).

These formative assessment strategies are very useful in clarifying concepts of different subjects. The characteristics of the one-minute paper would seem to make it a useful learning tool for instructors and students across a wide range of disciplines. Also, a one-minute paper sometimes called minute paper provides instant and detailed feedback for the class and their teacher (Stead, 2005). It is also a very effective mechanism for improving communication between teachers and students. Harwood et al. taught a large class consists of 250 students of general chemistry for science and engineering majors and found it very useful in clarifying chemistry concepts (Harwood, 1996). The Muddiest point helps to improve the learning of students (Simpson-Beck, 2011). Student's recall ability increased after applying the exit ticket strategy (Divoll & Browning, 2010).

These formative evaluation strategies are very useful in improving the students' achievement, improving communication between teacher and students, providing instant feedback, helpful in improving students' concepts in science. Thus the main purpose of the present research is three folded.

Firstly, the research work is related to evaluate the teachers' knowledge about these useful formative evaluation strategies. Secondly, the researcher also evaluated that what was the source of knowledge for teachers about these formative evaluation methods and tried to evaluate these methods which were studied by the teachers during their B.Ed. or any other teaching courses. Thirdly, the researcher evaluated that among these three formative evaluation methods the most preferable method used and the reasons behind the use of any particular method. Also, in the case of not using any of the above-mentioned methods what are the impediments due to which teachers are not using them. For that purpose, a survey was conducted of 500 secondary school teachers.

Open-ended questionnaires and semi-structured interviews were taken from 300 secondary school teachers. Specified subjects were mathematics and science. Science

was further divided into physics, chemistry, and biology. The reason behind the selection of these three formative evaluation methods was that these three strategies are good for the lecture method that is mostly used by the teachers at the secondary level. The motivation of the selection of SST teachers was that these strategies were applied in most of the researches at high school or the university level.

### ***Objectives Of The Study***

The objectives of the study are as followed.

1. To know about the knowledge of secondary school teachers about formative assessment techniques One-Minute Paper, Muddiest Point, and Exit Ticket.
2. To evaluate which formative assessment method is frequently used by the teachers at the secondary level.
3. To understand the perception of teachers about these formative evaluation strategies in the class.

### ***Research Questions***

Following are the research questions

- Do secondary school teachers know about the formative assessment methods including One-Minute Paper, Muddiest Point, and Exit Ticket?
- Do SST teachers study the use of any of the above formative evaluation strategies during their teacher training course?
- Are SST teachers using these methods in their classes during daily classroom teaching?
- If teachers were not using these strategies in their daily class teaching what are the obstacles in the use of these strategies?
- If teachers are using any of the above-mentioned strategies what is their opinion about these strategies.

### ***Significant Of The Study***

Formative assessment is like a backbone in the educational process. Through formative evaluation teachers not only timely understand the weaknesses of their students but also deficiencies in their teaching methods. In Pakistan, till grade 8 students study science but when students entered grade 9 science is divided into physics, chemistry, biology. Many concepts related to these subjects are not clear to the students such as concepts of acceleration, velocity, couple, torque, static friction, kinetic friction, etc in physics and chemical equilibrium, allotropic forms, cell structure, the process of photosynthesis, etc in chemistry and biology. If teachers know about the conceptual clarification of students on daily basis then it helps improve their achievement and facilitate students in further studies. One-minute paper, Muddiest Point, and Exit Ticket are formative evaluation strategies that are helpful in terms of providing timely feedback. The present study is significant in this regard that it highlights whether these formative evaluation strategies are known by the teacher and whether teachers are using them if not then why teachers are not using them and are these formative evaluation strategies part of their teaching training program if not then teachers training programs should be updated.

