Curriculum Diversification in Mechanical Engineering Technology Programs

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Abstract

Mechanical Engineering Technology is a very broad field of study that may include the following topics: structural design, machine design, fluid design, thermal design, manufacturing processes, engineering economics, quality control, electronics, computers, automation, and many others. Such a breath of topics is difficult to fit into a four-year curriculum and the depth of study in each is expected to vary between programs. A nationwide study of the TAC/ABET accredited Mechanical Engineering Technology programs was conducted to determine the amount of curriculum diversification, the depth of study, and the popularity of the various topics of study. The Internet was used to gather the curriculum for all of the eighteen programs that were found. The diversity of topics and the depth of study in these topics was determined. Twenty topics were identified. Some topics were very much more popular than others with several topics not available in the majority of programs. Considerable diversity existed in the number of topics and the total hours taught in various programs.

Introduction

Mechanical Engineering Technology (MET) is one of the broadest fields of study in Engineering Technology. Some of the topics generally associated with MET are computer-aided drawing (CAD), machine design, structural design, thermal design, fluid design, manufacturing, materials, safety, and others. After allowing for general education requirements, insufficient time is available to study all of these topics in a Bachelor of science curriculum. Consequently, compromises must be made in designing the MET curriculum. Between MET programs, considerable latitude in the curricula may exist. Additionally, TAC/ABET may have caused more topic depth and less breadth than would otherwise occur. Large MET programs may offer a wider variety of courses than smaller programs, and local industry probably influences the breath of topics offered. In order to answer some of these questions, this author became interested in defining two aspects of the MET curriculum compromise: (1) which areas of study were the most popular and (2) how much breath existed in the offering the array of topics.

Methodology

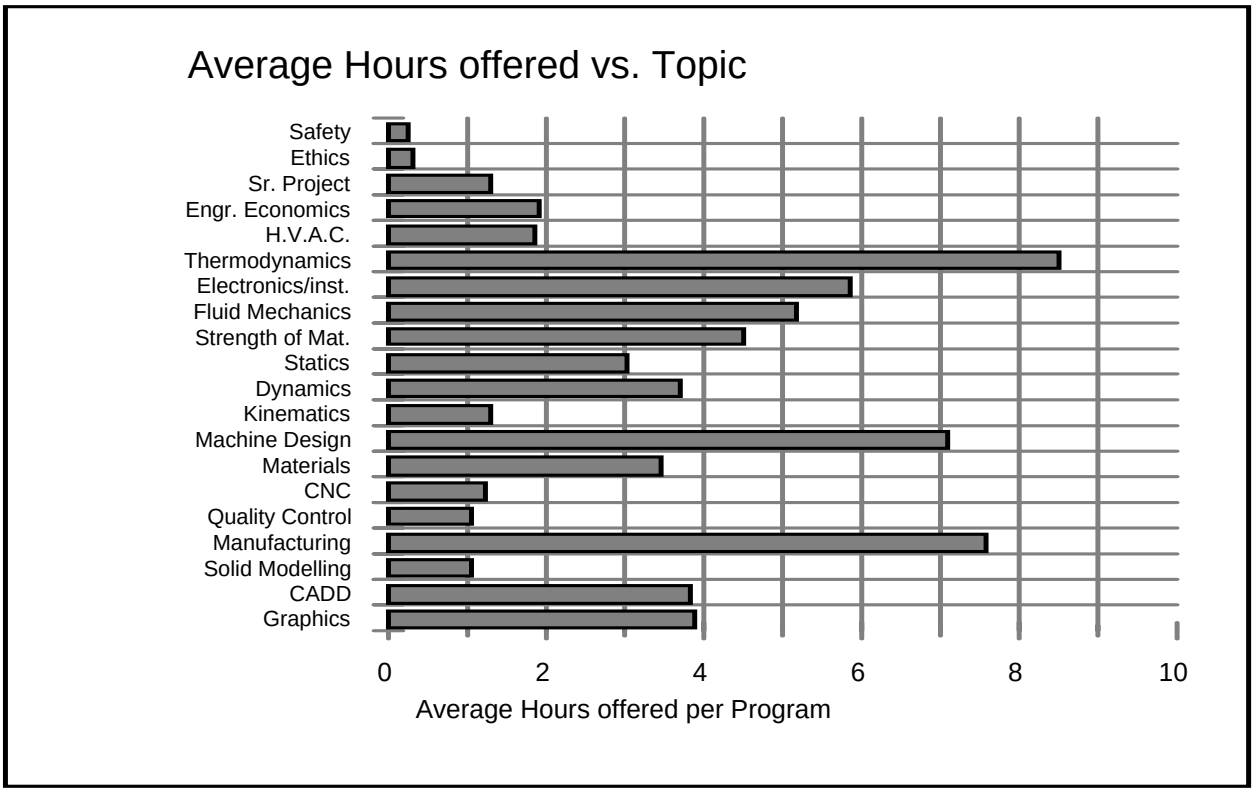
Gathering data on the MET curricula nationwide would have been more difficult prior to the Internet. However, the writer found that many of the MET programs did provide their curriculum and total course offerings on the Web. Some Web sites even provided scheduling information for the next few terms. After searching for “Mechanical Engineering Technology” and sifting through the duplicates and irrelevant entries, eighteen MET sites were found that were TAC/ABET accredited. The results obtained from this sample of eighteen would probably represent other MET programs that are currently scrambling to get on the Web.

