Chinese Journal of Aeronautics, (2018), xxx(xx): xxx–xxx

Chinese Society of Aeronautics and Astronautics
& Beihang University

Chinese Journal of Aeronautics

cja@buaa.edu.cn
www.sciencedirect.com

80 years education of aerospace science and technology in Tsinghua University

Jie LU, Yongli GAO, Xiaojing WANG, Chenyuan BAI, Bing WANG, Ziniu WU *

School of Aerospace Engineering, Tsinghua University, Beijing 100084, China

Received 1 June 2018; revised 4 June 2018; accepted 16 June 2018

KEYWORDS

Academic output;
Aerospace;
Education;
Favorite activity;
Students

Abstract The development of aerospace science and technology largely relies on the education and academic contribution of students in universities covering aerospace science and technology. The School of Aerospace Engineering of Tsinghua University, with a history of eighty years since the set-up of its Department of Aeronautical Engineering in 1938, graduated 5273 undergraduate students, 1939 master students and 931 Ph.D. students. This paper provides an overview and analysis of the data related to undergraduate, master and Ph.D. students of this school. These data include the historical evolution of number of students and the actual status of students like their various interests and academic performance. The data and information shared in this paper may be useful for comparative study and for those who need primitive data to study relevant issues such as mental health of students, promotion of gender balance and educational improvement.

1. Introduction

Tsinghua University established its aeronautical discipline in 1934, on which von Karmann offered advices in its early development, and this is the earliest discipline of aeronautics founded in China. Department of Aeronautical Engineering of Tsinghua University was set up in 1938, and was moved off to form Beijing Institute of Aeronautics (now Beihang University) in 1952. Department of Engineering Mechanics (DEM) was established in 1958 to retain some activities in aerospace research and education, which laid a foundation for the establishment of School of Aerospace Engineering (SAE) in 2004. This school includes the DEM and a new department called Department of Aeronautical and Astronautical Engineering (DAAE).

Exactly 80 years have passed since 1938. During these 80 years, 5273 undergraduate students, 1939 master students and 931 Ph.D. students graduated from this school/department. It may be of reference values for government agencies, industries, universities, professors and newly enrolled students to share the data, which reveal the evolution of number of students graduated, its correlation with the evolution of faculties and major historical events, the actual quality of education in terms of the productivity of Ph.D. students, and the interests of undergraduate students in various activities.

* Corresponding author.
E-mail address: ziniuwu@tsinghua.edu.cn (Z. WU).

Peer review under responsibility of Editorial Committee of CJA.

Production and hosting by Elsevier

https://doi.org/10.1016/j.cja.2018.06.017

Please cite this article in press as: LU J et al. 80 years education of aerospace science and technology in Tsinghua University, *Chin J Aeronaut* (2018), https://doi.org/10.1016/j.cja.2018.06.017

The education history alone is of interest for both education studies and government investment. For instance, in each year, the USA National Science Foundation provides 72 tables including detailed data on the demographic characteristics, educational history, sources of financial support, and post-graduation plans of doctorate recipients.[1]

As pointed out by Levecque et al.,[2] research policy observers are increasingly concerned about the potential impact of current academic working conditions on mental health, particularly of Ph.D. students. Mental health has been thought to be associated with the publication pressure of Ph.D. students for their dissertation work, since the publication is a prerequisite for an academic career[3] and this mental health problem in turn affects the overall quality and quantity of individuals' research output.[4] Thus, the data concerning the productivity of Ph.D. students may be useful for those who wish to make prediction of mental health problem from such data. For those who are concerned with the motivation and health behavior change of students, the duplication checking data of student thesis may be interesting. The low rate of duplication may be indicative of perfectionism that is estimated to increase over time in the United States, Canada, and the United Kingdom.[5]

The major data reported here come from the Record of Tsinghua University,[6] the report for the 80th anniversary of the SAE,[7] internal reports of the school[8–18] and the database of education of the University.[19]

This paper is organized as follows. Section 2 is concerned with undergraduate students. We will display the evolution of number of undergraduate students with correlation to the number of faculties. We will also show their interests in participating in various activities.