## **2. LITERATURE REVIEW**

Formative assessment is very important for the successful teaching-learning process. There are many techniques and strategies used to carry out a formative evaluation in a class by teachers. The strategies used by the teachers for formative

evaluations vary depending upon the purpose for which formative evaluation should be carried out. One-Minute Point, Muddiest Point, and Exit Tickets are some of the strategies used for formative evaluation. The one-Minute paper strategy was introduced by Charles Schwartz during the early 1980s. He was a physics professor at the University of California, Berkeley (Stead, 2005). Anglo et al. popularized this method (Angelo, & Cross, 1993). They mentioned nearly fifty assessment techniques. The technique was reinvented countless times. The One-Minute paper technique is easy to use and helpful in understanding the students' conceptual understanding. It can be used at the end of the lecture or during the lecture when one particular topic is finished. One-Minute Paper can be used as a retention technique (Drummond, 2007). The information obtained in the minute papers can be used not only to determine deficiencies in student knowledge but also to highlight possible weaknesses in lectures, which allows the instructor to refine and strengthen these points for future classes. Students' interests in studies can be increased by using the minute paper strategy (Dreike, Kumen, & L, 1998). In that technique, a teacher has to ask the students at the end of the lesson to write about the topic or concept which is best understood by them. Minute paper is very useful as indicated by Donald, he used minute paper and muddiest point in the class for teaching chemistry, biology, microbiology, and organic chemistry. He found that minute paper and muddiest point are very effective in understanding the students' conceptual problems and improving their achievements (Paulson, 1999). The concept of the Muddiest Point arose when Harvard's Professor Mosteller, after 42 years of distinguished teaching in statistics, figured that no matter how polished they seemed, some classroom explanations could still be improved. So he asked his students to write down what was the least clear topic to them. Asking students to identify which is the least understood topic is an interesting and potentially powerful integrative exercise because it requires students, first, to rate their understanding across several topics and, second, to ponder, if ever momentarily, why one particular topic should be selected as least understood.

Exit tickets are a formative assessment tool that gives teachers a way to assess how well students understand the material they are learning in class. This tool can be used daily or weekly, depending on the unit being taught. By using the muddiest point and other formative evaluation strategies students' perceptions of their experience changed over time (Smith, Obenchain, & Victoria, 2009). A good exit ticket can tell whether students have a superficial or in-depth understanding of the material. Teachers can then use this data for adapting instruction to meet students' needs the very next day.

The exit ticket is simply a question that is posed to all students before class ends. Students write their answer on a card or piece of paper and hand it in as they exit. This formative assessment technique engages all students and provides the all-important evidence of student learning for the teacher. Exit tickets gather purposeful information to target student learning, provide immediate feedback to the instructor of the course, and offer university students an opportunity to reflect on their learning. Exit tickets are a beneficial way of gathering student feedback, so the instructor can plan lessons and assignments based on the input provided by students (Danley, McCoy, & Weed, 2016).

### **3. METHODOLOGY OF THE STUDY**

The present study is quantitative where the survey was conducted using the Open-ended questionnaire and semi-structured interviews with the secondary school teachers.

***Research Design***

The present research was quantitative in nature. A survey method was used to collect the data.

***Research Tool***

Semi structure questionnaire was developed with the help of experts. Initially, the questionnaire had 20 questions one question was discarded. Thus, there were 19 questions in the questionnaire. Semi structure interviews from the SST teachers were conducted. Mostly five questions were asked to each teacher. These questions were according to the research question of the present study.

***Population***

All the SST teachers teaching science, mathematics, physics, chemistry, biology to the secondary classes of district Rawalpindi, Pakistan schools were considered to the population of the present study.

***Sample***

The sample of the study was 500 SST teachers who were teaching mathematics, physics, chemistry, and biology to secondary classes.

***Sampling Technique***

A random sampling technique was used for the present study

***Data Collection***

Data were collected by the researchers themselves.

***Data Analysis***

Mean and percentages were used to analyze data

**4. ANALYSIS OF DATA**

This section presents the analysis of the knowledge of the teacher about One-Minute Paper, Muddiest Point, Exit Ticket.

