

PERCEIVED VALUE OF STUDENT PARTICIPATION IN THE FIELD OF AEROSPACE ENGINEERING FROM A STUDENT'S PERSPECTIVE

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The importance of student participation in space projects is well known. New students are needed to supplement the future workforce and both experience and enthusiasm are important factors to join any industry. Students can also offer fresh perspectives to existing problems in any field of engineering. It is also argued that it is very beneficial for the students themselves. This paper will clarify the point of view from students on student participation in aerospace engineering for their own interests, both personal and professional, as well as their general opinion on space research and development. Qualitative interviews were held with several groups of (former) students: Students not (yet) engaged in a large project; Students in the concept stage of a large project and students at the end stages of a large project. Both engineering and non-engineering students are of interest for this research. A broad range of questions is asked to the participants as this is mostly explorative research. The aim of this paper is to increase student participation by means of a better understanding of student expectations and experiences. Projects better suited to student needs could be developed in the future. With this better understanding and improved projects, more student projects could be successfully launched by both universities and corporations. This should benefit both educational and corporate interests in active student involvement as more research will be done by the students and more students will be engaged and motivated in the space industry. Due to the nature of qualitative interviews students will come with ideas on how to increase student participation and make student projects more successful, so we can relay these to educational institutions and companies.

I. INTRODUCTION

With platforms like the cubesat¹ performing science in space becomes more and more affordable. As costs drop you can do more missions into space and as

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size decreases commercial (piggyback) launches costs will lower the costs even further. This makes it accessible for students as they often have to run at a low budget. When starting a large student project like designing, building and launching a satellite you are bound to run into some difficulties. This paper will address one of these problems: getting (the right) people to join the project. If the project is entirely voluntarily based it can be a problem to find the right people, you will have to make do with the students that volunteer. A large project can require a lot of dedication and will most likely involve work that you did not sign up for in the first place. Students can leave the project because their expectations are not met. An example of the above problem is the Low Orbit Astronomical Satellite (LOAS) project by TwenteSat². After the initial idea was pitched by a professor the project was started mainly by technical students themselves. While a well-

sized group was interested initially a lot of students left the project because they had to do a lot of administrative work they did not sign up for. Work like starting a foundation, recruiting more people, manage funding etc. But that had to be done before a lot of the research could be started. Yet people from studies like business administration did not see a place for themselves at such a project. They believed non-technical people would not be required at such a technical project.

To better address the above mentioned issues in the future this research is started. It will look at what expectations students have or had about large projects, not necessarily related to the space industry, and how well these expectations were met when they did work on a large voluntary project. Both technical and non-technical students will be questioned.

II. PERFORMING INTERVIEWS

A questionnaire was designed to find out the expectations and experiences amongst a diverse group of students from the University of Twente. The questionnaire consists of both yes/no questions and open questions to find out how to classify the respondent and to get an open answer about their expectations and experiences. An open ended question that invited the respondents to come up with ideas on how to improve student participation was added as well.

II.I Classification of student respondents

Students were classified by study, awareness of any long-lasting projects at their University and if they have ever taken part in such a project. Examples of the organisations organising projects at the University of Twente are: The above mentioned TwenteSat², The Solar Team Twente³ were a group of students is building a car completely powered by solar power to compete in an annual race, and the Green Team Twente⁴ that is similar to the Solar Team but based on a hydrogen powered car. Those that have already participated in a large project or are still working in it got an extra question about how far the project was along and which of their expectations were not met during the work on the project. Students were directly asked about what they study, if they were aware of any projects available at their university and if they ever participated in such a project.

II.II Measuring student expectations

To measure student expectations the questionnaire contained a question about what would trigger the respondents to join a project and a question about their expectations of what such projects would mean for their personal and career development. A question about how to increase student participation in projects was also asked.

II.III Other questions in the questionnaire

Other questions involved how much hours active students spend on their projects and how far the project was completed. Active students that Work(ed) on a project were also asked how well their expectations were met and how their project could improve the realisation of their expectations. A last question was asked to see if people would change any of their previous answers if the project was about something from the aerospace industry.

II.IV Number of responses

In the end 64 students answered the questionnaire seriously and their responses are used in this paper. Responses that lacked certain answers or were not deemed serious are omitted.

III. QUANTIFIABLE QUESTIONNAIRE RESULT

III.I Technical vs. non-technical students

24 of the respondents came from a technical study and 24 came from a non-technical study, 1 person does both. 15 people failed to name their study.

III.II Awareness of long term student projects

53 respondents were aware of at least 1 long term project that they could join at their university. 11 people did not know of any such project.

