

# Effective Transformation via ICT Tools

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## Abstract

The pandemic situation declared by World Health Organization challenged humans to learn. Education system is one among the systems which has been forced to apply and adapt the changes overnight. Moving from traditional classrooms to online classrooms was very challenging for educators as well as learners. The article provides a quantitative approach for online lectures with Visuals, Instructional strategy and Presentation (VIP) in the time of crisis and the suggestions to deal with the challenges allied with online learning. In this article, we report the adaption and judgement of students regarding different format of exercises, and how effectively they adjudged them for assessment and evaluation of learning. The engagement of students during the lectures is also studied via behavior analysis to validate the VIP analysis.

**Keywords**— Assessment, Evaluation, Engagement, Online learning

## INTRODUCTION

The pandemic situation, challenged almost all sectors around the world. Education sector also has no exemption. All schools and universities need to close their premises in response to lockdown measures. Suddenly unplanned lockdown creates a fear of getting trailed in the whole semester or even more in the coming projects. Researchers' assessment, indicates a long indefinite time for any sector including education sector to return to its normal. This "education in emergency" situation create unprecedented challenges for all educators to reinvent the pedagogy of learning and assessment, which could complement the replacement of face-to-face (F2F) teaching learning [1, 2] on urgent basis. To remain relevant, all educators expand the possibilities to reach out learners by online learning on different online platforms via Google meet, Zoom, MS Teams and many more. Though the strengths of the online platform rescued and is rescuing us from these hard times, still there is a need to customize our procedures and processes for to create a learner centric effective teaching learning environment [3].

Educators are exploring all possible ways to overcome the challenges. First approach was to understand the readily available online courses and its limitation. While reviewing the online courses, they found that as a result of a long research on needs and demands of learner community, a few educators opted e-learning (teaching and assessment) on online platforms even before pandemic [4-6]. The method of instruction is believed to be critical for the future of education [7]. The easy accessibility of internet has made it become an integral part of education [8]. But all these observations are true and viable only for technically developed countries. Developing countries like India still found many technical hurdles with model of e-learning over online platforms [9]. Apart from technical problems, the affordability was also an issue of concern to the general community of learners across the globe [10]. So, as it is opting, the already created e-learning content and assessment model on online platform not turned out to be effective solution in this education emergency.

From the learner perspective, use of learning content in the form of readily available content on internet may be a good option in terms of

affordability and availability. Even though, plenty of information about each and every subject are available on internet, books, articles etc., still the need of educators cannot be replaced with that. The role of educators is very crucial to make learners successfully participate in discussions, which facilitate learning, by providing clear guidelines to channelize the information [11]. In the conventional F2F classrooms these requirements were successfully catered but, this pandemic situation created a big challenge to educators to come up with resistance to technology driven innovation and use it effectively for creating a synchronous learning environment. This synchronous learning environment needs to create a possibility of instant feedback to the learners by real time interactions. Many conventional educators are experimenting different pedagogy on online platforms like: sharing self-made animations, instructional videos, flipped class rooms etc. to overcome the challenge [12-16]. However, development of any online courses content for effective delivery in the form of videos, animations, audios etc doesn't happen overnight for all educators. In this scenario, we experimented a new strategy by sharing available Visuals on internet followed by, Instructional strategy and Presentation (VIP) all together in online learning platform.

Education is not only bound to teaching and learning. It is a full package of teaching, learning, assessment, evaluation, enjoyment, classroom participation and involvement in learning. To make the learning outcomes measurable, assessment and evaluation is an integrated and essential part of teaching learning process [17]. This process influences students as well as course teachers [18]. Conventionally, face to face assessment for higher education, is carried out in two modes like formative assessment and summative assessment [19]. Computer-based assessment and online assessment have been in place for a long time now [19, 20], but because of the issues of validity, reliability, accessibility and dishonesty, it is not opted as an regular practice everywhere [21]. During the COVID 19 pandemic, the educational environment has

taken a paradigm shift in all school irrespective of discipline and grades. In this situation, an assessment method is to be generated, specifically for online mode of learning.

