

Entrant Students Welcome: Activity to Reduce Evasion*

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This paper aims to present an experiment developed in a technology degree college in São Paulo: the freshmen integration and remedial classes week. This work was developed due to the dropout rate that occurred in several courses. The 50% dropout rate was collected through a sample of the first semester from 2012 to 2014. This college has courses in welding technology, mechanical manufacturing, industrial automation and refrigeration, air conditioning, and ventilation and heating. It is a public college. As they are courses of the area of mechanical engineering, their first semesters consist of calculus, physics, chemistry, statistics, and other disciplines that require solid knowledge background from senior high school. This is not the reality for the profile of incoming students. Ninety-five percent of the students come from public schools. Remedial classes week is comprised of remedial classes on mathematics, motivational lectures, presentation of the academic, and job market area, as well as integration with veteran students, teachers, and coordinators. This work began in 2014 and there was 35% evasion reduction.

Keywords: learning, evasion, technology degree

Introduction

Getting into college is very important in the life of an individual. It is the beginning of a new phase in his/her professional life and personal life as well. However, upon starting an exact sciences course, there are several obstacles to be overcome.

The students must first overcome knowledge barriers. They begin their activities with disciplines, such as calculus, physics, electricity, and statistics that require they have some pretty solid previous knowledge, which was not often properly developed or even not developed at all in senior high school. This is a reality of the students who studied in public schools (Barros & Meloni, 2006).

In addition to these issues, the new student profile is one that goes to university at an age outside the expected range and has a job. There is a percentage of less than 1% of university students that can have full time to study. A larger universe of students end senior high school and go to job market, because they need to help their families financially and only two or three years later, they return to higher education. Not to mention those who returned to university studies after being more than 10 years away from any classroom (Nascimento, Mitsumori, & Graça, 2012).

This profile shows a student with low self-esteem, poor-trained, and who will very easily give up when facing the smallest obstacle that appears before him/her.

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The objective of this work is to present an experiment developed in a technology degree college in São Paulo, Brazil. The activities were initiated with mathematics remedial classes, for a deficiency in the initial subjects was detected. However, it was observed that, in addition to that deficiency, there was a need to increase the students' self-esteem and their knowledge about what university life would be like after the course they were starting. Thus, the activities developed with novice students also focused on improving their motivation and showing the horizons they would have with the chosen course. With this work and others that were developed in parallel, a 35% reduction of dropouts in three years of work was observed. This whole process will be described next.

Theoretical Context

The difficulties with calculus and physics in exact sciences courses have been known for a long time. Many studies have already been developed to try to minimize the impact this has on student motivation. But that is almost a rule in most exact sciences courses.

The students who are able to get integrated more easily in the early years of exact sciences courses are more likely to succeed in their academic lives, because they do not have traumas that can cause difficulties for them throughout their professional and student lives (Texeira, Dias, Wottrich, & Oliveira, 2016).

This stage of the students' lives, university entrance, has a very important meaning. For those who are teenagers, it is a time to change their life stage when they get freedom, but must learn how to deal with that freedom. For those who are older, it is a moment of victory, because they have managed to go to university and have a meaningful life-changing perspective. In this way, there is altogether expectation linked to the life history of each person. In addition, there is a change in the way of conducting studies from senior high school to higher education. The student starts to have a much more active participation in the activities and it is he/she who needs to seek knowledge to make his/her career consistent (Teixeira et al., 2016).

In addition to these emotional and sentimental challenges, there are those involving the mandatory contents in each one of the courses. That knowledge is all based on mathematics, because the physical and mathematical sciences need them to develop all the other sciences that are applied.

Thus, several studies are developed to try to understand the difficulties in understanding and passing disciplines, such as calculus, physics, statistics, geometry, electricity, and others. Some of the answers are in senior high school. The lack of basic knowledge at senior high school causes difficulties for the students in being able to absorb the new knowledge.

An experiment at Public Utilities Commission (PUC)/Catholic Pontifical University in Rio Grande do Sul shows this experience, in which academic monitoring was one of the alternatives to assist students with problems concerning calculus disciplines. The surveys showed the students had difficulties in performing calculation operations with fraction, operations with exponentials, and first- and second- degree equations (Cavasotto & Portanova, 2008).

Examples of Freshmen Welcome Weeks by Brazilian Universities

One of the concerns in the training of a technologist is that he/she is taught in a holistic way, with technical, ethical, cultural knowledge, so that he/she becomes an active, reflective, and transformative human being to act effectively in society (Germignani & Elizabeth, 2012).

However, this training process involves a series of changes and knowledge that the student needs to develop throughout his/her training. The university, on the other hand, needs to find ways to reach this student in an integral way and not only with information related to the course which he/she passed the entrance exam. This would help the student to start his/her course in engineering or technology without the evasion problems that exist due to several factors. One of these factors is the lack of motivation that existed at the beginning of the above courses because of the number of subjects involving mathematics.

