

Efficient & Flawless Output in Engineering Drawing, Through Pat Software Tools

L.Ranganath, Basam koteswararao, Marut Dev Sharma, P.Appalraju, P.Vijay



Abstract: Perception, Analyzing skills and cogitating levels of the 21st century students makes them to stand one step ahead of the yesteryear's practices of teaching. 20th century was an era wherein it was a mandate for everyone to have a teacher or instructor to guide and make a student learn the concept as well train them as an expertise in that domain. The traditional way teaching concepts still holds it upper hand or supremacy in most of the domains of engineering subjects. Areas like Engineering Drawing not only needs the traditional methods but also the aid of software's as virtual approach plays a vital role in bringing accurate output & helps for a better understanding. The traditional method of chart and scale is never an outdated one, its the pioneer in drawing but the need of the hour has changed as the student is thinking through a creative aura of imagination/virtual reality, and which can be easily executed in less time, through the software, than the traditional method. Moreover its been evident that the 21st century students and highly inclined towards the Practical Learning, through a survey conducted on 75 students who were taught with both traditional and applied approaches. This paper's purpose is to elevate this concept. Understanding and executing is very important in drawing, but efficacy is the most important ingredient in achieving the accurate result which can be possible with the aid of, a variety of soft ware tools. This improvisation of efficacy is possible at both ends, Instructor as well the Learner. Finally this paper aims at discussing the usage of 10 possible software tools that were already tested and used for effective teaching of Engineering Graphics.

Keywords: Effective teaching, Engineering Drawing, Engineering Graphics teaching, Teaching made easy, Software tools

I. INTRODUCTION

Drawing is an age old concept for every human being who played with a pencil, pen and eraser. But, the aspect of drawing has changed its facet when it comes under the domain of Engineering.

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Standards were set, Rubrics were added and the new face of the age old everyone's drawing turned into professionals "Engineering Drawing".

Now the question is, Is drawing a tough or easy subject?

It might have been an easy task when the teacher gave the student a freehand in school, to draw a tree without any restriction, where the student or the learner used to draw a brown colour branch with green colour leaves. This particular aspect was so easy because the learner had a visual in his mind and he can easily depict it on the chart.

But coming to the perspective of engineering drawing there will be a restriction or condition, which asks the learner to draw a line, which is kept at an angle of 30° and how it looks from the top view as well as from the front view. This kind of specific drawing needs the best ways in executing as well as teaching or in providing guidance. As there is a dearth in applied teaching this aspect of engineering drawing appears to be a tough subject. At this juncture when the student can't visualize as per the conditions laid as well when there is no proper guidance that is a point where the student starts getting confused why and how it happens, i.e., why should I look it from the top angle why I should look it from the side angle. All such questions crop up and the student gets more confused. In turn all the questions that which erupted in their minds will allow them to come to a conclusion that only strong minds will understand this kind of subject and thus the concept of understanding the Engineering Drawing will go missing. To avoid this kind of confusion the instructor if could arrange a setup in such a way that movable projectors will rotate in the required dimensions and see that, the to be visualized image appears on the screen and thus the required front view and the top view of the line will be viewed and this kind of practices in the classroom will be more encouraging as well as fun, exciting to the students and thus draws attention of the student towards learning. Even though, this is the best practice of using projectors in the classroom, this also involves some of the drawbacks wherein the moment of the projector to here and there in the classroom and utilization of manpower. So it is not possible all times to provide with these kind of facilities or external sources and this is the situation where the software tools come into picture and play an interesting role. A software, Laptop or Personal computer and Projector, With these three simple tools the instructor can make the class more interesting & more effective. A recent approach [1] says the ancient methods which are similar to present methods of analysis. This technology equipped era has a wide variety of tools for every subject to make the teaching process more effective. So it depends upon the individuals choice, of choosing the best source from the available tools[2] [14].

Here is a list of tools which would identify as best sources for effective teaching in engineering drawing.

Note-This list is created based on personal experience and usage.

