

THE STUDENTS' EVASION AND PERCEPTION AS IMPACT FACTORS OF THE SÃO PAULO'S STATE ECONOMY

Cristina Corrêa de Oliveira

Graduate Program in Production Engineering
Paulista University (UNIP), São Paulo - Brazil
E-mail: crisolive@ig.com.br

Nélio Fernando dos Reis

Graduate Program in Production Engineering
Paulista University (UNIP), São Paulo - Brazil
E-mail: neliojundiai@ig.com.br

Jair Minoro Abe

Graduate Program in Production Engineering
Paulista University (UNIP), São Paulo - Brazil
Rua Dr. Bacelar 1212, São Paulo - Brazil. 04026-002
E-mail: jairabe@uol.com.br

ABSTRACT

Forecasts suggest a decrease in Brazilian Gross Domestic Product (GDP) for the second quarter compared to the first quarter of 2014; studies indicate the shortage of manpower in Information Technology (IT). The objective was to conduct an exploratory quantitative study of the investment, cost and economic impact on GDP in the IT industry by the evasion of IT technological higher education students in the state of São Paulo. This study used data collected by an instrument that evaluates the students' perception, institutional official data on student flows, data about the difficulty of a given subject and data on the impact of the scarcity of IT professionals. Results indicate high dropout rate, but within the range, with students presenting behavioral changes to follow the course; necessity of investment in education to increase the number of professionals, reducing the lack and possibly helping the GDP growth.

Keywords: school evasion, state economy, higher technological education

1. INTRODUCTION

This paper presents an analysis and implications of students' evasion in the technological education of São Paulo, Brazil, and the relationship in the decline in GDP, according to a survey, in the third quarter of 2014 (MANPOWERGROUP, 2014). The Net Employment Outlook (NEO), by the employers, is estimated at + 12%, 5% of this estimation is contribution of the state of São Paulo. This expectation is the lowest since 2009, when the research by this world-wide company was initiated, and the lowest in the Americas. An increasing rate is perceived in the services sector, where one out of three employers intends to increase its staff. The state of São Paulo presents an optimistic expectation rate of approximately 7% for the city of São Paulo and + 5% for the state. The sector that offers the best NEO rate is the service sector with a forecast of + 24%, but year-over-year, hiring expectations declined, as the service sector fell by four percentage points compared as the second quarter of 2013. According to the Brazilian Institute of Geography Statistics - IBGE - (IBGE, 2014) employment in the metropolitan region of São Paulo declined by 1.7% compared to 2013, with the industry having a decrease of 7.4% , the services sector showed a stability and there was a decline in Gross Domestic Product (IBGE, 2014).

In a globally competitive economy and increasingly dominated by technology and advanced skills and competences, ensuring access to a group of qualified people will be key to success in business (MANPOWERGROUP, 2013) and a degree course is the minimum required to obtain a chance to compete in the labor market, get a job in the chosen field of study and ensure the desired way of life (MARTINS, 2007).

Higher education presented in 2013 (DA EDUCAÇÃO, 2013) 7,305,977 enrollments in 32,049 courses in public and private schools, with a gross rate of 28.70% in 2012, an increase of 12.1% compared to 2003. This growth indicates an increase of the population attending higher education and that the inclusion policies need to be expanded with the participation of the public schools, as they represent only 26% of students enrolled in the same period, with 119 state institutions with 604,517 registrations and only 82 892 graduates.

Technological courses increased by 13.6% from 2012 to 2013, with a rise of 24.1% enrollments from 2002 to 2013, 14.4% offers increase in public schools and 84.6 % in private institutions, with a percentage of 63.1% of evening classroom courses in 2013, with the state system presenting an almost balanced distribution with 41% of day courses and 59% evening courses. Between 2012 and 2013 there was a 5.7% decrease in the number of graduates, totaling 23.1% of graduates in public schools in 2013, where the course of Systems Analysis and Development (SAD) presented in 2013, 66,383 of newly admitted (DA EDUCAÇÃO, 2013). The SAD course is considered a core course because the graduates will be inserted professionals in Brazilian Software Industry and IT services, whose main income source are the IT activities (SOFTEX, 2012).