Student's engagement is also one of the most widely researched indicators of attractiveness and effectiveness of the teaching-learning process. Literature validated that reliable surveys and classroom observations are few instruments to measure the cognitive and behavior aspects of student engagement [22, 23]. In this study, we choose to measure engagement using classroom participation of students and triangulated it with the student survey.

In this article, we present a qualitative analysis of VIP as a teaching strategy and its effect on learning outcomes. Different assessment and evaluation tools are also discussed to measure the learning outcomes of the course delivered through VIP technique. We also report the survey result to determine the student engagement while implementing VIP. The over-all impact of VIP on expectation of teaching learning process is concluded at the end.

## RELATED WORK

### Active Learning Techniques in Education Research

Active learning techniques mainly comprises of the methods to increase the engagement of students with the content to understand and express their thinking. Physics education researchers have been repeatedly evaluating different active learning techniques with the aim of improved student engagement and learning. Visuals and Peer-Instruction is the key research-based active learning technique that has been widely adopted in science classes [24, 25]. Studies shows that students when taught via peer instruction score significantly higher grades than an equivalent traditional lecture-based class [26]. In this study, we add to the research into active learning strategies by evaluating how Visuals-Instructions-Presentations (VIP) fosters student engagement and helps in improving their results.

## Visuals-Instructions-Presentations (VIP) and Determining Student Engagement

Visuals-Instructions-Presentations (VIP) is a collaborative and active learning strategy, in which students first learn from the visuals during the lecture, then follow the Instructions given by the instructor to think on it further and at the end they present the same topic in the coming sessions. Students get opportunity for self-study with the use of visuals, at the same time it gives them chance of self-testing too. Through visuals instructors can deliver complex information and contents to students. If used creatively, videos can become a powerful technological tool in education [27]. Student engagement is one of the most broadly researched instruments of the allure of the teaching-learning process. It is an important goal to achieve, but in parallel difficult to define too, thus it can be operated in many ways such as

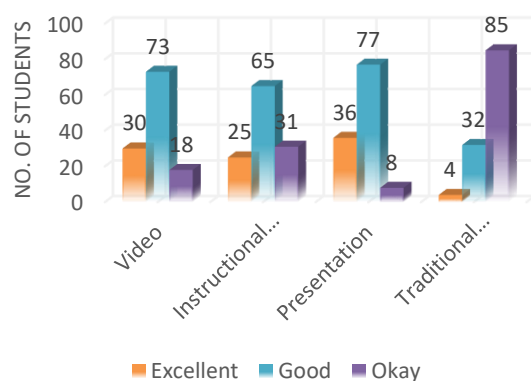


Figure 1. Pedagogy experimental results

classroom participation, classroom attention, student satisfaction and so on. Engagement can be measured using instruments such as surveys and class participation, both targets different aspects of engagement. Several reliable instruments exist to measure the cognitive and behavior aspects of student engagement [23, 28]. We choose to measure engagement using classroom participation (online) of students as this offers a direct picture of student engagement and triangulated it with a student survey as well.

## METHOD AND ANALYSIS

## Online Learning with VIP During Pandemic

In this research, we worked on VIP (Visuals, Instructions, Presentation) learning strategy. We had applied this strategy in different phases for online lectures as sudden shift of offline to online lectures indicated the necessity of change. Initially, lectures were conducted in traditional way. But, the lack of communication was observed which made us to switch to traditional lectures with Visuals and providing the link of source to the students after the lecture. Delivering the lecture using visuals of the main concepts and discussions on the same after the lecture in class. Different Instructional strategies applied, before, after and during the lectures also played a very important role, and the authenticity was checked by asking students to make a Presentation and present it on the same topic. We attempted to find out the efficiency, and reliability of these ICT tools in online mode of teaching. The teaching materials were also delivered to students timely and in a properly arranged manner.