Figure 1 shows the detail of the sample. There were a total of 500 secondary school teachers participated in the study. 290 teachers knew about One-Minute Paper, Muddiest Point, and Exit Ticket. While 210 teachers didn't know about these formative assessment techniques.

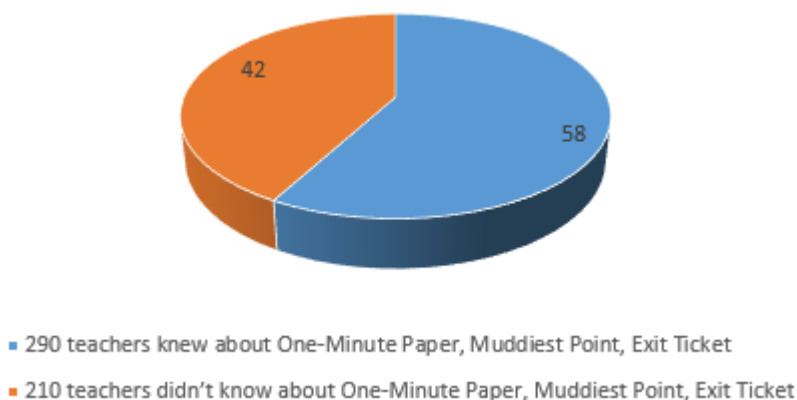


Figure 1: Detail of the Sample

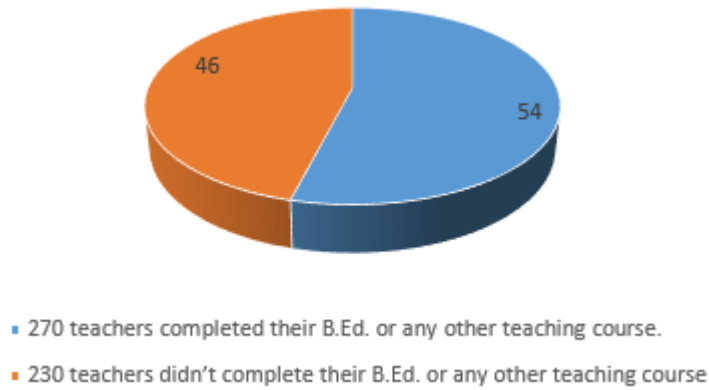


Figure 2: Teachers B.Ed. completion Information

Figure-2 shows the details of the teachers who had completed their B.Ed. or any other professional training in education. Out of 500 teachers, 270 teachers had completed their B.Ed. which made 54% of the current population while 46% of teachers said that their degree is in process.

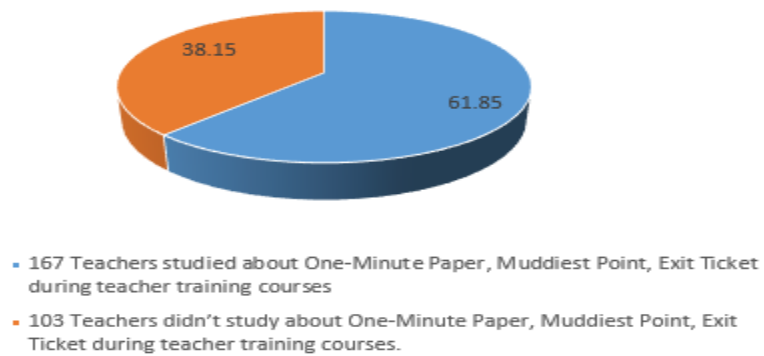


Figure 3: Teachers knowledge of formative evaluation methods during teacher training courses.

Figure 3 shows that 62% of teachers studied about One-Minute Paper, Muddiest Point, Exit Ticket during teacher training courses while 38% of teachers didn't study about One-Minute Paper, Muddiest Point, Exit Ticket during teacher training courses.