In another point of the study emerges a critical factor: evasion, an issue that afflicts all educational institutions in general, referring by the search for its causes, and these reasons has been the subject of many studies and educational research (SILVA FILHO *et al.*, 2007). According to these authors, the student dropout in higher education is an international problem that affects the outcome of education systems. The loss of students who do not complete their courses is a social, academic and economic waste, causing problems for Higher Education Institutions (HEIs) private and public, given that resources are scarce (PLANEJAMENTO, 2014), it is understood that school evasion is a serious phenomenon and requires effective combat measures. This study, with a quantitative approach, applied nature and exploratory objective, analyzed quantitative data such as annual state investment in technological education in the state of São Paulo, linking it to student progress, the perception of the value and the meaning of learning, building a reflection on the causes of school dropout in Technologist course in Systems Analysis and Development (SAD), from the perspective of students, using the Course Valuing Inventory (CVI) comparing data to a recent study on the mental workload (OLIVEIRA *et al.*, 2014), with an internal institutional research on institutional Evaluation, the state budget and data from NEO.

2. ECONOMIC SCENARIO

Complex and distinct, the economy of São Paulo, the most economically active state of Brazil, is a supplier of consumer goods, capital goods, raw materials and services to all regions of the country and, likewise, for the country abroad. According to IBGE (IBGEb, 2014) and the State System of Data Analysis Foundation (SEADE, 2014), São Paulo, Graphic 1, represents more than 33% of gross domestic product (GDP) (2012). The wealth produced by this state totaled more than R\$ 1.2 trillion in 2012, the equivalent of over R\$ 30,800 per capita (IBGE; 2014, SEADE; 2014).

According to a study, the share of sectors of economic activity in the generation of wealth indicates the predominance of the services sector with 69% compared to the industry, which has 29% and the agricultural sector with 2%. São Paulo concentrates more than half of the production of Brazilian financial institutions, distinguishing also in services to companies (45%), information services (46%), health and education (42%).

Graphic 1 - National and Paulista GDP



Source: (INVESTE, s.d.)

Usually correlated to the ability of income generation, the access to education, besides being a basic right, is a fundamental requirement for integration into society. Considering the data from the National Survey by Household Sampling - PNAD for the state of São Paulo, it appears that family income affects the level of education (IBGE, 2014a). Periodically, the INEP conducts a research on higher education with the goal of providing to the academic community and the society in general detailed information on the situation and the major trends in the subject.

3. HIGHER EDUCATION IN BRAZIL FROM 1990 TO 2013

From 1990 to 2014 the growth of higher education institutions (HEIs) in Brazil has been very large, presenting itself as a kind of profitable investment, therefore attracting businesspeople from several economic sectors.

In Brazil education is free for private initiative, if in compliance with the general standards laid down by the Government and operating license for educational establishments.

The for-profit institutions realized that, with lower costs than public HEIs, already established, they could, through management processes, sometimes more effective, perform the removal of some components that accompanied the educational process.

In total, including campus student and distance learning, the number of enrollments in higher education surpassed the 7 million mark in 2012. As the table below the number of students in technological graduation courses in private education has increased annually and mainly in the modality of Distance Learning (DL), while at the State administrative category the increase is much smaller.