In Section 3, we display the evolution of number of master (including master of science and master of engineering) and Ph.D. students, with correlation to the number of faculties. We will also discuss their academic activities in publication and in attending conferences. The quality of the work of Ph.D. students will be displayed using the number of papers published by each student, duplication checking data of their Ph.D. thesis and blind peer review of their Ph.D. thesis.

In Section 4, a summary is presented.

2. Undergraduate students

The evolution of the number of undergraduate students is displayed in Fig. 1(a) for the period of 1936–1979 and Fig. 1(b) for the period of 1980–2017.

During the period of 1936–1939, only 33 students graduated from the aeronautical discipline. In 1960–1969, 1237 students graduated from the DEM. The number of undergraduate students graduated then dropped to 641 in 1970–1979, and became 697 in 1980–1989, 847 in 1990–1999, and 348 in 2000–2003. In 2004, the DEM was expanded to the SAE and since then 1272 undergraduate students have acquired their bachelor degree from the school.

The number of yearly enrolled undergraduate students largely oscillated before 1979, due to various historical reasons. During 1980–2003, the number of yearly enrolled undergraduate students was around 80. Since 2004, the founding year of the SAE, the number of yearly enrolled undergraduate students has exceeded 100 except in 2006 and 2007. The number of teachers decreased from 188 in 1982 to 71 in 2003, and then increased to about 110 in 2018. Moreover, the number of non-teacher faculties was in the order of 100 in the 1980s and dropped to the order of one tenth in recent years. In 2017, there were in total 516 undergraduate students in the school, compared to 110 teachers, meaning that the student-teacher ratio is 5.32. The lower number of non-teacher faculties means that many graduate students (notably Ph.D. students) are involved in undergraduate education, serving as institutors and assistant teachers.

As can be seen from Fig. 1(a), the evolution of the number follows a quite irregular shape before the end of 1970s. This is largely due to historical events.

The data are incomplete. For instance, we are unable to find the number of students enrolled before 1938 and the number of students graduated between 1940 and 1959. During 1966–1971, there was no student enrolled, due to the Great Cultural Revolution. The large amplitude oscillation of the number of students enrolled before 1980 may be associated with the Sino-Japanese war, Second World War, Internal War and the establishment of People's Republic of China in 1949. In 1952, the number of students enrolled reached 350. In 1952, the old SAE was moved off to form Beijing Institute of Aeronautics so that there is no student enrolled during 1953–1954. Between 1953 and 1957, teaching activities did not stop and the number of enrolled students gradually increased until 1958 when the Department of Engineering Mechanics and Mathematics (later on called Department of Engineering Mechanics) was set up.

Female students usually constitute a very small fraction of the total number. For instance, the undergraduate students enrolled in 2014 were divided into 6 classes, Class 1 had 5 girl students among 15 students in total, Class 2 had 2 among 31, Class 3 had 2 among 20, Class 4 had 0 among 13, Class 5 had 0 among 29, and Class 6 had 2 among 28. Thus, there was only 11 girl students among 136 students in total (note that the total number displayed in Fig. 1(b) is 126 for 2014, because 10 students counted here are officially from other departments or schools). Fig. 2 shows undergraduate students in outdoor activity (left) and in class (right), from which we can see much less girl students than boy students. Therefore, the gender balance in the education of aerospace engineering should be changed in the future, with the consideration of enhanced motivation of female engineers.

Apart from course studies, undergraduate students have diverse interests. Fig. 3 shows the most favorite and most valued activities, according to a survey conducted in 2015 by the student association called LixiaoYi (a WeChat official account).[20] Of the students, 31% mostly like the Student Day; 24% mostly love social practices; 20% are in favor of Schoolboy Day (November 12th) and Schoolgirl Day (March 7th).

Attention may be drawn to the fact that only 25% of students are fond of the rest activities such as sports, scientific innovative projects, diathesis enhancement, etc.

However, the activities that students consider to be most valued show different percentages. 37% of students most care social services; 23% consider that sports are the most important; 17% attach importance to research; hobbies and interests occupy 17%. Since more than 50% of the students will do research after graduation, 17% of the students mostly caring research appears to be too low, meaning that for most students, doing research is simply a choice not driven by interests.

Please cite this article in press as: LU J et al. 80 years education of aerospace science and technology in Tsinghua University, *Chin J Aeronaut* (2018), https://doi.org/10.1016/j.cja.2018.06.017