

Models and Real Time Simulation are the Way of Effective Learning

Vishrant Mishra, Ravi Kushwaha, Dr. C.S. Malvi

Abstract-In this paper, we tried to convey the importance of effective learning through difference between the theoretical and practical outcomes and how it is beneficial for the learner. For example, one numerical from the textbook is being converted into the practical model. For the above conversion, we fabricate a model in our college workshop. This model conveyed the correct picture of mechanism given in numerical. This technique enhances the practical skills of students. In this case study, we have focused on the importance of recycling the waste paper generated from surrounding. During the study in our college, we came to know that a lot of papers are used daily and are just a waste. Therefore, there must be a recycling setup for reuse of these papers. By using this plant, the waste paper generated can be recycled and reused easily. We also observed that the prepared plant is economical, requires less maintenance and space to operate. Workshop is generally associated with development of basic knowledge of manufacturing. This includes fabricating the basic structures like T- joint, lap joint etc. but these joints become wastage after sometime. So, replacing this with an idea of distributing the different minor projects among the group of students in workshop. This minor project includes making of different types of products chosen by them which will increase their imagination or thinking power. Therefore, it will reduce the wastage of products and also develops an entrepreneurship skill. This also encourages the students to develop a start –up. The above case study concludes that the modern methods in workshop are much more beneficial in different aspects for the students than the traditional methods.

Index Terms - effective teaching, engineering skills, entrepreneurship, imagination skills, innovative skills, modern learning, practical knowledge, re-utilization.

1 INTRODUCTION

Interactive teaching is basically the interaction between the mentor and the learner so that learner can easily grasp the mentor's thoughts. In this type of teaching lab work plays an important role, lab work includes the real time simulation of theoretical aspects by using working models, prototypes, experiments etc. Creativity is another factor which is important for practical implementation because without any creativity, practical things are difficult to understand. As mechanical engineering concern with design, manufacturing, and use of machines therefore, interactive teaching is necessary like in mechanical engineering that includes moving parts like gears, shafts etc. These things are creating

differences between the ideal study and practical application which leads to a gap between the student's understanding and mentor's thought. This gap requires a bridge which is to be filled through interactive teaching. Teaching can be done by texts, pictures, schematic- sketches, may be simulation or a project but the objective behind that is to create a conceptual study and easy learning. The idea of 'Interactive Teaching' evolved to us by the experiences in class during the study of 'Gear Mechanism' in which we face difficulties in learning gear trains. Then we attempted to learn through various experiments, models, real time simulations which results in easy understanding.

In today's scenario, paper is highly used in every sector like agriculture, education, business, entertainment, communication, etc. With the overusing of paper, there is a drastic effect on environment due to which environment is continuously degrading so it is essential to reuse the waste paper. As paper can be easily renewed as compare to other reusable or non-reusable materials.

- Vishrant Mishra, Ravi Kushwaha, U. G. Student, Mechanical engineering, Madhav institute of technology and science. E-mail: vishrantmishra@gmail.com
- Dr. C.S. Malvi, Associate Professor, Mechanical engineering, Madhav institute of technology and science.

So paper recycling set up is a good mean of reusing paper. It only requires sufficient water, additive reagents, a pulp making machine, a sieve holder and screw weight. It is very easy to handle, operate the plant so even can students do the above process easily during their curricular and normal teaching classes. As different types of paper are wasted daily so this plant will decrease the rate of wastage of paper. Besides, running the waste paper plant this process also increases the student's responsibility and priority towards the environment.

Every college has a regular workshop which follows the traditional methods of providing basic knowledge of manufacturing products made of wood, metal, fiber etc. by preparing basic joints like T- joint, V- joint. But after some time these products prepared by the students are of no use. These products are treated as wastage and are generally being dumped which results in high wastage of wood and manpower. So, these traditional methods can be refined by assigning a mini project to a group of students. The theme of projects can be chosen by students themselves. This will not only increase their innovative approach but also enhance their team work skills while preparing the project.

2 CASE STUDY I: EFFECTIVE LEARNING BY MODEL FABRICATION

2.1 MODEL FABRICATION

While preparing practical model of the above numerical, the following fabrication steps are done:

1. First , the gears are arranged of respective teeth given in numerical
2. Then the shafts wereturned to the respective sizes of gears by turning operation on lathe.
3. Gears were installed properly on the shafts like two compound gears D-E on the same shaft and two gears B-E on the arm.
4. Then the shafts were inserted in the bearing which in turn was supported by two supports so it can be easily revolve about its own axis.

5. Now, gears are adjusted for proper meshing with each other.
6. Joints were properly welded and motions are restricted for desired motion of gears as provided.