Table 1 - Number of Enrollment, Total freshmen and Graduates in Technological Graduation Courses for Learning Modality, according to the Administrative Category - Brazil - 2007/2012

| year | Administrative Category | Presencial | | | Distance | | |
|------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------|
| | | Enrollments | Total freshmen | Graduates | Enrollments | Total freshmen | Graduates |
| 2007 | Total | 347.150 | 219.437 | 70.666 | 67.672 | 61.989 | 13.675 |
| | Federal | 34.188 | 12.745 | 4.199 | 169 | 2.475 | 6 |
| | Estadual | 24.743 | 9.124 | 3.381 | - | - | - |
| | Municipal | 4.589 | 1.898 | 1.074 | 1.131 | 1.904 | 102 |
| | Private | 283.630 | 195.670 | 62.012 | 66.372 | 57.610 | 13.567 |
| 2008 | Total | 412.032 | 254.936 | 85.794 | 127.619 | 99.777 | 23.156 |
| | Federal | 35.627 | 12.938 | 3.989 | 4.376 | 2.086 | 16 |
| | Estadual | 28.740 | 11.325 | 3.895 | 15.562 | 15.562 | - |
| | Municipal | 4.494 | 1.801 | 1.168 | 2.492 | 2.612 | 513 |
| | Private | 343.171 | 228.872 | 76.742 | 105.189 | 79.517 | 22.627 |
| 2009 | Total | 486.730 | 257.139 | 104.726 | 193.949 | 95.836 | 33.500 |
| | Federal | 45.431 | 17.305 | 5.938 | 12.103 | 2.672 | 197 |
| | Estadual | 35.972 | 12.953 | 6.962 | 4.887 | 5 | 1.726 |
| | Municipal | 3.442 | 1.584 | 650 | 55 | 62 | 0 |
| | Private | 401.885 | 225.297 | 91.176 | 176.904 | 93.097 | 31.577 |

| | | | | | | | |
|-------------|--------------|----------------|----------------|----------------|----------------|----------------|---------------|
| 2010 | Total | 545.844 | 268.040 | 111.596 | 235.765 | 113.845 | 51.046 |
| | Federal | 45.830 | 18.506 | 4.821 | 17.651 | 7.682 | 394 |
| | Estadual | 44.144 | 16.936 | 4.567 | 4.842 | 102 | 2.220 |
| | Municipal | 3.171 | 1.775 | 818 | 85 | 109 | 0 |
| | Private | 452.699 | 230.823 | 101.390 | 213.187 | 105.952 | 48.432 |
| 2011 | Total | 606.564 | 303.053 | 121.283 | 263.970 | 140.200 | 49.352 |
| | Federal | 51.508 | 21.052 | 4.856 | 16.676 | 1.279 | 6.639 |
| | Estadual | 53.555 | 21.072 | 6.164 | 2.566 | - | 252 |
| | Municipal | 4.022 | 2.081 | 1.102 | 206 | 156 | 19 |
| | Private | 497.479 | 258.848 | 109.161 | 244.522 | 138.765 | 42.442 |
| 2012 | Total | 640.683 | 347.370 | 135.782 | 304.221 | 194.480 | 53.253 |
| | Federal | 53.504 | 22.156 | 5.067 | 10.920 | 2.919 | 5.942 |
| | Estadual | 62.189 | 24.104 | 7.862 | 129 | 54 | 66 |
| | Municipal | 6.072 | 2.832 | 1.607 | 8.121 | 3.544 | 1.796 |
| | Private | 518.918 | 298.278 | 121.246 | 285.051 | 187.963 | 45.449 |

Source: MEC/Inep; Table elaborated by Inep/Deed

After verifying the increase in the number in educational establishments and enrollments, the evolution of demand is observed in the private sector. In this scenario, as in others, is present as invariant the cultural belief that education acts as the main upward social mobility mechanism, and therefore individuals from various social classes are willing to invest on improving their educational levels. This fact is also recognized by the State, but the big difference when it comes to higher education, is the perspective taken by the government that the country is experiencing too many difficulties and has few resources to make significant investments in higher education. It is understood that, in one way or another, the private sector is supplying demand, even with a very heterogeneous quality standard and effectiveness. This rapid growth of private HEIs against the retracted growth of the public ones sharpens the private sector in order to pursue new investments in markets with good financial returns, thereby transforming higher education in a commercial commodity.