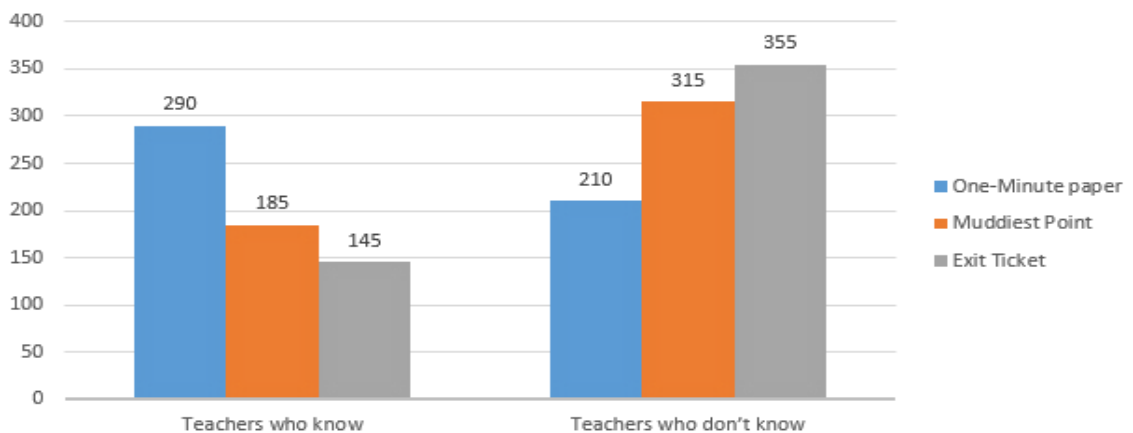


Figure 4: Teacher knowledge of formative assessment strategies.

Figure 4 shows that out of 500 teachers 290 teachers had knowledge about One-Minute Paper Strategy while 185 out of 500 teachers knew Muddiest Point and their percentage was 37% while the percentage of teachers who did not know about Muddiest Point was 63%. Similarly, 145 out of 500 teachers had knowledge about Exit Ticket their percentage was 29% and those teachers who had no idea about the Exit Ticket strategy were 71%.

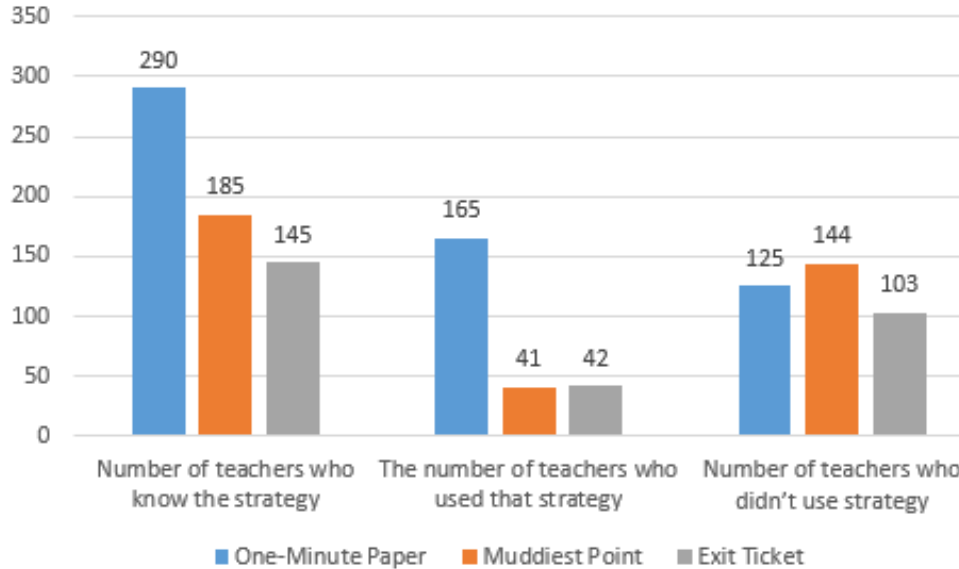


Figure 5: Teachers utilization of One-Minute Paper, Muddiest Point, Exit Ticket in class

Figure 5 shows that out of 290 teachers who know the One-Minute strategy only 165 teachers were using that strategy in class. Similarly out of 185 teachers who knew Muddiest point technique 41 teachers were using it in the class. While out of 145 only 42 teachers were using exit ticket strategy in the class.