Further to obtain a perspective from the learners regarding the need and effectiveness of the tools we used in the live lectures, a survey had been carried out. The survey is analysed under use of Visuals, Instructional strategy and Presentation (VIP) from the diploma students, engineering students from first year and final year as well. The details are as follows – out of around 200 students 120 have responded. The results are shown in the Fig. 1, which shows that almost all the students are in fair agreement of learning the content with the help of the online tools which is just the opposite in case of Traditional classroom technique.

Analysis with the students was done on the use of online tools in the lectures i.e., Video, Instructional strategy and Presentation (VIP). As per our survey, maximum students turned up that the tools when amalgamated with the traditional way of teaching helped them amply and helped them to analyse the main concepts discussed in the lectures quickly. Delivering the lectures using the online tools show positive acuties and are in agreement with the survey result. The VIP strategy helped both high and

low achievers to clear their qualms, strengthen concepts, boost confidence and prepare for examinations. Students displayed positive perceptions about the Instructional strategy too, as they can interact well with the teacher during lecture. After all the discussions, working on the topic and presenting it boosted confidence in the students. Fig. 1 represents the clear impression about the student's opinions regarding the VIP strategy used in online lectures. It was also found that a topic could be conveyed better using VIP strategy in class, as compared to Traditional teaching method which is evident from the analysis, as shown in the Fig. 1. In the Instructional strategy, the teachers applied TPS (Think Pair Share) by dividing the students into small groups and interviewing the students to know their strengths and weaknesses. The two Instructional strategies used were found to be effective. Lastly, students were asked to present the topic so as to check the effectiveness of the online tools, which boosted student's confidence too.

We worked with students of different courses. The lectures were implemented in same way with all the groups. First lecture was conducted in a traditional way followed by the lectures using VIP strategy. The scenarios are described in detail below.

- A. Relatively tough topic was selected and the lecture was delivered using different Visuals (pictures, videos, animations).
- B. Dividing the students in small groups for TPS and to interview (Instructional strategies) them to know about the extent to which they understood the topic delivered in the previous lecture and to know their strengths and weakness.
- C. Presentation on the same topic by the students.

An oral quiz was conducted after the traditional lecture and TPS activity held after the Visual strategy lecture. The students showed a lot of improvement after using the Visual strategy in the lecture for the same topic. Discussions held during the student's presentation too, which

again proved to be fruitful and in favour of students learning.

### **Online Assessment and Evaluation After Using VIP Strategy**

Assessment is a vital part of the education system that influences students on the one hand and course instructors on the other hand. It stimulates students to learn subject contents and assists them to boost their learning. It directs them to spot strengths and weaknesses of their learning. It additionally provides a chance to students to beat weaknesses of their learning. It guides course instructors to gauge their teaching performance with respect to the courses that they offered to students.

*Assessment and Evaluation* are the important parts of the education system. These components have direct significance to quality assurance [29]. Certain skills of student need not be assessed effectively by conventional assessment practices [30]. The assessment-evaluation procedure we adapted during this pandemic is assurance to the quality education. But biggest question was to measure quality, that too in online mode of teaching. Collaborative projects, discussion forums, or peer review activities are few of the ways to measure the quality. For students also these are some effective ways to interact with each other and to understand the course content in better way.

Different individuals approach the assessment and evaluation differently. Balanced assessment system must include both summative and formative assessments, which play a vigorous role. Student achievement in the classroom becomes uncertain if one depend too much on one or the other assessment method. Summative assessment at the classroom level is a liability measure that is generally used as part of the grading process. Whereas, through formative assessment both teachers and students come to know about the understanding at a point and when timely adjustments can be made. Students achieve targeted standard-based learning goals within a set time frame because of these adjustments.

Summative approach is a conventional one which has to be followed as per the institution guidelines. In our case the conventional evaluation methods such as the multiple-choice examination and the essay format are taken. The advantages of multiple-choice tests include that they can test knowledge quickly within large groups, can be used to provide quick feedback, can be automatically scored, question bank can be stored and re-used whenever and whichever way required [31]. Many disadvantages are also enlisted including that multiple choice tests as, its construction time, can test knowledge and recall only, it never allows to test literacy, never test creativity, or unique thinking [32].