4. METHOD

This study with a quantitative approach of an applied nature, with exploratory objective, aimed to analyze the annual state investment in technological education in the state of Sao Paulo, particularly in a State Institution of Technological Education - Fatec Zona Leste - relating it to the students' progress over six semesters, their difficulties, using recent study on mental load (OLIVEIRA *et al.*, 2014); the perception of the value and the meaning of learning, relating them to affective reactions, from the perspective of students, using the CVI assessment tool, comparing data with an internal institutional research on Institutional Assessment, the state budget and data NEO.

Subjects

The target population consisted of students of the four Fatec Zona Leste courses for internal institutional assessment, called WebSai and internal data; the sampled population are students of Systems Analysis, freshmen since 2010, when we implemented the course of Systems Analysis, for the CVI and the inclusion criterion was the passage of the student to the fourth semester of the course flow and concluded the discipline Software Engineering II (ESWII) using the sample of the study on the mental load (OLIVEIRA *et al.*, 2014).

Mesures

Course Valuation questionnaire, developed to quantify the value and the meaning of a course in a learning experience, created by Nehari and Bender (NEHARI; BENDER, 1978), consisting of 36 questions covering aspects of learning, personal development through experience school, according to (Sobral, 2008), this tool permits checking if the degree of positivity is associated as the autonomous motivation levels and reflection in student learning by examining the perceptions of quality of curricular travel experience. This instrument was adapted to the course of System Analysis (SOBRAL, 2008).

The CVI is a tool to assess the valuation of an experience of learning and its effects on the learner related to the perceptions in the course's domains of valorization, of cognitive content, personal-affective and behavioral. The cognitive domain refers to the extent that the student understands that gained knowledge and integrated understanding of the issues; the affective-personnel is related to the experience and the perception of students with yourself and with others; the domain of course valorization is related to the learning experience as valuable and meaningful. Each domain ranges from 9 to 36, and the total score ranging from 36-144.

A recent study (OLIVEIRA *et al.*, 2014) pointed out that the mental demand and the effort for a particular discipline in the _ System Analysis course, presented high rates, $n = 0.7391$ and $n = 0.7155$ respectively, followed by the temporal demand ($n = 0.6879$) and the justification for this study was the expectation of understanding why this subject was ranked third in number failure rate and degree of difficulty, according to institutional research conducted by Paula Souza Center in Fatec Zona Leste, and it belongs to the axis of Software Engineering, corresponding to 20% of the course without considering transdisciplinarity, which increase to 50% of the course of a total 2,800 hours.

The State budget for the year 2014, as Table 2, shows that only 15% of the budget (PLANEJAMENTO, 2014) of higher education are intended for technological education, totaling about 70,000 higher education students enrolled in the State Center of Technological Education Paula Souza (CEETEPS) as (CEETEPS, 2014). Higher education is administered by the Economic Development, Science, Technology and Innovation Secretary and the primary education is administered by the Education Secretary.

Table 2 - Budget of the State of São Paulo HEIs for 2014 in billion Reais (R\$) unit

| INSTITUTION | 2014 BUDGET | 2013 EXPENSE |
|---|-------------|--------------|
| Universidade de São Paulo - USP | 5,00 | 5,74 |
| Universidade Estadual de Campinas - UNICAMP | 2,55 | 2,31 |
| Univ.Est."Júlio de Mesquita Filho" - UNESP | 2,37 | 2,27 |
| Centro Educação Tecnológica Paula Souza - CEETEPS | 1,84 | 1,85 |

Source: (PLANEJAMENTO, 2014) and (FAZENDA, 2013)

The IAS, Institutional Assessment System, was created in 1997 and implemented in 2000 in the Technology Colleges of the State of São Paulo, with a performance evaluation tool with rigorous statistical criteria used to analyze the internal functioning processes of education units, the results and the social impact of the unit in which it is inserted, aiming educational quality improvements, detecting positive and negative points, helping the establishment of strategies designed to improve the performance of the unit and students. The evaluation is carried out electronically, with all the community, students and alumni, professors and staff participating by secure access, encrypted, using a username and password, thus the results are made available to the units (CEETEPS, 2014).

