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The Role of English for Specific Purposes in an Aeronautical Design Contest

TATZL Dietmar (1)

FH Joanneum University of Applied Sciences, Austria (1)

Abstract

English for specific purposes (ESP) courses fulfil an essential function in tertiary education to prepare content students for their academic studies and future career fields. In a globalised world, demands on learners to actually use professional English are increasing and may already occur during university studies. An example of such a scenario are international engineering contests that challenge students on technical-mathematical, financial, logistical, organisational and linguistic levels. The current paper presents the role of ESP in an aeronautical student design competition hosted by the American Institute of Aeronautics and Astronautics (AIAA). This annual contest requires participating teams to design, build and fly a model aeroplane according to certain operational parameters, within a tight schedule and under highly selective conditions. Through several competitive stages, the initial number of above 100 teams is reduced, and the winning team is determined after a sophisticated scoring process at the contest site in the United States of America. Before the teams are admitted to the competition flyoff, they need to write and submit a design proposal in October and a design report in February. Only if both documents are accepted, will the respective team be allowed to participate in the flyoff in April. Particularly non-US student teams are thus faced with the challenge of producing decisive technical documents in English to achieve a good final ranking in the competition. The author's institute has encouraged student participation in this contest for four years now to boost learner motivation and compete with other teams on a global scale. The paper finishes by depicting the team results from these contest years and by drawing conclusions on the potential of engineering design contests for higher education.

Keywords: English, ESP, technical documentation, language use, engineering student contest, higher education;

1. Introduction

English for specific purposes (ESP) is a heterogeneous field with different manifestations, contexts and learning scenarios. Apart from ESP courses, for instance, university students face other scenarios in which they need to apply English as a foreign language (EFL) for academic and professional communication. International engineering contests represent such events that challenge student teams at multiple levels. Not only do they require competing teams to merge mathematical, scientific and technical knowledge with linguistic skills, but they also afford students the opportunity to immediately compare their own achievements with those of other teams.

1.1 The Design/Build/Fly (DBF) Contest

The annual Design/Build/Fly (DBF) contest is hosted by the American Institute of Aeronautics and Astronautics (AIAA), Raytheon Missile Systems and the Cessna Aircraft Company. It is a global competition that invites international university student teams to design, construct and fly an original unmanned aerial vehicle (UAV) according to certain rules and operational parameters. The flyoff with the teams' demonstration flights of their designs alternately takes place in Tucson, Arizona, and Wichita, Kansas, in April each year.

The whole competition adheres to a strict schedule with the registration of teams finishing in October for each contest season. Registration is only complete when teams also submit a design proposal, which serves as the basis for the organising committee to rank the "top 100 proposals plus ties" [1] for the acceptance list. This first selective criterion is followed by the submission of a fully-fledged design report by a February deadline. The point score given to this design report then determines the flight line for the flyoff in April, and after the aircraft designs admitted to the flyoff have passed a technical inspection, a ground mission and several flight missions, the final score is established and communicated to the teams at the contest site [2]. This shows that student teams undergo several assessment stages of their contest documents, aircraft design and flight

performance, which leads to a drastic reduction in the number of teams from the initial registration to the actual final ranking.

1.2 Rationale for the Participation in a Design Contest

As the DBF contest blends technical-mathematical, financial, logistical, organisational and linguistic challenges, it closely resembles real-life engineering assignments. Firms recruit engineers who "combine technical expertise with practical ability, backed up by strong interpersonal skills, including an awareness of commercial realities" [3]. Furthermore, authentic engineering tasks foster student motivation [4], and engineering competitions are viewed as best practice in project-based learning (PjBL) [5]. The DBF contest resembles the Conceive-Design-Implement-Operate (CDIO) approach promoted by engineering educators [6], and it is related to Lave and Wenger's situated learning theory [7]. Apart from the core scientific and mathematical skills required from graduate engineers, "[e]ffective oral and written communication in professional and lay domains" [8] is crucial for a successful career in engineering. For these reasons, the Institute of Aviation at the FH Joanneum (FHJ) University of Applied Sciences in Graz, Austria, has encouraged student teams to participate in the DBF competition (joanneum Aeronautics, jA). Participation in this contest is particularly demanding for international teams, as students need to complete an elaborate technical task as well as use English for communication and documentation, which often is a foreign or second language for such teams.

