

Based on Project and Innovative Ability of Engineering Practice

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Abstract: Importance of engineering practice and innovative education was introduced. Engineering practice was emphasized, which was the major stage of innovative education that had important action to enhance quality of students, set up right weltanschauung and worth view. Understand of acting the innovative practice by students was discussed. Every one has innovative potential, which was exploited by practice. Stability base could be built to make more innovation in engineering practice. The innovative experience of our university was introduced which the engineering practice course content was organized newly, and students' interested electronic circuits was made by themselves which was consulted by independent experiments. Innovative ability and cooperation ability were trained. The action was made know one year, that the innovation was success. The students like joining in the engineering practice more. Hands-on ability was exercised, and more techniques knowledge was learned. Innovative idea and means could be known. The society was realized more.

1. Introduction

There were some changes happening on engineering training which emphasized strong practice nature. First, haploid technique and skill training was edged out by diathesis and colligate training, second, stand-alone skill training was edged out by colligation economy and innovation training, third, conventional technique and skill training was edged out by new technology and new techniques. Base on the understand engineering training course was developing, our university bring out that training student engineering practice consciousness, and enhance students inaugurate ability, according as practice project and interest ability specialty of students.

2. Essentiality of Engineering Practice and Innovation Education

Students has changed to use a good many tools and handle a large number of equipments, but these ability was not the all of engineering practice. Engineering practice includes the ability to look-in and analyze the thing, bring forward problem and solve problem on the fact, operated the equipment themselves, assorted with new problem arisen. Students operated a large number of equipments, touched correlation app technology, fetched up the shortage of practice knowledge and practice experience. Experience succeeds and lost, at sea and apperception, students could know the working trial, understand laborer, and respect work.

Engineering practice was import to education for all-around development, students' correct philosophy weltanschauung and worthiness. Engineering practice could contact theory knowledge with practice operation and confirm theory. The problems were considered and solve themselves. Innovative ability and innovative thought was trained.

“Innovation is the soul of a progressive nation and the motility of a blossom nation”. University mans had the innovative potential all. But the potential needed some fashions and ways to exhibit which was the Engineering practice namely. There were a lot of equipments and techniques

containing the idea of deviser and fabricant in the Engineering practice. Students could gain edification and innovative afflatus.

3. Understand of Innovation Practice to University Mans

Now, technology developed with each passing day. New techniques which was mostly created by university mans appeared quickly. Bring up students' innovative consciousness and innovative ability, which can create more. Engineering practice is the footstone to university mans. There are a lot of equipments which have some lacks on new age sight. Know the lacks and ameliorate them, which leave over precious thought and develop room. Even advanced numerical control machine tools are constituted with general parts and innovative parts.

After know past and today, know difference, we can create better future. The reason of learning the knowledge is to solve the fact engineering problems. Existing engineering theory and practice can solve mostly problems in mass things. But if the problems exceed the existing knowledge, the new engineering theory and means need be found. Engineering technology was developed as knowledge and science. In fact, almost everyone has innovative potential, which depend on unite of theory and practice, depend on personal create enthusiasm and pressure extent of society demand. The key of bring up the innovative spirit is an okay bring up mechanism that the faculty adviser lead propriety and make the students grip the means of innovative thought.

4. Reformation of Engineering Practice Teaching

The reformation of engineering practice teaching is developing as the times. The traditional engineering training course was redefined to "Engineering Practice Base on Project and Inaugurate Ability" in our university. Break the traditional teaching fashion, base on synthesize practice project, emphasize students' individuation learning, consult the work piece in cases, come true students' innovative facture. There are more imaginations and ideas which offered to students. Innovative ability and manufacture ability are better trained.

Training students' basic techniques sills, autocephaly working ability, engineering consciousness, colligate innovative ability. Learn knowledge, boosting up touch ability, training innovative ability in practice. Combining traditional practice with new technique practice, and combining engineering training with technique analyze, skill training with innovative ability, theories with operation, engineering practice with manufacture of army equip. Make the students able to predominate basic knowledge of modern engineering technique, realize engineering culture of manufacture, deepen understand of product in produce course. Boost up engineering practice ability, enhance engineering diathesis, and train innovative spirit and innovative ability using practice conditions offered by the course.

Based on project and innovation ability is mainly designed and expounded from two aspects.

4.1Reform and Practice Project of Mechanical Manufacturing

The course content contact a whole by the principle of "basic, system, advance, practicability", designed in modularization and structure casing. The content make up of four mostly modules:

(1) Module of general technique basic training---heat machining part including foundry, electric welding, gas welding, argon arc welding, heat treatment, surface handles; Cold training parts including vehicle, mill, grind, clamp training. Which train students touch ability and learn general technique knowledge.