Software Tools for making Engineering Graphics Easy and Effective are:

1. Solid Works (it's need not be solid works it can be any 3D modeling software)
2. AutoCAD (How to draw on a sheet can be shown by using this software)
3. ActivInspire (Geometry tools like scale, protractor, compass, the eraser will be used virtually)
4. Magnifier (To zoom in and Zoom out the screen especially while teaching AutoCAD)
5. Epic pen (Pen on Desktop, it works on any application)
6. Icecream screen recorder (To record the class)
7. Explaindio (make effective animation slides and videos with Text)
8. Movie Maker (avoiding the unnecessary steps and make the video more efficient)
9. VideoScribe (pen with Animation hand)
10. H5P (interactive videos)

This point on wards attempts in explanation will be there to elaborate on how effectively software works in Engineering Drawing:

TARGET : Line inclined to plane making an angle ϕ .

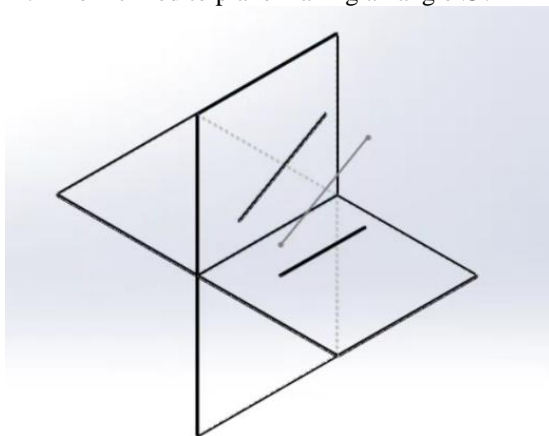


Figure :1: Line making an angle ϕ in the first quadrant

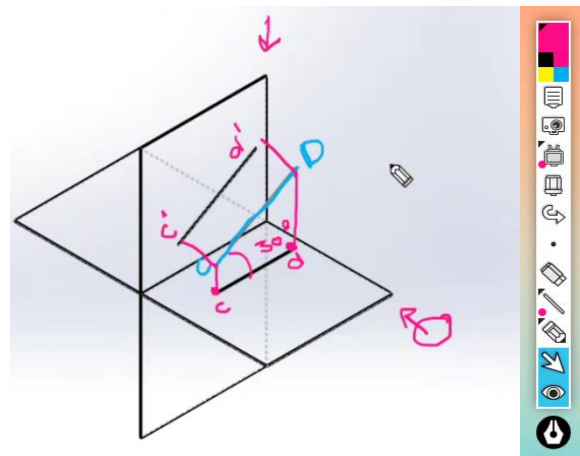


Figure 2: Demonstrating the concept using Epic Pen tool

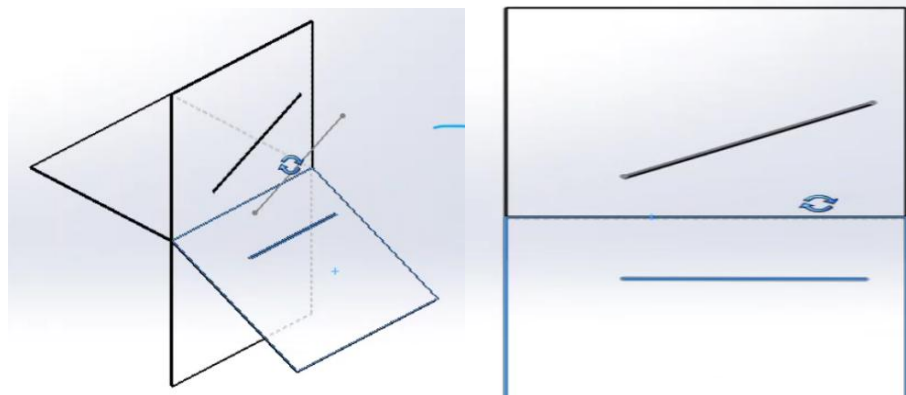


Figure 3: Rotating Horizontal plane by using the rotating command in Solid Works, and how it will be visualized in its front view and top without changing the position of the observer