Another issue is the change in job market that makes the student rethinks his/her career and priorities in life, often having to choose between employment and study.

In the second issue raised, it is not possible to interfere with, except by using efficient public policies focused on education, but in the first case, it is possible to develop a series of actions to motivate and assist students in these first periods in their higher education courses.

The active methodologies are an interesting alternative to help in this process of reducing students' demotivation in the first semesters of the course. Active methodology is understood as a process that stimulates the student to reflect, starting from action. The student is encouraged to experience situations where he/she analyzes and seeks knowledge to solve that problem and from this reflection the knowledge that will be inserted in their curriculum is developed (Germignani & Elizabeth, 2012).

The use of an integrative project, work in groups, case studies, and interdisciplinary structure helps the students to better understand the use of the knowledge they are acquiring in the disciplines. This process can be developed during the semester so that the student can develop the contents more significantly. However, there is an existing deficiency due to inadequate senior high school education. Because of the inadequate teaching of mathematics, the contents developed in the classroom are impaired and end up discouraging the students.

For this reason, there is an initial concern to motivate the student as soon as he/she arrives at the university, and hence, the importance of the freshmen welcome week or the use of pre-calculus or similar activities.

In several institutions throughout Brazil, work is carried out to receive the freshmen in a pleasant and welcoming way. An example is the "New students' week" developed by the academic center of the telecommunications engineering course of the Instituto Federal do Ceará (IFCE).

In this "New students' week" the students that came were welcomed with lectures, courses, and social activities in order to have moments of integration with the institution and with the veteran students. Besides that, they know what they could develop upon finishing the engineering course. There was also in this institution a large dropout rate of 55% that occurred because of the students' demotivation in the first semesters. With these activities began in 2012, which dropout rate was reduced to 17% in 2014 (Cavalcanti & Rodrigues, 2014).

The beginning of academic activities is a very important stage for the general education of a student. Therefore, it requires great care in the reception of these students in their first few weeks at a college or university.

Another interesting experience was held in São Cristóvão, where students are welcomed with complimentary math classes, lectures, and an overview of the university. With this work they were able to get the students of the first semesters involved with their courses, avoiding that they be discouraged from the beginning. Thus, the university also obtained a positive result regarding dropouts (Nascimento et al., 2012).

All the experiences that were observed about the creation of the freshmen welcome weeks were motivated by the necessity of getting the students more involved with their courses, and so facilitate the passage of those

students through the initial periods of the physical and mathematical science courses which are usually very full of problems for the students, due to the disciplines of calculus, physics, chemistry, statistics, and electricity. Besides that, there is the adaptation to a routine of studies along with work and family.

Methodology

The methodology used in this research was action research. Action research emerged around the 1930s. It came about through the research process developed by some scholars in their actions. It has been improved with the idea that it is necessary to go through a process of analysis of the experience that is being developed (Tripp, 2005).

The cycle starts from the moment a problem is identified and needs analysis. This way one can plan what can be improved and what actions are needed for that improvement. Once, the actions are taken, monitoring is necessary to identify the results obtained and if there were differentiated facts. From the results obtained, it is interesting to evaluate if they are suitable to what was planned.

Action research follows this cycle in all processes of analysis and differs from other methodologies because the author himself accomplishes all these steps. It can be defined as a form of action investigation that uses research techniques to improve an action that has been identified as needing improvement (Tripp, 2005).

This number of dropouts has led the administration (principal, coordinators, and teachers) to think of alternatives to reduce such evasion. Several meetings were held to discuss possibilities. Among the ideas that emerged, the freshmen welcome week was created in order to assist the student in this integration activity.

Description of Activities Developed

Faculdade de tecnologia (FATEC) itaquera began its activities as a college in the second semester of 2012 with two courses: mechanical manufacturing technology and welding process technology. In the following year, the course of industrial automation technology was initiated, and in 2014, the course of refrigeration, air conditioning, and heating and ventilation technology was initiated. All courses are in mechanics area, which requires students to have very good mathematical basic knowledge.

The structure of the courses starts with one year study of subjects, such as calculus, physics, drawing, electricity, and geometry. These are disciplines whose fail rate was initially 80%.

In the second semester of 2013, an analysis of dropout rate was made and identified it as 50% as well as the fail rate in the main subjects of the basics. From this survey, disciplines data of fail rate for calculus, physics, drawing, English, and electricity was identified. It was found that fail rate of these subjects was 80%.

Faced with this situation, a team of teachers came together to think about how to solve these problems. It was initially proposed to have remedial classes for the students that failed in calculus disciplines. This procedure was performed during two semesters. But the result was not satisfactory, because few students attended remedial classes during vacation period and those who did it could not get grades good enough to pass the course.

A basic mathematics remedial classes program was created in January 2014, for the entrant college students. They enrolled, and in following week had two hours of daily basic math review, a review of senior high school content. These contents were identified from the questions veteran students asked in classroom and in monitoring meetings from 2013 to 2014. Table 1 shows that the activities developed over the three years.