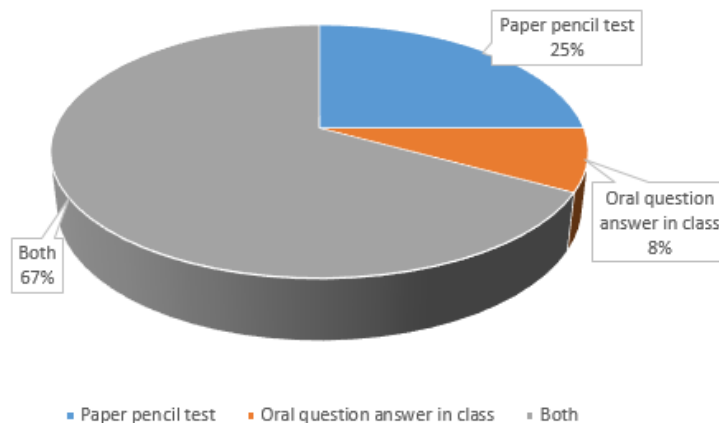


Figure 6: Utilization of traditional formative evaluation strategies in class

Figure 6 show the detail of the formative evaluation methods used by teachers in the class. It is clear from the table that most teachers used paper-pencil tests and oral questioning answering in the class for formative assessments. 335 out of 500 teachers used the paper-pencil test and oral question techniques while 125 teachers used the paper-pencil test and 40 used the question/answer technique.

*Analysis of semi-structured interviews*

Semi-structured interviews were conducted with 300 teachers. Especially to get the answer to the question that if teachers knew about One-Minute Paper, Muddiest Point, and Exist Ticket assessment techniques then why they were not using them in the class. Themes were generated after the analysis of the interviews. The details of the data analysis were as followed.

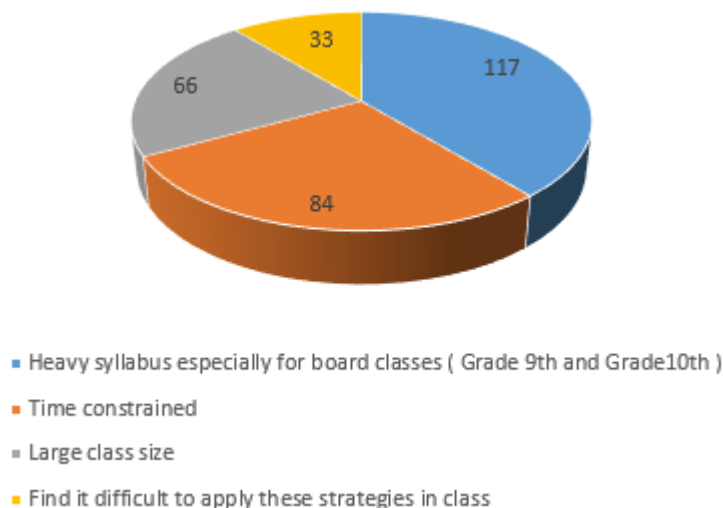


Figure 7: Themes generated from semi-structured interviews

Figure 7 shows the details of the themes generated from the semi-structured interviews. Most of the teachers complained about the heavy syllabus and time available to complete that syllabus. Some teachers said that the exit ticket is difficult to apply. They knew that strategy but found it difficult to use in the class.

**5. FINDINGS**

From the analysis of data, it was found that 500 secondary school teachers had participated in the present study. 290 (58%) teachers knew about One-Minute Paper, Muddiest Point, and Exit Ticket. While 210 (48%) teachers didn't know about these formative assessment techniques.