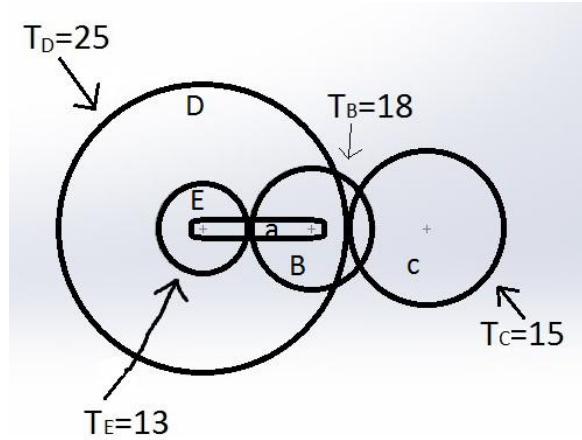


Figure no. 1



Figure 2: Model and its parts

2.2 OBSERVATION

Table no. 1

S. No .	Speed of arm (in rpm)	Theoretical speed of C	Observed speed of C	Percent age error
1.	30	80(clockwis e)	60(clockwise)	25%
2.	35	93(clockwis e)	70(clockwise)	24.73%
3.	40	106(clockwi se)	80(clockwise)	24.52%

2.3 OBSERVATION METHOD

This method can be done by using practical model of epi-cyclic gear mechanism

Given speed of arm A = 40 rpm

So it is being rotated manually

Therefore, main shaft is rotated i.e. speed of D and E (x) = 40 rpm

Observed speed of gear C (due to meshed with D and E) = 80 rpm

2.4 RESULTS & DISCUSSION

1. The average calculated percentage error is equal to 24.52%
2. Observed and Calculated speed of gear C is 106 and 80 respectively (in rpm)
3. The Observed and Calculated gear ratio for gear D and C are 2.0 and 1.67 respectively.

By using these types of teaching techniques, learning becomes much easier and entertaining as compare to usual methods. This technique helps in solving complex problems which are not easily solvable using traditional techniques as much more clear results are observed. In addition to this the future learning is much more interactive and also enhances the practical skills, learning capability, detailed knowledge of a learner.

3 CASE STUDY II: REUTILIZATION OF WASTE PAPER IN PAPER RECYCLING PLANT



Figure 3: Paper Recycling Setup

3.1 METHODOLOGY

During our study paper was recycled by the students in the paper recycling set up in our college workshop. This setup consists of following major components i.e. a pulp making machine, a sieve holder, a screw weight, roller and cutter.

Starting with the pulp making machine, firstly we collect some waste paper from our college premises and then preparing a pulp by using motor. There should be proper ratio of water and paper while making the pulp then we add require amount of additive reagent like bleaching powder, caustic etc. Secondly, sieve the produced pulp in the sieving set up carefully with the use of strainer.

Finally, we use screw weight for converting dry pulp into flat sheets of paper. Screw weight is used to

flatten the pulp by applying force manually then we use roller and cutter to obtain the required shape of sheet. The above discussed method is easy enough for anyone could operate the plant themselves and no guidance is required.

3.2 RESULT

During our study, we came to know that this is a type of innovative approach to recycle waste paper into an eco-friendly product and it is also enhances the student capability to work on a machine and to operate it correctly.



Figure 4: Processes While Recycling Paper

3.3 DISCUSSION

1. We also came to know that during this process students become aware of responsibilities towards environment and they can find different ways of recycling other materials.
2. This case study concludes that the way of saving environment by using different innovative and interactive approach for the young generation.

3. We know that paper is primary requirement so it is needed to find different ways of recycling paper.
4. As the initial and maintenance cost of such setup is low so it can be establish in different areas for recycling paper frequently.



Figure 5: Obtained Recycled Paper

5. Manufacturing is an energy intensive business and we are dedicated to minimizing our energy use in all aspects of our plant.

4 CASE STUDY III: MINI PROJECTS FOR STUDENTS

4.1 METHODOLOGY

In our case study, we observe some students who are engaged in doing their mini projects. While preparing their projects, they are frequently using different methods like riveting, punching etc. and also developing different ways of constructing their projects. They are also using different types of tools, machines. After preparing their projects, they are engaged in finishing them and giving an aesthetic appearance by different means like polishing, painting by different colors.

4.2 RESULT & DISSCUSSION

1. Many different types of product are generated.
2. Some of them are used for the purpose of decoration and also used in daily household practices.
3. By using, this technique, the materials which are getting waste can be properly utilized now.



Figure 6: Obtained Mini Projects From Students

4. The students can learn different ways of manufacturing the products.
5. This process enhances the team work skill among the students.
6. The products which are manufactured by the students can be sold in the markets which will their marketing and entrepreneur skills.

5 CONCLUSION

From all the cases which are discussed above, we came to the conclusion that they all emphasizes on effective way of teaching which are beneficial for the students. This effective teaching leads to improvisation of entrepreneur skills, creative thinking, learning skills and machine operating skills.

Effective teaching creates a bridge between the learner and the mentor which enhances the grasping ability of learners. This teaching skill also increases the practical knowledge of the learner because theoretical problems transforms into practical models.

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