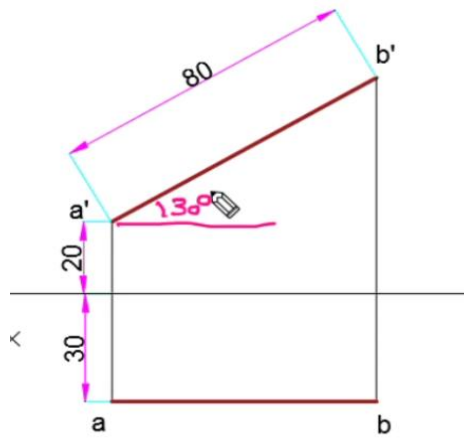


Figure 4: The rotated views drawn using AutoCAD tool

III. VIDEO SCRIBE

Video scribe is a good replacement of teachers writing, Instructor need not turn towards the board, instead he can have eye contact with students and the writing on the display/projector screen will be done like below.

A sample picture is shown below in fig5. In starting of the class what we will discuss today's class, yesterday class, how we will execute the course all these can be done in below way.

Its a proven psychological fact that a moving [8] picture leaves more chances for a better understanding of the explanation being given by the instructor during his/her lecture. Since the moving hand on the display/projector screen keeps on moving, the instructors role on the board gets minimized and thus can have a total grip on the students and that's an added advantage for a novice instructor.

WELCOME BACK,

TODAY IN THIS SESSION WE WILL START OUR NEW CHAPTER CALLED "SCALES".

WHAT IS SCALE?

A SCALE



Figure 5: Using of Video scribe tool for writing sentences and formulas

IV. ACTIVINSPIRE

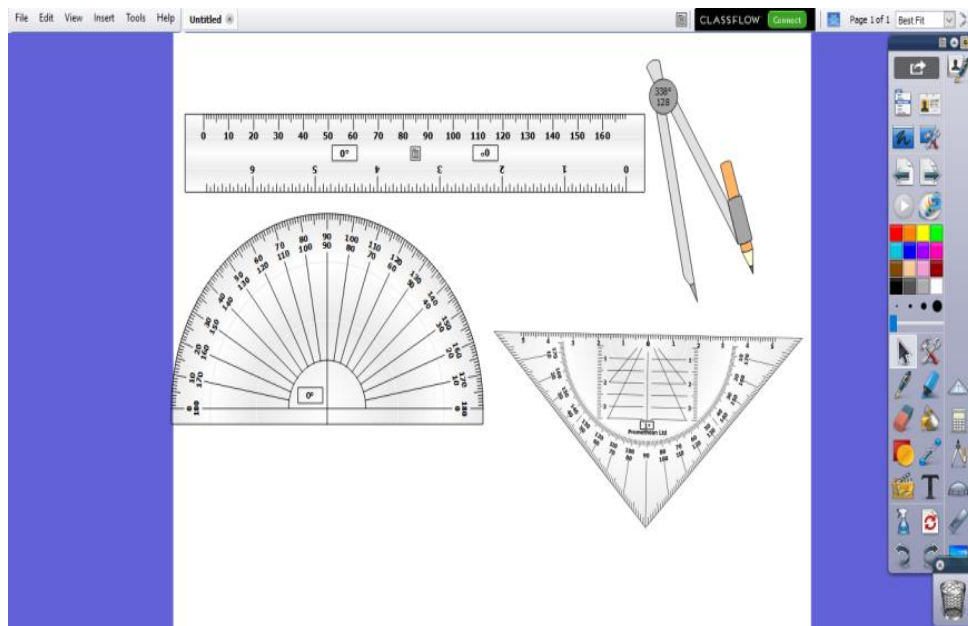


Figure 6: Activinspire studio advantage tools for a tutor to teach Engineering Drawing