Among 500 secondary school teachers, 270 (54%) teachers had completed their B.Ed. course. While 230 (46%) teachers didn't complete their B.Ed. during interviews, the researchers came to know that their degree was in process.

Among those 270 teachers who completed their B.Ed. 167 (62%) teachers said that they studied these formative evaluation strategies during their B.Ed. course. While 103 (38%) teachers said that they did not study about One-Minute Paper, Muddiest Point, and Exit Ticket strategies during their B.Ed. course. There was one teacher who didn't do B.Ed. but had knowledge about these formative assessment strategies.

When data was further analyzed it was found that 58% of teachers knew about the One-Minute Paper strategy. 37% of teachers knew about the Muddiest Point strategy and 29% of teachers knew about the Exit Ticket Strategy.

Although 270 teachers knew about One-Minute Paper, Muddiest Point, and Exit Ticket Strategies. Only 165 ( 57%) teachers were using that strategy in class. Similarly out of 185 teachers who knew Muddiest point technique 41 ( 22%) teachers were using



it in the class. While out of 145 only 42 ( 29%) teachers were using exit ticket strategy in the class.

Most of the teachers ( 66%) used paper pencil and oral question-answer strategy in the class.

Analysis of semi-structured interviews showed that the main reasons behind the not using One-Minute Paper, Muddiest Point, and Exit Ticket were heavy syllabus, time management problem, large class size, and occasionally for some teachers these strategies were difficult to apply like exit ticket.

## **6. DISCUSSION**

The purpose of formative classroom assessment is to help teachers direct and redirect their instruction to improve student learning (Boyd, 2001). Teachers use many different strategies for formative evaluation such as One-minute paper, Muddiest Point, and Exit tickets which are helpful and easy to use. Data showed that only 290 (58%) teachers knew these formative assessment strategies. While 210 (42%) teachers did not know those formative evaluation strategies. This indicated that the teaching-learning process was not well facilitated by teachers. As many researchers (Stead, 2005; Lucas, 2010; Ashakiran & Deepthi, 2013) showed that One-Minute Paper is very helpful, flexible, and requires no technology for its use. So in a country like Pakistan having fewer resources especially for education, teachers have to use these simple and inexpensive methods for formative evaluation of students.

The analysis of data showed that 38% of teachers even after doing their B.Ed. course yet not familiar with these formative evaluation methods which showed that teachers' training programs had some deficiencies which must be fulfilled. Because if teachers used the One-Minute Paper strategy then students can briefly reflect on and ask questions about which can provide the teacher with timely feedback (Stead, 2005). Similarly, Muddiest Point along with the other assessment strategies made students active learners in class ( Hall , Waitz, Brodeur , & Soderho, 2002).

Another important fact that resulted from the present study is that only 57% of teachers were using the One-Minute Paper strategy in class. While 22% of teachers were using Muddiest Point in the class and 29% were using Exit Ticket. Again that is not a good sign. All teachers were secondary school teachers and teaching Mathematics, Physics, Chemistry, Biology. These three selected formative evaluation strategies were meant especially for those subjects. Many researches have proved the significance of these strategies. As research done by Michael & Kristine proved that Minute Paper is helpful in pharmacy studies they said students are very receptive to the use of the minute paper in pharmacy courses (Michael & Kristine , 2001). Similarly, King showed that Muddiest Point with the help of clickers provides a better conceptual understanding for chemistry students (King, 2011). Dawn and his fellows showed that Exit ticket helps understand the conceptual clarification in mathematics and by eliciting ongoing evidence of every student's learning in quick and simple ways, teachers can immediately assess students' needs and make timely adjustments necessary to instruction ( Sondergeld , Courtney , & Dawn , 2010).

Analysis of data also showed that most teachers (67%) were using the Paper Pencil test and Oral Question/Answer technique for formative evaluation of students. Paper pencil tests could not ensure the conceptual clarification of students which were essential for subjects like physics, chemistry, and biology. Although the oral

question/answer strategy is good but again needs well-trained teachers who could have complete command of the subject.