Table 1

Summary of Activities Developed From 2013 to 2016

Developed activities	2013.2	2014.1	2014.2	2015.1	2015.2	2016.1	2016.2
Dropout rate survey (%)	50	50	40	30	20	20	17
Fail in basic subjects' survey (%)	80	80	50	40	40	40	40
Meetings with teachers (%)			-				
Remedial classes (%)			-				
Elaboration of math support booklet (%)			-				
Parallel remedial classes during the semester (%)			-				
Monitoring program (%)			-	-	-	-	-
Freshmen welcome week (%)		-	-	-	-	-	-
Freshmen welcome week evaluation (%)		-					
Freshmen welcome week with motivational lectures (%)			-	-	-	-	-
Integrative project (%)				-	-	-	-

These remedial classes were taught by monitors. They were instructed by mathematics teachers and had a basic handout to distribute students and answer their questions, in addition to an exercise list for each subject applied.

An assessment was made by the teachers of and calculus and fundamentals of mathematics, checking the students who participated in that week. Ninety percent found it was very positive and suggested that it would be organized including other subjects, such as Portuguese and chemistry. Eighty percent praised their relationship with the instructors and reported on how they felt their support for the first few days classes.

After this assessment, the handbook to be used in the following semester was improved and a permanent training to the monitors for fundamentals of mathematics was developed. This decision is due to the fact of surveying the needs observed by teachers and students in the subjects taught in the first semesters. In addition to the concern with basic knowledge in the area of mathematics, the issue of starting a university course was aroused, as well as how to deal with a new way of studying, doubts about the future of the chosen profession and other uncertainties that came from the students themselves.

A series of lectures were organized in order to motivate and welcome these new students, so that they have the will to face the new challenges. These lectures are about job market, about the academic area, the experience of alumni or veteran students in dealing with everyday college life, and a vision of the job market that looks for new collaborators. Besides the creation of fellowship moments, so that students can meet one another and already create a more pleasant environment to be in. Table 2 shows an example of activities developed.

This experiment was carried out from February 2014 to January 2016 (the second semester of 2014 to the first semester of 2016). The results were very positive. Concerning the remedial classes period (before the classes), more students started to participate and to spread to others the importance of this week for their school life at the university. In the subjects of calculus, physics, and fundamentals of mathematics, it was noticed an improvement in fail rate which was on average 80% and went down to 50% on average. It is not possible to attribute this improvement only to the remedial classes week, since other actions were done in parallel, but it also contributes to the reduction of both dropout and fail rates.

In addition to this reduction in fail rate, the cancellation ratio on average fell from 14% to 11%. This gain is due to the motivation developed in the students through these initial activities and the works of the integrative project, lectures and participation in visits and fairs. This research was conducted on students in the early years through informal interviews and on veteran students through statistics obtained through cancellations and dropouts.

Table 2

Examples of Activities Developed With Students

Dates	Activities/2016.2
2016/01/26	Presentation about FATEC
2016/01/27	Fundamentals of mathematics class/course presentation/veteran student experience
2016/01/28	Fundamentals of mathematics lecture/presentation about FATEC itaquera college
2016/01/29	Fundamentals of mathematics class/presentation about scientific initiation and post-graduation
2016/01/30	Fundamentals of mathematics class/professional life/rock band presentation and community luncheon
2016/02/01	Fundamentals of mathematics class/lecture about personal image
2016/02/02	Fundamentals of mathematics class/how to organize yourself to study

Conclusion

This work has the purpose of presenting an experience lived in a technology degree college in São Paulo. It consists of holding a welcome week to the freshmen which has also remedial classes of math in its event schedule.

This project arose from the need to reduce dropout rates in the first semester of courses in the mechanics area of the technology degree college and to reduce fail rate in the first semesters.

The average fail rate of calculus and physics was 80% and term dropouts averaged 17%. These results were very disturbing, because classrooms became crowded, teachers were unable to identify students' problems correctly; the classrooms were not prepared for having more than 45 students in each group and the number of students in the subsequent terms was too low.

In 2014, the work of reception of freshmen was started with the purpose of assisting students who had a lot of difficulty with fundamentals of mathematics. In addition to it, a series of lectures were created to show the students their professional future.

With this and other actions, there was a reduction in the number of fails to 50% on average and dropouts were reduced to 11% on average per year. Other disciplines of the course as well as the graduation of each course were studied.

The freshmen welcome week provided a qualitative leap in students' entrance, because as the classes start they already have a good review of the initial content, they are already worried about the subjects, and about fulfilling the study load necessary, so as to avoid having problems with the disciplines.

In addition to these gains, it was possible to observe a great connection between the students and involvement with college from the first days. From this, it was possible to develop stronger work in the disciplines, causing the teachers to be less worn out at the first classes.

This work has been rewarding, for the results come very quickly. The next steps are to get these students involved in programs, such as monitoring and scientific initiation, which will be very interesting for training and for competition in job market.

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