We incorporated challenging problems in the exercise sheets and asked students to work on the same individually. Solving the problems while working in groups build the conceptual understanding and problem-solving skills in students, but group discussions among students are difficult during online lectures thus work was assigned individually. Students apply critical thinking skills and problem-solving methods rather than repeating the material covered in the books or lectures. They worked on the problems and submitted the solutions. Receiving grades and feedback on the submission motivated the students. Guidance is provided to students through discussions after the students have worked on the material. We incorporated a large number of textbook problems with hints for students and provide automatic grading. Evaluation and comparison of the online homework systems was done with ungraded homework and the standard methods of collecting and grading homework [33, 34]. Most studies have shown that online homework systems are advantageous [35-38]; however, in general more iterations and expansions of the homework system are required to accomplish the required efficiency [39].

Further to obtain a perspective from the learners regarding the requirement and effectiveness of the assessment and evaluation techniques, a survey had been carried out. The survey is analysed for effectiveness of formative approach to learning from the diploma students,

engineering students from first year and final year as well. The details are as follows – out of around 200 students 120 have responded. The results are shown in the Fig. 2 and Fig. 3. Fig. 2, shows that almost all the students are in fair agreement with formative assessments, summative being compulsory at the same time. Some students definitely seeing the work as an unwelcome external imposition. This approach is often associated with routine and reflective memorization and practical problem solving, with restricted conceptual understanding being an expected outcome. This approach is related to high quality learning outcomes [40]. Even the multiple-choice tests can be taken in a different way under formative assessment and the feedback from students and instructors would suggest that most learn a great deal during the process of taking the tests [41, 42].

Analysis was done by comparing different formative online exercise formats given to the students which could be assessed. As mentioned earlier 120 students responded among 200 for the survey. Exercise sheets were provided to each and every student and assessment format was followed in steps as shown below,

The students submitted the solutions for rectification, and then discussed in the online lecture.

- The solutions were reassembled during a live online session.
- Exercise sheets were solved in online lectures and then discussed in groups.
- The solutions to the exercise sheets were given out to the students.
- Exercise sheets were discussed via Forums without time limitations.

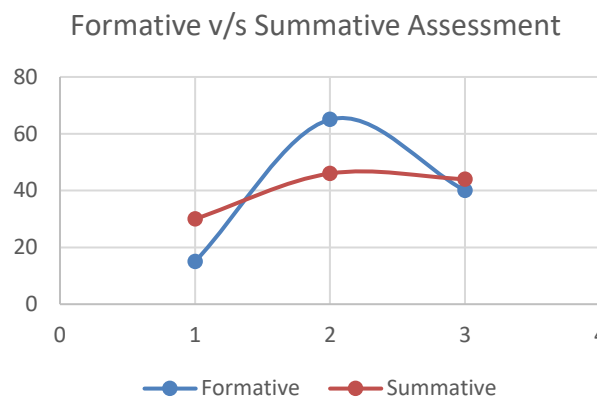


Figure 2. Student's views on assessment format

Fig. 3 shows the fraction of total answers for each category. Very few students showed interest in handouts of solutions. They emphasized on working on exercise sheets during online lectures. Following the same, we observe that forums are seeming to be ineffective for the given online exercises.

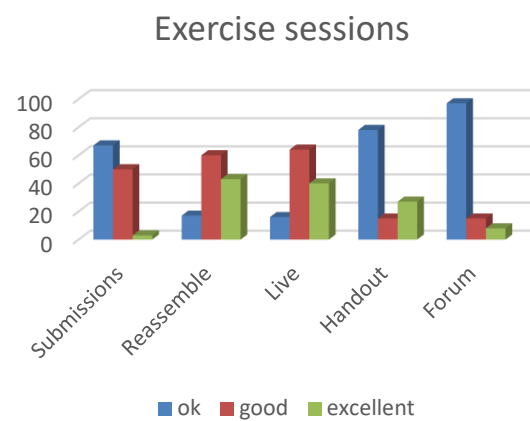


Figure 3. Students feedback on different format of online exercises

Fig. 3, shows the preference of the students for different format of online exercises. Among all the five formats the students preferred in lecture (live) discussions and reassembling of problem solutions. From an educational perspective the results seem plausible.