Most of the teachers claimed of being burdened by the heavy syllabus and short time. And because of that teachers were unable to use One-Minute Paper, Muddiest Point and Exit Ticket in their classes. But researches showed that these strategies are not time-consuming and could give much better results as compare to paper pencil and oral question/answer strategies. Cotrell and fellows proved that these formative evaluation strategies can stimulate and motivate students, and it can form an important bond between instructor and students (Cotrell, Richard, & Weaver, 1985). While Ankeny and Krause showed that these strategies helped create a positive student attitude concerning value, interest, and cost ( Ankeny & Krause, 2014). Muddiest Point strategy caused continuous improvement for positive gains on student attitude, achievement, and retention (Krause, et al., 2013). Exit ticket had a positive effect on the short answer questions ( Divoll, Brownin, & Winona , 2012).

Teachers also claimed that because of the large class size they were unable to apply these strategies but researches showed that students typically perceive these strategies favorable, in both small and large group teaching (Stead, 2005).

Thus in short it can be said that “where there is a will there is a way”. If teachers have aimed to improve the concepts of their students then they should use new and innovative methods for the formative evaluation so that students’ interest in studies will be increased and teachers can get timely feedback about the students’ weakness and can clarify their concepts. As One-Minute Paper and Muddiest Point both together enable instructors to identify areas of improvement to ensure that student learning occurs and that the students are prepared for their future academic and/or professional lives (Mansson, 2013).

## **7. CONCLUSION**

By keeping in view the statistics and findings of the study following conclusions have been drawn.

1. Most of the secondary school teachers do not know the formative assessment strategies like One-Minute Paper, Muddiest Point, and Exist ticket.
2. Teachers’ training programs have some deficiencies in terms of inculcation of recent researches and latest knowledge.
3. Even if teachers know about One-Minute Paper, Muddiest Point, and Exist Ticket strategies yet they are not using these strategies in their classes for formative evaluation of students
4. Teachers mostly used the paper-pencil test, oral question/answer strategies for the formative evaluation of the students.
5. Teachers claimed that because of the heavy syllabus, less time, and large class size they are unable to use new and innovative formative evaluation methods like One-Minute Paper, Muddiest Point, and Exit ticket in their classes for formative assessment of students.

## **8. RECOMMENDATIONS**

In light of the findings and conclusions of the study, the following recommendations are made

1. Teachers’ training courses should be revised in ordered to ensure the inculcation of new researches on formatives and summative evaluation methods and strategies.

2. Refresher courses should include the training of teachers in the field of new and innovative methods for formative and summative evaluations.
3. Teachers may be encouraged towards research culture by giving them some initiatives.
4. Further researches should be done on higher secondary teachers to evaluate their knowledge and use of these formative evaluation strategies in their classes