By using the above tools, below is the diagram which was recorded

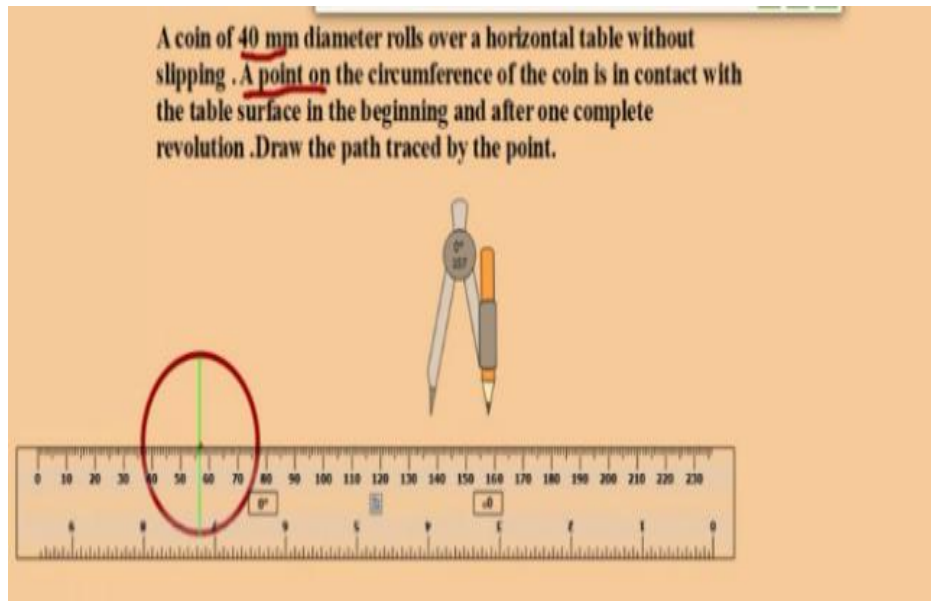


Figure 7: cycloid problem solved using ACTIVINSPIRE

The above procedure can be recorded by the Instructor for class purpose. Once the explanation is done on blackboard, if he/she plays the video of the above, then student will easily understand.

ICE-CREAM SANDWICH:

The recording process for the above mentioned procedure can be done by Ice-cream Sandwich screen recorder, which is

user-friendly and freeware. The screen will be recorded easily, but the way tutor did cannot be displayed as it is, because when the tutor playing it, it goes very slowly, it needs to be made fast and error free.



Figure 8: Ice Cream screen Recorder screen shot.

MOVIEMAKER:

Movie maker is another tool which will help a user to edit video and increasing the speed ratio, and this software

can act as a solution for the flaw that is there in Ice cream Recorder, which is mentioned above.

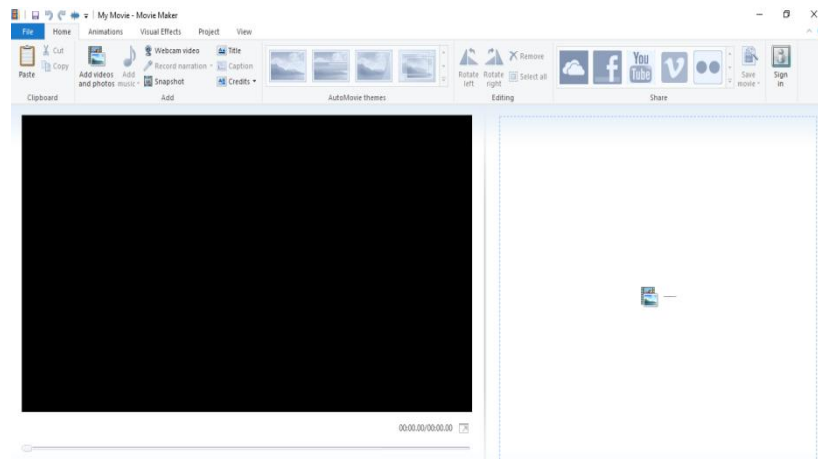


Figure 9: Best user-friendly software for editing videos Movie Maker

EXPLAINDIO:

Explaindio is a typical tool which can be used not only for editing videos but also for creating impressive

presentations as well. Focusing on using this particular software will make class more interactive and effective.