Table I. Average engagement through-out the semester

No of Students = 114	Traditional lectures			VIP Lectures		
	Writing in notebook	Discussing with faculty	Reading notes	Writing in notebook	Discussing with faculty	Following class discussion
Fully Engaged	72.8	45.6	71	64	56.2	64
Mostly Engaged	21.9	33.3	21.9	22.8	26.3	22.8
Sometimes Engaged	4.4	14.9	4.4	7	7.9	11.4
Never Engaged	0.9	6.1	2.6	6.1	9.6	1.8

### Behavior analysis

Though the VIP technique worked well for students and gave fruitful results, still an online survey was conducted for our students on several aspects related to the class. We first classified the collected observed behaviors as desirable and undesirable behaviors. Desirable behaviors were those that indicated engagement. Desirable behaviors include reading notes, reading the screen, writing in notebook, talking and listening on topic, asking the instructor a question, responding to an instructor question, group discussion and looking at laptop. The remaining behaviors were classified as undesirable. We classified the

desirable behaviors further into active and passive [43]. During traditional lectures writing in notebook and discussing with faculty was considered as active behaviors, while reading notes was considered passive engagement behavior. During the VIP lectures writing in notebook, discussing with faculty and following class discussion were considered active, while looking at the screen or notes was passive.

The goal of the study was to observe maximum number of students who are engaged. This study was done through a survey conducted for the students, and which is shown in the table below. In both strategies, we classified the desirable behaviors further into active and passive [43]. In both the strategies the

predominant behavior is writing in notebook, which is (72.8 %) in traditional and (64 %) in VIP strategy. Writing during Traditional way of lecture is followed by reading the notes (71 %), whereas in VIP lecture writing is followed by class discussion (64 %) as shown in the Table 1, which is a passive behavior and which was not observed in the traditional lectures. We note that in both the ways a majority of behaviors are active with a very less margin between them.

Since the observations were been studied during the pandemic online lectures, it is difficult for us to triangulate the survey data with any other method. But we have checked the engagement of the students via an activity done using Padlet, in which with every lecture the students were asked some questions discussed during the lecture itself. Students were given two minutes of time to put forward their thoughts on the same via Padlet, which helped them to clear their thoughts on the same topic and at the same time ensured the engagement in the class too. Depending on the type of question there were slight variation in the time given to answer. Three to four questions were asked per session, which gives a strong reflection of engagement during VIP lectures. We can indirectly triangulate the same with the results shown in our assessment and evaluation after applying the VIP techniques, which is shown in the Fig. 3.

## CONCLUSION

This paper addresses the importance and effectiveness of online tool VIP for students aimed at self-learning and better understanding and focusses on different assessment-evaluation techniques for the quality assurance. We have used three ICT tools i.e. Visuals, Instructional strategy (TPS and interview) and Presentation (VIP) along with our online lectures during this current pandemic. Overall, preliminary results show positive perceptions on the use of these online tools when merged with the traditional classrooms. Students emphasize the usefulness of visuals as reference material to clear their doubts and Presentation followed by Instructional strategies as an efficient way to

boost their confidence and hold on the topic. Results show that the students preferred the practice of conducting traditional lecture followed by providing Visuals, Instructional strategy and Presentation. These strategies were useful for strengthening the concepts, for clearing doubts, and to prepare for exams. Results also show that the TPS made the class more interactive. Many online exercises were taken to measure the strength and knowledge of students. We reported the results about online problem-solving sessions taken after VIP lectures. We derived several suggestions from the study for future online learning and it will certainly play an important role. Our findings regarding the engagement behavior of students also supports the benefits of VIP strategy.

The results presented here may be helpful for other faculties when it comes to planning online teaching and learning in general and during the next terms. This paper presents findings from an initial study, and more experiments with different courses and student groups are required to authenticate the suggestions in this paper. The data size is currently limited and further work is required to oversimplify the results.

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