The curricula of the sample were analyzed and twenty topic areas were identified as follows: Safety, Ethics, Sr. Project (Capstone), Engineering Economics, H.V.A.C., Thermodynamics (and heat transfer), Electronics (and instrumentation), Fluid Mechanics, Strength of Materials, Statics, Dynamics, Kinematics, Machine Design, Materials, CNC programing, Quality Control, Manufacturing (machining and manufacturing processes), Solid Modeling, CADD, and Graphics (manual). Within each curriculum, the number of hours devoted to each of these topics were counted and an average per program was calculated. This process yielded the popularity of each topic.

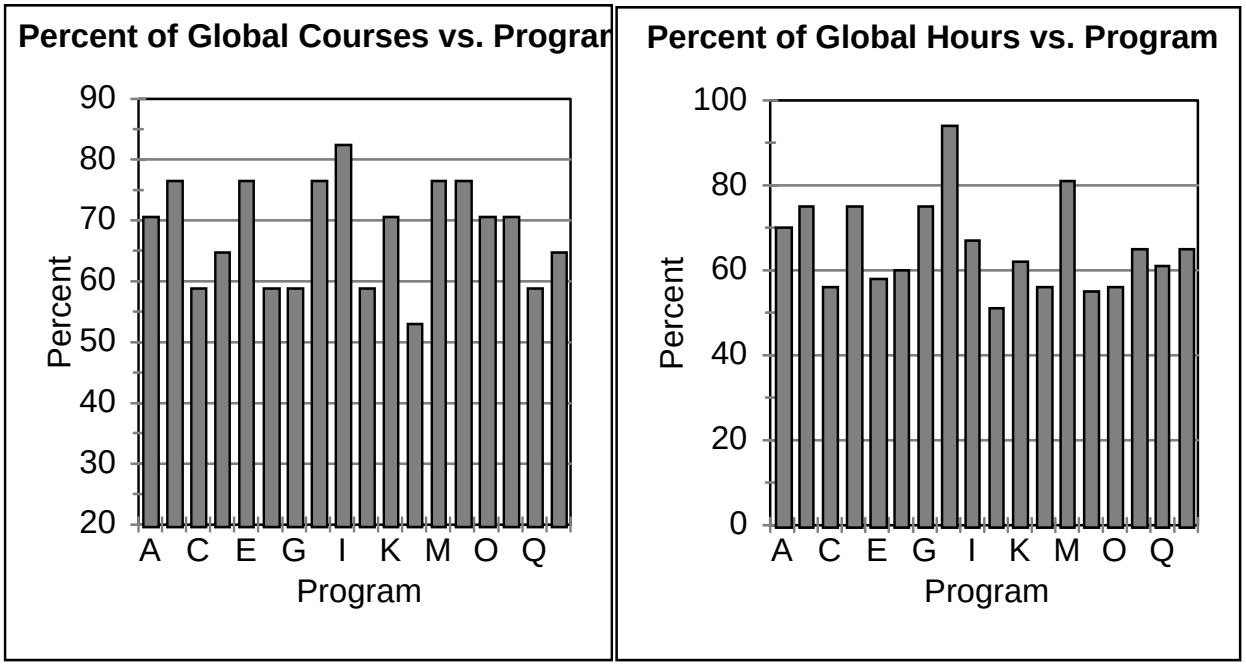
To define the breadth of study, all of the topics offered were considered the "Global" MET curriculum. The Global MET curriculum was defined to be all of the topics available for study at all of the programs even if they were optional or elective topics. The percentage of this Global curriculum was calculated for each of the programs. Two ways of calculating this percentage are presented, (1) a count of topics compared with the "Global" count and (2) the hours offered by each program compared with the "Global" hours offered.

Results

This study does not identify individual MET programs or their institutions. The individual programs are identified by the letters A through R. The following graph displays the relative popularity of the twenty topics. The three most popular or widespread topics were found to be Thermodynamics, Machine Design, and Manufacturing. It is interesting that the fourth most popular topic was Electronics/instrumentation. In some programs, AC circuits, DC circuits, Digital Logic, and instrumentation were required. The increasing industrial use of computers as data loggers and other sophisticated instrumentation requires some facility with electronics. The topics, Safety and Ethics, were not as popular education as in industry. The average hours per topic was calculated to be 3.2 with the large standard deviation of 2.5.



The curriculum diversification is shown in the graph below and left. One hundred percent would represent a program offering all of the course topics that any program offers. The maximum offered was 82 percent and the minimum offered was 53 percent. The average offering was 68 percent with a standard deviation of 8.6 percent. The more topic offerings were generally associated with large programs that could support many options and electives. However, even the smallest program provided ample offerings to be TAC/ABET accredited.



Another approach to diversity was comparing the hours taught by each program with the Global hours taught shown in the graph above and right. This graph has more resolution than the prior graph because it not only counts the topic but includes the hourly emphasis on the topic by each program. An unexpected result was the difference between counting the topics available in each program and counting the total hours available in each program. The reason for the difference is that some topics counted only once but contained many elective courses. The maximum hours were 94, the minimum hours were 51 and the mean was 65.7 with a standard deviation of 11.

Conclusion

The data and graphs indicate that Mechanical Engineering Technology programs can vary quite widely and still be successful enough to become accredited. Students who are interested in a particular topic could benefit by attending a MET program with depth in that topic. The Web can provide information to make that decision. The quality of the MET Web sites varied from simple text to ornate artwork, and from sparse to quite complete. More MET programs will utilize the Web in the future. This can provide not only their curriculum but also their faculty photographs and credentials, campus photographs, laboratory photographs, salaries of graduates, and other aspects of interest to prospective students.

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