III.III Engagement in long term student projects

6 people are or were actively engaged in a long term student project, 58 were not. Of these active people 12 hours were weekly dedicated to their project on average. 2 out of the 6 active respondents were (nearly) finished with their project. Only 1 of the people was not doing a technical study.

IV. QUALIFIABLE QUESTIONNAIRE RESULTS

IV.I Students (formerly) in a long term project

4 out of 6 active students mentioned that they expected to upgrade their Curriculum Vitae (CV) with the project. None of them complained about not achieving this. They all agreed it is good for personal and career development. 4/6 people said that there should be more information available about these projects, one student detailing the benefits specifically and another mentions to also involve people from other colleges and more international students.

IV.II Students not in a long term project

9 out of 58 of the students mentioned improving their CV as an expectation. A lot of people mention making contacts with new people (inside the team you are working with and outside the team) for networking. Just having fun is also very important to a lot of people. People that are not in a project often mention that certain rewards would trigger them, both financial

rewards and rewards to advance your study are mentioned. A lot of people also like more leniency from the university. More flexibility in how to spend time and less focus on getting your degree as quickly as possible but allowing people to miss a year more easily are mentioned several times.

Especially non-technical students, which are not working on a project, mention that there should be more information about available projects, this comes less from the technical students. Some non-technical people also mention there should be more projects without a technical focus or that they do not know how they would fit in with a technical project. They also would like more information during courses, professors telling them how newly learned information could apply to a known student project or maybe working on cases from a project for a course.

V. ANALYSIS OF THE RESULTS

V.I Curriculum Vitae

The thing that really jumps out from the results is the difference in expectations about improving your CV. 2/3th of the students that did do a project said improving their CV was one of their expectations but only about 15% of the people that are not in a project said it to be one of their expectations, this is nearly 4.5 times lower than active students. This can be explained either by the fact that people seeking to improve their CV are more prone to enter such a project or that people are not aware of how such projects would be good for their CV. Either way it will be a good idea to emphasize how a project could help your CV and how well this is appreciated by companies. In the case that mainly students looking to improve their CV are joining voluntary projects they will be better aware of what advantages your offering them, if people do not realise the potential CV improvement this will give them then some extra information will show them.

V.II Informing better and to more people

Both the active and non-active people say there should be more information handed to the students. Though only some people are not aware of any available projects a larger group seems to not know how it would be something for them. Even projects of a mainly technical nature will need students that handle the non-technical stuff of running the organisation, this could also be very educational to a lot of people.

Universities could also help more by linking courses to student projects, just mentioning how learned information could apply to a student project or using cases in their courses that come from a student project. Sometimes just mentioning available projects in their field of study would be enough to get some people's

attention, this is how TwenteSat² started. It was an interesting suggestion to involve more people from local colleges and the international community. Not only does this give access to new people but it will most likely provide new insights. It could be a bit harder to convince these people though. International students often cannot afford to spend a longer time in the country and need to graduate in time. People from local colleges can see it as a big step, working at a university project.

V.III Rewards

Though a good number of students said they would be interested if they would get a reward this is considered to be outside the scope of this paper as this paper is only about voluntary projects. They mentioned both financial awards and extra study credits. Making clear how much reward such projects will bring in the future is an option. Especially if you got companies to support your claims about improving your CV.

VI. FURTHER RESEARCH

Further research can be done by interviewing more people that have done a long term voluntary student project on why they think improving your CV is so important. You could also study how much the improvement on a CV a long term project will be on your later career.

VII. CONCLUSION

In this paper it has been researched how student participation in large voluntary student projects could be improved, aerospace projects included. It was studied what a students perceived value in such projects is by asking for their expectations and looking at some experiences people had from large voluntary projects. A majority of the people that already did such a project had a clear interest in improving their CV and feel like they succeeded with that, on the contrary only a minority of the students that were not involved in such a project expected to improve their CV by joining a project. Another point that became clear is that people from non-technical study often seem to feel that they have no place in such projects. It is concluded that student participation can be increased by giving more information in how it will improve your CV and how a student would fit in with the project.

¹ A. Toorian, K. Diaz and S. Lee, "The cubesat approach to space access," IEEE Aerospace Conference, Big Sky, MT, 1-8 March 2008

² M.J. Bentum "Twentesat – The first low-frequency interferometer in space" 63th IAC, Naples, Italy, august 2012

³ Solar Team Twente <http://www.solarteam.nl/en/>

⁴ The Green Team Twente <http://www.greenteamtwent.nl/en/>