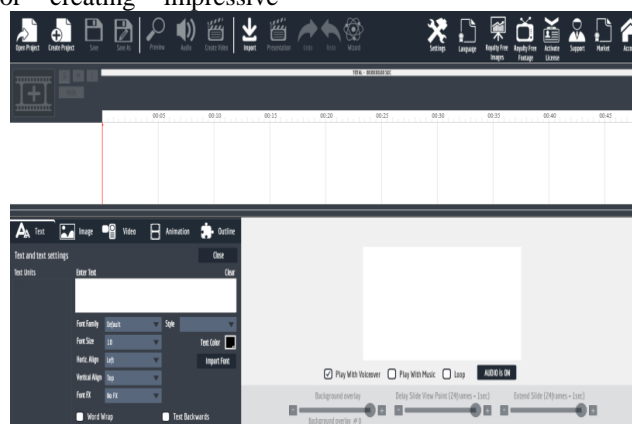


Figure 10: Explaindio for editing videos and better interaction

Chapters like Orthographic and Isometric need more visualization, SolidWorks or any 3D modeling software will make this job easier for a teacher. Below is an example of Orthographic projection problem. First student will be shown 3D [9] [10] model with colors. Based on colors

sorting of views will be done next as exercise. Which will create a greater impact in learning.

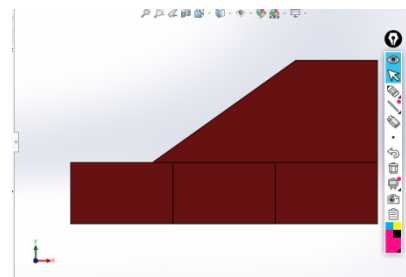
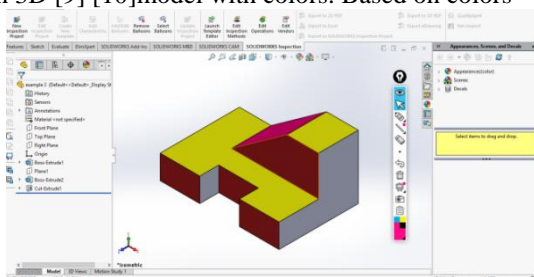


Figure 11: orthographic views of a solid (Isometric to orthographic views)

A visual pictorial representation of orthographic and isometric will definitely drive the student to an extent such that their inhibitions of fear will fade off.

MAGNIFIER:

Magnifier is the tool used to zoom the screen at a particular area for 100% or 200% or more than that, this is the best

tool for bigger classrooms[12] [13]. When the class size is large and there is any vision problem for a learner, this mode of showing the screen will be a definitely benefit solution.

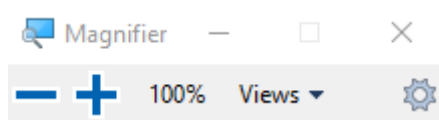


Figure 12: screenshot of the Magnifier tool

<https://www.youtube.com/user/mechrangal/videos>

Using all the above tools some videos are made just for awareness to teach drawing & can be referred @ the link provided here ↓ for a better understanding.

H5P (INTERACTIVE VIDEO EDITOR) :