(2) Module of advance manufacture technology training---manufactures in numerical control vehicle, numerical control mill, numerical control line incision, figuration of electricity light; manufacture system in local area network. Which combine general technique knowledge with advance manufacture technicsogy. Accomplish handwork programmed and automatism programmed, learning manufacture system and high level manufacture software.

(3)Module of innovative project design and technique design---innovative independent experiments execution colligating all training module of cold machining and heat machining, base

on students' innovative idea, come true innovative design and making of workpiece, select material and frame the path and means of manufacture in the case of engineering training pieces. The students can learn scientific thought, bring up scientific spirit which is brave in exploration, audacity practice, and dare to innovation. The ability of colligation handle knowledge and innovative ideation can be boost up.

(4) Module of innovative project and colligation diathesis training---execution about colligation independent experiments., which bring up touch ability and the level of engineering technology, build up engineering consciousness, bring up practice ability and innovative ability, and enhance the ability of analyzing and solving problem in fact engineering. The training also enhances the students' diathesis; make the foundation for being the high diathesis and new pattern military affairs person which have strong innovative spirit and innovative ability.

4.2 Reform and Practice Project of Electrical Practical Teaching

The design of electrical practical teaching content is carried out in a progressive way. Innovative independent pilot projects based on product or project design are constructed. The group production of students is shown in figure 1 and figure 2. Aircraft design and digital clock circuit design make students feel the fun of making. Students are active in completing the experiment, and their comprehensive ability has been greatly improved.

The content of innovative project consults by the independent experiments. built by our university, which fill exert students' ability and wisdom, cooperate with the students and have an innovation together. There are a lot of craftwork and process of experiments in the independent experiments.

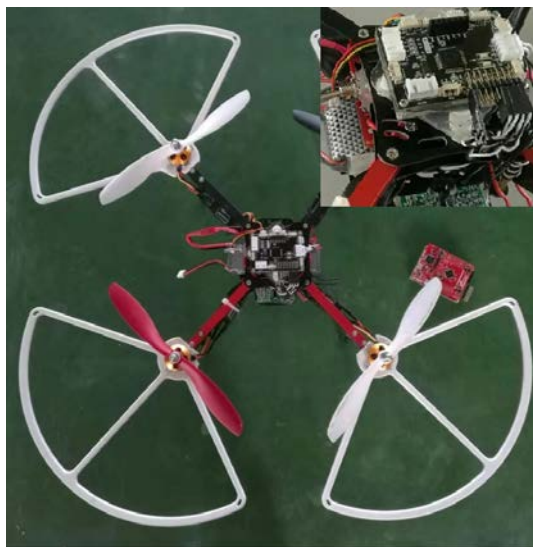


Fig.1 Flight vehicle design



Fig.2. Digital clock circuit

After reformation, the students who learn engineering training know basic knowledge, theory and means about machine manufacture. The students also choose appropriate manufacture means

and accomplish the making of simple part by themselves. In studying and practice teaches, engineering consciousness and scientific style which about security consciousness, quality consciousness, responsibility consciousness, colony consciousness, protect of circumstance, economy, manage, discipline, innovation, can be bringing up.

5. Conclusion

The aim of engineering practice is that innovative ability was train, which was a key opening up the gate of science and handing by university. Innovative ability also was the base of development of whole society. The innovation of engineering practice course in our university which engineering practice base on project and inaugurate ability, just was that enhance innovative ability. The fact was proved one year, that the innovation was successful. The students like to join the practice more. Hands-on ability was exercised; basic technique knowledge was learned; innovative idea and means could be known. The society was realized more.

References

- [1] Introduction to Manufacturing Process, Third Edition, John A. Schey, McGRAW-HILL INTERNATIONAL EDITIONS, 2000
- [2] Maurer M J, Thompson H A. Non-Fourier effects at high heat flux. ASME J. of Heat Transfer, 1973, 95:284-286
- [3] Schultz H. Electron Beam Welding, Cambridge: Abington Publishing, 1993
- [4] Dr. Bernardof. Adiviso, Industrial training in the context of technician education and training programs in Colombo plan member countries, proceedings of the 6th International Conference on Modern Industrial Training, 24-27, October, 2000, Beijing, china
- [5] Tsui J 2005 Fundamentals of Global Positioning System Receivers: A Software Approach (New York: Wiley&Sons) pp 205-206
- [6] Lewandowski W, Azoubib J and Klepczynski W J 1999 GPS: Primary Tool for Time Transfer. Proceedings of the IEEE 87 163