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Survey and Analysis of the Educational Problems of Engineering Graphics

Binta Bhargav¹, Roshani Patel²

^{1,2} Asst. professor, Mechanical Engg. Dept., MBICT, New V. V. Nagar

ABSTRACT: To develop the basic capability of Engineering Graphics students, commonly problems and countermeasures in study are discussed in this paper. The rare realization of Engineering Graphics importance, negative learning attitude, blind admiration to computer graphics, importance of other non technical subjects which are comparatively easy and insufficient practices are discussed in detail. Strengthen practice and improve communication between teachers and students, proper arrangement of chapters is effective to gain better teaching quality. Through the follow-up survey of completion of their after-class exercise and drawing practice, the effect of enthusiasm, practice and interference is demonstrated. The Engineering Graphics subject contribution deals with the transformation of engineering drawings in a paper form into a 3D computer representation. A 3D computer model can be further processed in CAD/CAM system, it can be modified, archived, and a technical drawing can be then generated from it as well.

Keywords: Engineering Education, Engineering Graphics, Teaching Methods, Computer Graphics, continuous evaluation system, 3D Model

I. Introduction

Technical communication is an advanced form of communication whereby people of the same trade (profession) can convey messages to one another more accurately and precisely. To achieve this, a technical language, which is well standardized, is needed. Engineering Graphics is a commonly used drawing method similar as language; it has played a fundamental role of engineering progress. Basically, drawings are used for communication in industry, mainly in mechanical, civil and architectures, because it is the most effective way to tell people what to make, and how to make. The fundamental purpose of an Engineering Graphics is to carry, control and maintain a product's definition in a precise and clear way with all detail without any risk and without any misinterpretation or assumptions.

In today's scenario, with the improvement and development of industry and computer graphics software, the importance and practical range of Engineering Graphics is drastically expanded. In the education aspects, Engineering Graphics is a compulsory technical basic course for college students of engineering. Almost all the problems about engineering are related to Engineering Graphics, the designer use drawings to express the ideas of designing, the material handling use engineering drawing for different materials and compare to each other, the manufacturer working according to the standard of drawings. As a compulsory technical basic course for first year students from engineering and technology, it's great challenge and committed to mission of cultivating students' logical visualization, imagination, skills of be familiar with the sense of abide by the relevant national standard and master the basic drawing and reading of Engineering Graphics. But in the teaching process, the former part of the course is very abstract and requires certain ability to visualization, imagination and the latter part is closely related to the engineering applications, both making obstacles to students who are commonly lack of engineering acknowledges. Especially in recent years as the overall quality of the fresher's decreases of learning quality in school years and entry percentage at the time of admission, the learning status of this course is worsening. With the development of teaching methods, multimedia assisted instruction, software entry is introduced and the amount of information is much improved, so the class is more interactive and effective, but the actual effect is inconspicuous. For the purpose of high diathesis personal, solutions should be sought in many aspects to improve the teaching quality.

In this paper we will discuss the ways to improve teaching quality of Engineering Graphics based on the problems and hurdles found in education.

II. Problems with the engineering drawing subject

Artistic Drawings: These are a form of freehand representation that makes use of pictures to provide a general impression of the object being drawn. There are no hard rules or standards in the preparation of artistic drawings. They are simply drawn by

artists, based more or less on one’s talent and skills. Although these drawings are often very attractive, they find very limited use in the world of science.

Technical Drawings: These are detailed drawings drawn accurately and precisely. They are pictures that have been prepared with the aid of mathematical instruments in order to record and transmit technical information. They provide an exact and complete description of things that are to be built or manufactured.

- Technical drawings do not portray the objects the way they directly appear to the eye.
- They make use of many specialized symbols and conventions in order to transmit technical information clearly and exactly.
- To understand and correctly interpret technical drawings, one needs to acquaint oneself with the fundamentals of technical drawing – hence the purpose of this course

Engineering Graphics is a very important technical basic course for students of engineering; it is the basic to the latter professional courses and also is widely used at industries. Because the important and fundamental, the course is arranged in the first level. As a technician who has been working on engineering techniques for years, it is of no difficulty to understand the importance of Engineering Graphics, but it’s hard for a fresher’s to feel the importance of the course.

In order to find out the difficulties of the Engineering Graphics, an investigation is carried out. Seven courses are involved in, they are: Engineering Graphics, Physics, Basic Electronics, advanced mathematics, Computer Programming and Utilization (CPU), Contributor Personality Development (CPD) and Elements of Electrical Engineering (EEE). The importance is divided into 5 levels: A, B, C, D and E, “A” means the highest importance level, and it is reduced step by step from “A” to “E”, There are 30 number of students involved in the survey, all the students' major are from mechanical branch. The result is shown in table 1.