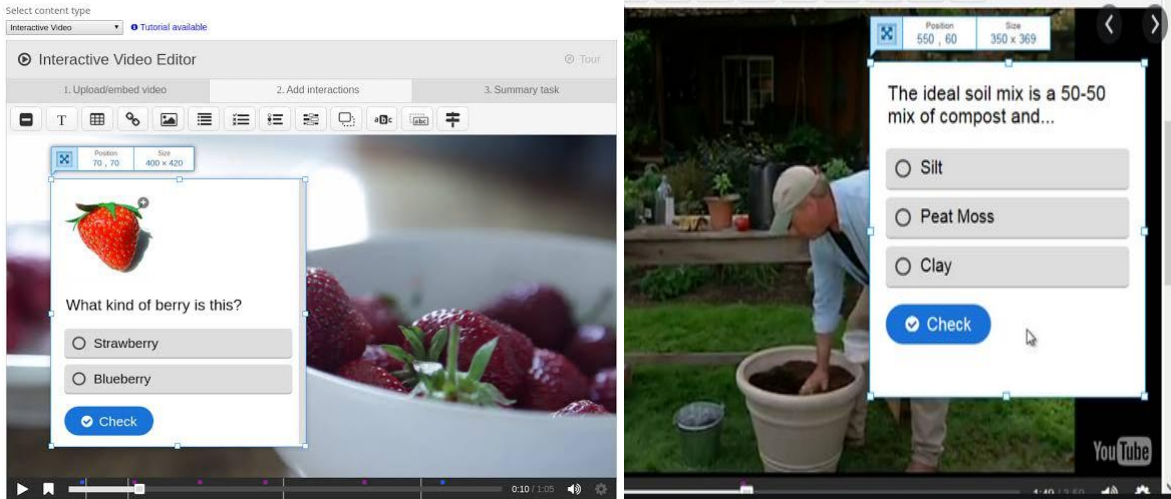
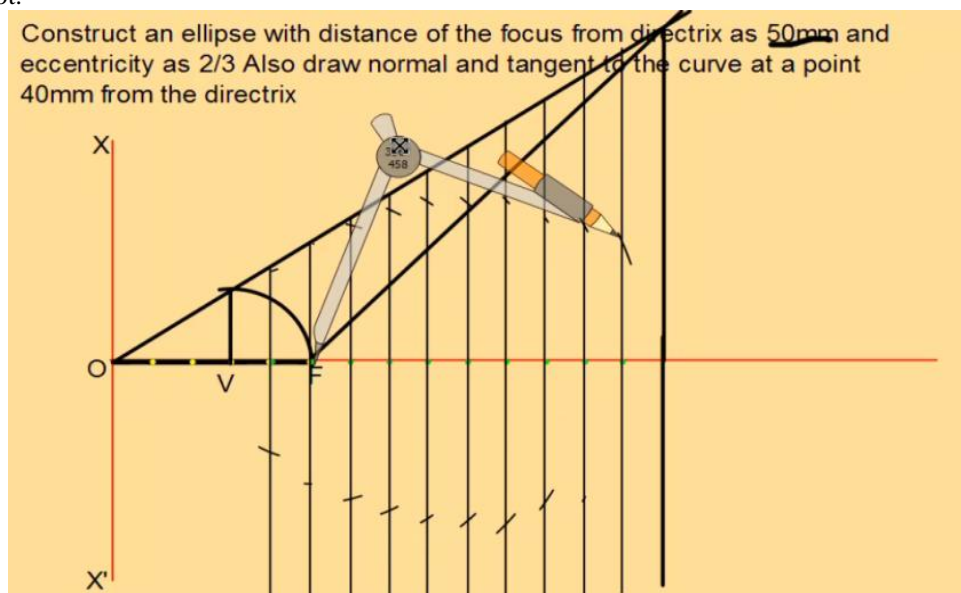


Figure 13: Screen shot of H5P interactive video Editor

A students knowledge after completion of a concept, will be evaluated through the assignments given by an Instructor. The above Fig:13, is such an example which tests a student knowledge. This will be another magnificent tool to test the knowledge of student whether he understood the concept or not.

(How to use H5P) -
<https://www.youtube.com/watch?v=UAj4Ars7pBE>

SCREEN SHOTS OF SOME CONCEPTS DONE USING ABOVE TOOLS:



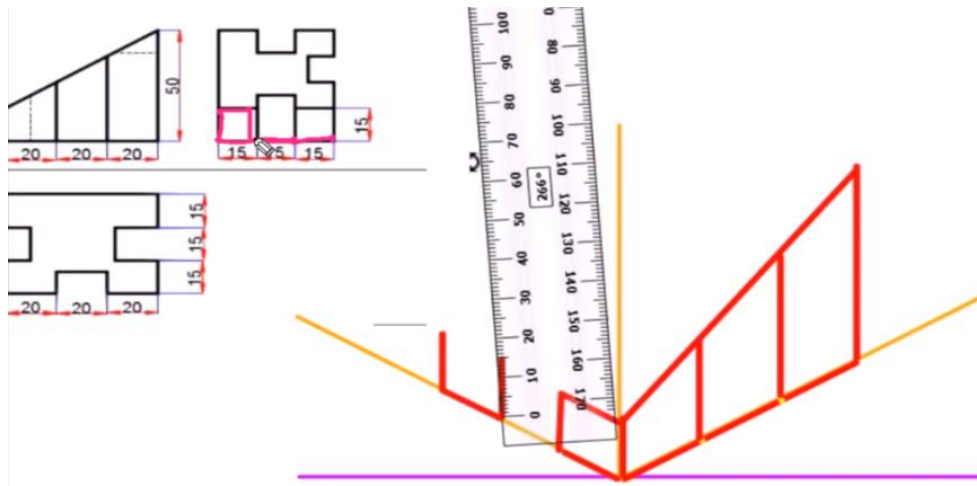


Figure 14: Ellipse and Isometric draw using Activ Inspire software

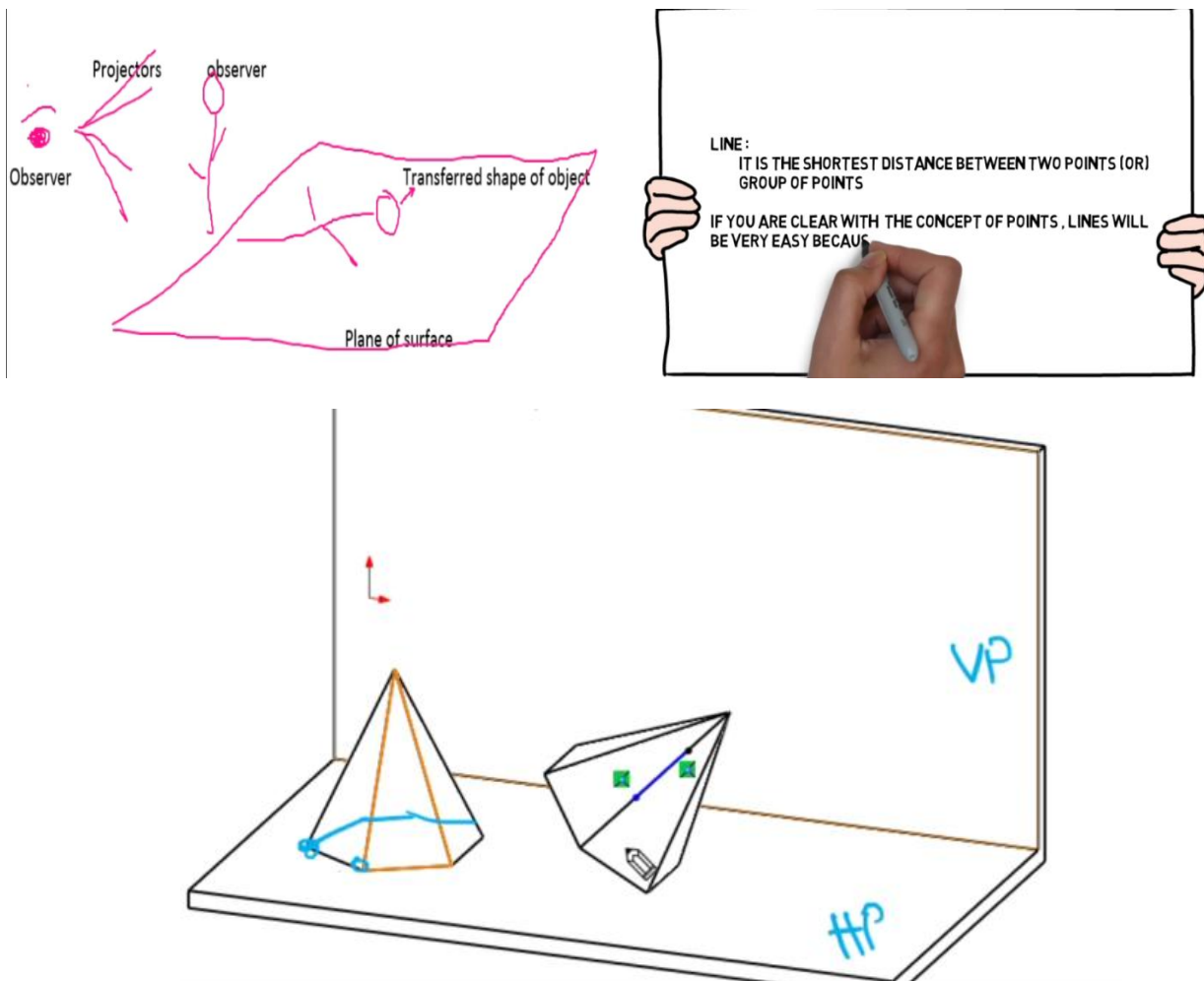


Figure 15: projection of Solid problem (Hexagonal pyramid) in solid works



Figure 16: Setting of drafting video with labels using Explaindo

IV. CONCLUSION

Considering different influencing factors from different spheres, its very much evident that the 21st century generation (Engineering Student Community) have a greater inclination towards smart learning and is highly interested to learn things from animations, software's and through practical models. In the domain of teaching chalk and talk played a vital role, but today the situation is strongly recommending a replacement & in accordance with that the Instructor choice of teaching tools should get modified, without forgetting the base for Engineering Drawing.