In the year 2013, the results indicated that the unit (FATEC ZL) achieved a 79.96 rate on productivity index, using a formula with the variables of freshmen, graduating students, values reduction, goals and others as effective participation of the community in WebSai research. One important report in the 2013 WebSai is the graduating rate of 42.5% and 36.88% in 2011 and 2012 respectively, 2013 WebSai assessment is in process of completion and will be used only consolidated data for this paper's analysis.

The ManpowerGroup presented in the years 2013 and 2014, manpower lack reports revealing that employers state the talent shortages of respectively 35% and 36%, the highest percentage in seven years (MANPOWERGROUP, 2014), Engineers are in the second position and the Information Technology (IT) professional is in 8th in 2014. The difficulties to fill job openings range from lack of specific technical skill representing 35%, lack of available

candidates with 31%, lack of experience with 25% and the lack of personal skills with 19% of the sample, the remaining difficulties represent less significant percentages. Companies interviewed claim that the lack of employees' skills impact the reduced ability to serve customers, increase turnover, increase the costs of remuneration, lower commitment and motivation of employees and reduction of competitiveness and productivity.

Procedures

The methods used this paper were a longitudinal study and a transversal study of data. The longitudinal study, characterized as a study of trends, was conducted over the five years of the course of System Analysis, for the data of freshmen and graduates, as well as the enrollment monitoring, cancellations and senior students. The procedures used were the documentary survey of internal and external institutional data such as the budget, data collection with a questionnaire composed of 36 CVI questions to inquire what is the student's vision and learning experience. 23 questionnaires were administered, and 2 returned with inconsistent data and were discarded for not contain all the answers.

Table 3 shows the characteristics of the sample, 71% of students came from public schools and 57% had technical school before entering in Fatec. An interesting factor is that 48% of students used a bonus factor in the entrance exam using quotas, which can be for having previously studied in public school, racial quotas or other. Another important fact is that in this sample was detected a failure rate in 3 disciplines that should have already been completed, since the curricular structure does not require the existence of prerequisites.

Table 3 – Social-Educational Feature

| | Public High School | Technical School | Entered the College through Quotas |
|-----|---------------------------|-------------------------|---|
| Yes | 71% | 57% | 48% |
| No | 29% | 38% | 52% |

The data analyzed, shown in the tables below, belong to the interval from 2011 to 2014 and are official surveys on entries, locks and cancellations of registrations, according to Table 4, as the course of Systems Analysis was implemented in the first half of 2010, and the disciplines of greatest impacts are taught from the second half of the course.

Table 4 - Data on the Systems Analysis course

| Year semester | Enrolled | Locks | % Locks | Cancellations | % Cancellations |
|----------------------|-----------------|--------------|----------------|----------------------|------------------------|
| 2010/2 | 222 | 8 | 3,60% | 2 | 0,90% |
| 2011/1 | 290 | 27 | 9,31% | 8 | 2,76% |
| 2011/2 | 323 | 36 | 11,15% | 29 | 8,98% |
| 2012/1 | 393 | 37 | 9,41% | 6 | 1,53% |
| 2012/2 | 482 | 49 | 10,17% | 25 | 5,19% |
| 2013/1 | 487 | 33 | 6,78% | 21 | 4,31% |
| 2013/2 | 557 | 38 | 6,82% | 12 | 2,15% |
| 2014/1 | 591 | 40 | 6,77% | 50 | 8,46% |
| 2014/2 | 595 | 41 | 6,89% | 43 | 7,23% |