## REFERENCES

- [1] Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques A handbook for college teachers (2nd ed.)*. San Francisco: Jossey-Bass.
- [2] Ankeny, C. J., & Krause, J. S. (2014). Flipped biomedical engineering classroom using pencasts and muddiest point web-enabled tools. *ASEE Annual Conference and Exposition*. Indianapolis, IN: American Society for Engineering Education.
- [3] Black, P. and Wiliam, D. (1998b). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan*, 80 (2): 139-148. (Available online: <http://www.pdkintl.org/kappan/kbla9810.htm>.)
- [4] Danley, A., McCoy, A., & Weed, R. (2016). Exit Tickets Open the Door to University Learning. *A Journal of Scholarly Teaching*, 11(1), 48-58.
- [5] Divoll, K. A., Brownin, S. T., & Winona, V. M. (2012). The Ticket to Retention: A Classroom Assessment Technique Designed to Improve Student Learning. *Journal of Effective Teaching*, 12(2), 45-64.
- [6] Drummond, G. (2007). Programme feedback: it only takes a minute. *International Journal of Educational Management*, 21(1), 29-36.
- [7] Hall, S. R., Waitz, I., Brodeur, D. R., & Soderho, D. H. (2002). Adoption of active learning in a lecture-based engineering class. *32nd Annual Frontiers in Education*. Boston, MA, USA, USA: IEEE.
- [8] Sondergeld, T. A., Courtney, A. B., & Dawn, M. L. (2010). Understanding How Teachers Engage in Formative Assessment. *The Journal of Natural Inquiry & Reflective Practice*, 24(2), 72-86.
- [9] Ashakiran, M. S., & Deepthi, M. R. (2013). One-Minute Paper: A thinking centered assessment tool. *Internet Journal of Medical Update*, 8(2), 3-9.
- [10] Boyd, B. L. (2001). Formative Classroom Assessment: Learner Focused. *The Agricultural Education Magazine*, 73(5), 20-28.
- [11] Carol, B. (2002). *The Concept of Formative Assessment*. ERIC Digest. ERIC Clearinghouse on Assessment and Evaluation College Park MD. .
- [12] Cotrell, H. W., Richard, L., & Weaver, I. (1985). Mental aerobics: The half-sheet response. *Innovative Higher Education*, 10(1), 23-31.
- [13] Divoll, K., & Browning, S. (2010). The "Classroom Ticket" to Concept Retention. *international journall for the scholarship of teaching and learning*, 4(2), 1-14.
- [14] Dreike, A. E., Kumen, J., & L, M. C. (1998). The impact of one-minute papers on learning in an introductory accounting course. *Issues in Accounting Education*, 13(3), 485-497.
- [15] Harwood, W. (1996). The one-minute paper. *Journal of Chemical Education*, 73(3), 229.
- [16] King, D. B. (2011). Using Clickers to Identify the Muddiest Points in Large Chemistry Classes. *Journal of Chemical Education*, 88(11), 1485-1488.

- [17] Krause, S. J., Bake, D. R., Carberr, A. R., Koretsk, M., Brooks, B. J., & Gilbuena, D. (2013). MuddiestPointFormativeFeedbackinCoreMaterialsClasseswithYouTube, Blackboard,ClassWarm-upsandWordClouds. *120th ASEE Annual Conference and exposition* (pp. 6-17). American Society for Engineering Education.
- [18] Lucas, G. M. (2010). Initiating Student-Teacher Contact Via Personalized Responses to One-Minute Papers. *College Teaching*, 58(2), 39-42.
- [19] Mansson, D. H. (2013). Assessing Student Learning in Intercultural Communication: Implementation of Three Classroom Assessment Techniques. *College Student Journal*, 47(2), 343-351.
- [20] Martin, M. B. (1999). Classroom Assessment Techniques Designed for Technolog. *In: Proceedings of the Mid-South Instructional Technology Conference* (pp. 141-150). Murfreesboro: U.S. department of education office of Educational Research and Improvement Educational Resources Information Center (ERIC) . doi: 436 119
- [21] Michael , B. G., & Kristine , M. A. (2001). Method for Assessing Course Knowledge in a Large Classroom Environment: An Improved Version of the Minute Paper. *American Journal of Pharmaceutical Education*, 65(2), 264-267.
- [22] Paulson, D. R. (1999). Active Learning and Cooperative Learning in the Organic Chemistry Lecture Class. *Journal of Chemical Education*, 76(8), 1131-1140.
- [23] Simpson-Beck, V. (2011). Assessing classroom assessment techniques. *Active Learning in Higher Education*, 12(2), 125 - 132.
- [24] Smith, N. S., Obenchain, & Victoria, L. (2009). Students' Perceptions of the Residential Environmental Education Program at the New Jersey School of Conservation. *Journal of Environmental Education*, 40(2), 50-62.
- [25] Stead, D. R. (2005). A review of the one-minute paper. *active learning in higher education* , 6(2), 118-131.
- [26] Sadler, D. R. (1983) Evaluation and the improvement of academic learning, *Journal of Higher Education*, 54(1), 60-79.