Table 1. Importance Investigation

Course Name	Numbers of student				
	A	B	C	D	E
Engineering Graphics(EG)	18	5	4	3	0
Physics	20	7	3	0	0
Basic Electronics	17	4	5	4	0
Advance Mathematics	1	12	2	0	0
Computer Programming and Utilization (CPU)	15	4	10	1	0
Contributor Personality Development (CPD)	23	4	3	0	0
Elements of Electrical Engineering (EEE)	15	3	1 1	1	0

From table 1, the most important course is “CPD”, the second is “physics”, and the third is “Engineering Graphics”, the forth is “Maths”, thus it can be seen that the traditional course occupy a larger proportion. There are mainly two reasons leading to this: the subjective understanding is poor. From the perspective of students, they have just began to contact Engineering Graphics with little drawing experience and don’t know the role of drawing in practical production process, the lessons can’t let them really feel the practicality of the course; from the perspective of the

teachers, no doubt every teacher will emphasize on the importance of the course repeatedly, but the students usually don't seem to pay enough attention to it. On the other hand, the subjective request of students cultivating plan largely weakens the importance of Engineering Graphics. Although in many forms Engineering Graphics is placed on a crucial place by many engineering professions, but in fact it appears to be not. Some courses with mandatory targets take the students a great lot of time and it is impossible for them to learn engineering drawing well even if they want to. For example 23 students are found learning cpd before class, but seldom read the Engineering Graphics material or do drawing practice.

To establish the crucial position of Engineering Graphics in professional teaching of engineering, the key stone is to realize its importance in applications and teaching practice, implement on it and not just confined to form. A simple and effective way is to set up continuous evaluation system of engineering Graphics for students of engineering and the mode of cpd and physics grading system can be taken for reference, the specific form can be combination of theory and practical.

III. Negative Attitude

Concluding from the many years of teaching experience there is always some students or even lots of students whose learning attitude is worst. The most obvious feature of them is learning carelessly. Symptom can be found as follows: Do not take the class seriously or even skip it, rarely do the homework on time, the drawing is casual and doesn't follow the standards of drawing, make the same mistake many times while ignoring the correction given by the teacher. The factors affecting learning attitude is of many aspects. Firstly, after going into college, the academic pressure is completely released, and the loose management in school lead to the decrease of the learning initiative, some students loses their learning activity. Secondly, engineering drawing is a totally new course for almost all students, except technical school background students and isn't as easy to accept as English and math which have been learned continuous and comparatively natural to accept. As a fresh new subject it has unique way of thinking and learning method, part of the students failed to conquer the difficulties at beginning and find it difficult to learn, so gradually some of them may give up and takes a negative attitude towards this subject. In addition of this students basic tendency of not attending classes at the beginning of term and as the topic of the subject is connected to each other they do not understand the topic and their interest is going to reduce from the subject and they create negative attitude towards the subject.

Attitude plays a decisive role in learning and all kinds of effort is useless if the students give up the learning themselves, it's crucial to cultivate their enthusiasm and initiative. In the teaching process many methods can be used to encourage them and improve their enthusiasm such as making examples of application instances, visiting the producing process, praise the ones who finish the practice well and explain the importance of this course in future working by examples.

IV. Insufficient Practices

Aspect of practice includes home work and but they don't achieves the expected result because of all kinds of reasons. Engineering Graphics is a very practical course, which requires a lot of practice except for reading and thinking, and improves logically, so there must be some amount of homework for the students but in fact the majority of them fail to accomplish it. The reasons can be included as follows: some students take a negative attitude and some put more energy into other courses that have more requirements. Usually 10 to 20 learning hours is arranged in Engineering Graphics to do the model practice which is clearly targeted, such as: continuous learning method, and adequate communication between the teacher and the students is necessary, but as the teaching hours are limited so part of the work has to be done after class and this will reduce the chances of face-to-face communication and weaken the effect of practice process. Implementation of practice is crucial to the study of Engineering Drawing, and it will be beneficial for the students if practice is strengthened properly, more guidance and communication are favored.

V. Faculty Input:

For the better understanding of this subject; technical subject, add new techniques in teaching, give more emphasize on drawing practice by giving easy problems with easy chapters at the beginning of term with very simple and understanding language. The homework should not be too much and too lengthy as the students may feel tired and lose interest about it

gradually. Now a day with the help of computer software's arouse the interest of the students and mobilize their initiative, and improve ability to draw diagrams in improved and effective manner. It lays a solid foundation for course learning. Improve test method of Engineering Drawing has followed a mode which got scores by an examination paper and improve confidence of students.

The most important part is assessment, it should reflect the fairly, equitably and publically. For example, the class examination records must record the classroom questioning and exercises timely, and students who has the best and worst performance must be announces. It is better to praise the excellent and thrash the backward students in time, and promote the middle students by sizing both sides' students. Fair and public of examine to build up good students have more enthusiasm in studying, and bad students study hard to catch up, which can promote the further improvement of the teaching effect.

VI. Conclusions

In this paper, problems in Engineering Graphics study are proposed. The main contributions of this approach can be summarized as follows:

- Engineering Graphics is an important technical basic course for students of Engineering and its importance should be implemented in teaching management and process.
- The key problem is to cultivate activity and initiative.
- Well finished the homework and drawing practice is the basic c requirement.
- Focus on the learning of the basic theory, way of thinking, drawing method and obey the regulations strictly.
- Continuous evaluation of the course leads good improvement in knowledge of students. This information arrives at twice the result with half the effort.

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