2. The Role of ESP in the Contest

ESP manifests itself throughout the DBF contest and assumes a central function for student teams. It comprises all main language competences, from receptive to productive and from written to oral skills, which may be further subdivided into various text types and communicative events. First, concerning reading, students access the contest website and download the contest rules, which was a 28-page document for the 2017/2018 competition [1]. Teams usually also consult winning reports from previous contests to prepare their own documents. Second, in the area of writing, the core contest documents are the design proposal, the design report and a three-view drawing that need to be submitted to the organising committee. However, writing further occurs in the completion of administrative documents, such as registration forms, shipping lists and customs declarations, as well as in email correspondence with contest organisers and potential sponsors. In addition, students tend to create public relations documents, texts for their team website and contributions to social media with the aim of drawing attention to their participation in the contest. Finally, planning the trip to the USA involves written communication to organise accommodation and transportation. Third, there is the area of spoken interaction. At the flyoff, students communicate orally with DBF judges, AIAA engineers, contest organisers and other teams. During the whole trip, they meet US citizens in all walks of life as well as international travellers and company employees, such as airline representatives, car rental agents or shop assistants. The 2016/2017 joanneum Aeronautics team, for instance, even recorded a short video interview with the then executive director of the AIAA.

3. Team Results over Four Contest Seasons

In the past four seasons, FHJ student teams participated in the DBF contest with their original aircraft designs. Table 1 shows the joanneum Aeronautics team rankings in bold in comparison with the total number of eligible teams at important stages in the competition and the score achieved on the jA design report. The table also reflects the influence of the report score on the queue for the flyoff and illustrates the good results achieved by all FHJ teams. Students' ESP skills, particularly in technical writing, thus considerably contribute to the overall team result.

Table 1. Overview of the jA DBF team results from the past four contest seasons (data from the AIAA final results releases posted on the competition website [9], [10], [11], [12])

Year	Contest Season	Initial Entries of Candidate Teams	Design Proposal (Final DBF Accept. List)	Design Report (Queue for Flyoff)	Report Score (max. 100)	Final Rank after Contest Flyoff	Notes
2017/ 2018	22nd	134	**57**/101	**15**/91	**86.33**	**16**/77	2nd-best internat./16
2016/ 2017	21st	138	**11**/104	**5**/95	**90.63**	**11**/73	3rd-best internat./14
2015/ 2016	20th	145	–/137	**15**/80	**91.00**	**7**/66	best internat./25
2014/ 2015	19th	100	–/–	**19**/84	**90.50**	**26**/65	1st jA season

4. Discussion and Conclusions

The DBF contest affords students the opportunity to test their engineering knowledge and skills in a scenario which comes close to real-life workplace assignments. Furthermore, student teams can see how their designs fare in comparison with those produced by international peers. A number of challenges adhere to the competition that seem to additionally encourage students to master the tasks set. These include the fact that the rules, requirements and missions change from year to year, so that a new design needs to be delivered in each contest season. Similarly, the late freezing of rules means that teams may have been working on an aircraft which then has to be redesigned to meet the changed regulations. In other words, there is a short period for teams to complete their designs from the rules release to the final design, and this period is even shorter for some international teams, as academic terms and thus preparations for the contest may start later than at US American universities. International teams also face more complicated shipping issues than US American ones, and they need to create technical documents in English, for them a foreign or second language.

Despite or maybe because of all these circumstances, student motivation tends to be high each year. In fact, the DBF contest seems to boost students' team spirit, confidence and enthusiasm. In addition, it makes the ESP share in a team's success visible and tangible, which leads to an added value of ESP for students, who are eager to achieve a high ranking in the competition. The contest also strengthens students' ties with faculty and the engineering community, and it creates public relations value for a team's university. Finally, students gain international experience and use English in various domains and communicative events. In brief, the DBF contest merges features of an engineering project and a business case into a multilevel challenge with educational merit for all participating teams. Educators in other settings, therefore, may find similar competitions in their students' career fields to prompt participation by a team from their university.

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