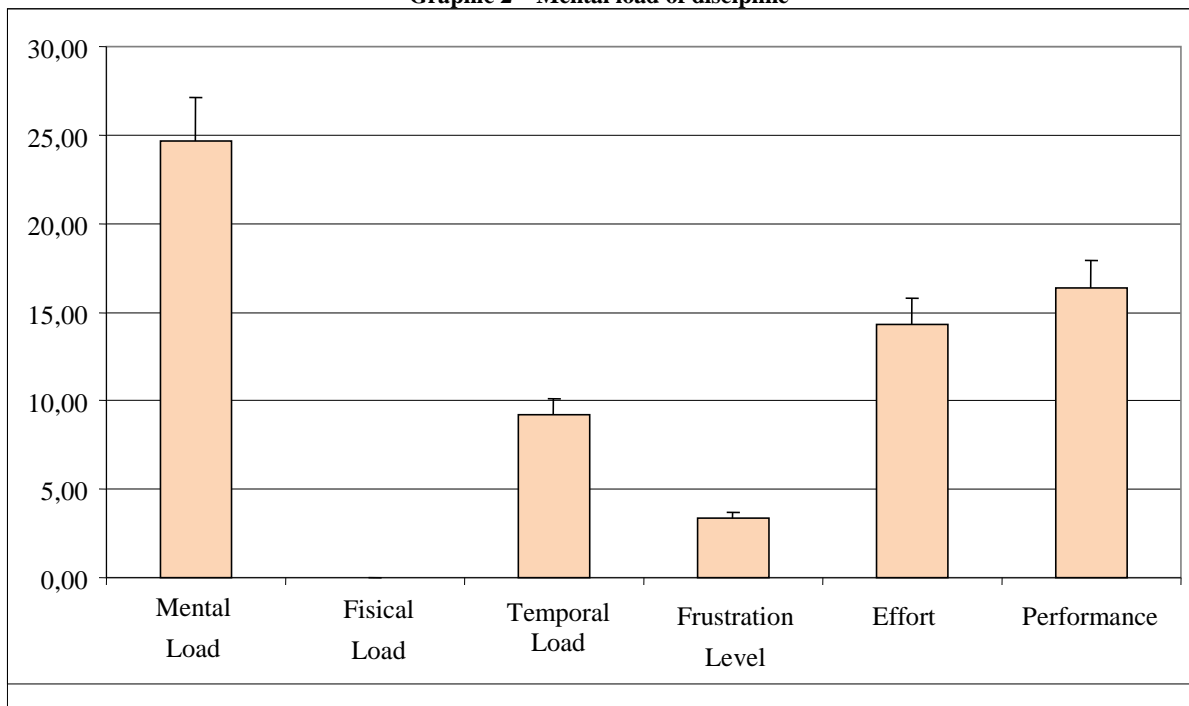
The System Analysis course maintains a constant input of 40 students per shift, with the course being offered in the evening and at night. The rates of locks and cancellations are felt from the second half of 2010, according to Table 2, and the rate of non-graduates can be seen in Table 5.

Table 5 - data of graduated and senior students

| Year Semester | Graduated | Total that should have graduated | Graduates percentage |
|---------------|------------------|----------------------------------|----------------------|
| 2010/2 | - | - | - |
| 2011/1 | - | - | - |
| 2011/2 | - | - | - |
| 2012/1 | - | - | - |
| 2012/2 | 6 | 80 | 8% |
| 2013/1 | 6 | 80 | 8% |
| 2013/2 | 8 | 80 | 10% |
| 2014/1 | 22 | 80 | 28% |
| 2014/2 | 120 ¹ | 80 | 150% |
| Total | 162 | 400 | 41% |

Data from the study on mental load show that students have difficulties to complete the discipline and to remedy the difficulties, they should strive to achieve their goals, showing a behavior of commitment in carrying out their tasks, as Figure 2.

Graphic 2 – Mental load of discipline



Given the budget earmarked of CEETEPS, only one share of it is intended for higher technological education, as shown in Table 6, based on 70,000 students, corresponding to the number of vacancies offered by registered courses.

¹ Semester in progress in the year 2014 and the number corresponding to the candidates for graduation, but have not yet completed the semester.