This is possible only when the teacher change himself, by employing new technologies or mapping the real-world technology, taking them away from class and bring them back with importance all together he needs to be a magician to grabs everyone attention towards subject. Then only the purpose will be full filled.

It is not guaranteed that by following with all tools and concept 100% attention but to an extent of 80% will be sure. The survey depicts that almost all are interested in practical demonstration and interactive teaching. Not many are showing interest in chalk and talk concept.

Here is the result of a survey:

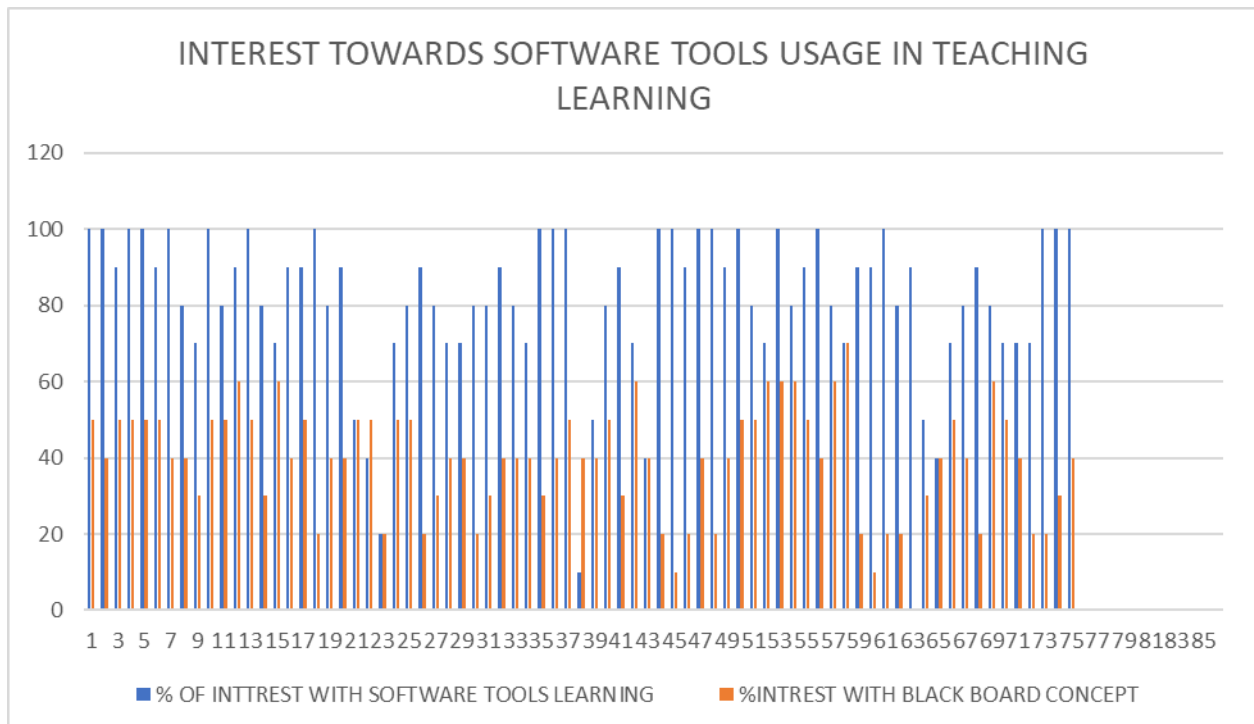


Figure:17. Results of the survey

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