Table 6 - Predict Budget for Technological Education in Reais (R\$)

| | TOTAL | EDUCATION TECHNOLOGICAL | ANUAL COST PER STUDENT |
|------|------------------|-------------------------|------------------------|
| 2014 | 1.843.598.055,00 | 121.392.531,00 | 1.734,17 |
| 2013 | 1.852.398.791,46 | 138.935.172,55 | 1.984,78 |

The average result of CVI shows, in the student’s view, that the school has fulfilled the role of technician pedagogy, with an average of 118.33 in total of 21 participants, of whom 47% of the sample were above 118, only 5% had a score below 100. The valuation domain of the course had the highest average with 32.23 in the scale, demonstrating positive perceptions of students in this domain, raising the hypothesis of the perception of quality on the educational environment, as shown in Table 7. The second domain in positivity is the cognitive domain indicating that the course offered a wider and deeper perspective on the IT area and specifically the development of software, as standard deviation, some students have not been able to unite all the concepts presented, this fact may be explained by the flow of the course subjects where practical disciplines, on software development, are taught in the semester of respondents students. The third area in positivity is the behavioral domain indicating that students have taken greater risks to maintain performance and be approved, with distinct behavioral changes to achieve the results (final approval), assuming responsibility for new methods of learning and assuming new positions, including communication, because many of the activities are carried out in groups, requiring the interaction between them.

The fourth domain was the personal-affective with the lowest rate of positivity, despite all students agree on the impact on personal growth, other items such as perspicacity, feelings of self-knowledge and understanding of the world did not show such positive results, suggesting the hypothesis that these feelings are slightly worked throughout the course. The students’ profile is, for the most part, shy and introspective people and the school does not seem to substantially change these characteristics.

Table 7 - Comparison of the Domains with the averages and standard deviation of the Course Valuation Questionnaire

| Variables | Personal-affective | Behavioral | Cognitive | Course Valuation | Total |
|-----------|--------------------|--------------|-------------|------------------|--------|
| Average | 27,14 (5,81) | 28,23 (3,88) | 30,71(2,96) | 32,23(2,99) | 118,33 |

5. DISCUSSION

This study attempted to show the students’ perceptions in a reflection on the initial experience of the course by detecting the characteristics of the educational environment, the difficulties in assuming responsibilities with an active role in the learning context, requiring new positions in the face of these difficulties.

Due to the technicistic nature, the course does not motivate the personal-affective development, in despite of this domain interact with the others components such as cognitive and behavioral. The CVI shows that students enrolled in the course regularly adopt positions of changes in attitudes related to the cognitive and behavioral aspects.

The CVI is characterized by being be a multidimensional instrument that provides reliability (NEHARI; BENDER, 1978) in the evaluation of the course overall experience, may possibly (SOBRAL, 2008), assist in the actions of teaching support throughout the course to curb school evasion, as the costs of dropout students are high, according to the data in Tables 4, 5 and 6.

Another relevant discussion is the low investment for technological education by the state, accounting for only 15% of the higher education budget allocated to this sector, which supports the technological development of the country, implying a decline in gross domestic product, according to the survey by MANPOWERGROUP (2014).

The evasion numbers, Table 4, have similar characteristics in other schools; Softex Observatory (2012) points out that evasion in 2007 to 2008 ranged from 29.3% to 26.5% respectively. A study by the same company suggested in a model that shortage of IT manpower suffer directly economy influences, as the search for innovative and entrepreneurial solutions is directly related to the economy, since the greater the IT business, the greater the scarcity of IT professionals, establishing a cycle of lack of professionals and the area growth with a feed back.

The lack of solution to the shortage problem may result in loss of up to R \$ 138.00 billion by 2022 (SOFTEX, 2012) as the scarcity predictions are close to around 400 thousand.

The evasion is a problem to be fought, as scarce resources are spent that do not allow its return, the CEETEPS has a dropout rate of 50% (SON DETREGIACHI, 2012), and that professionalizing education can meet the society with citizen with integral formation, emphasizing the intention to give priority to practical training of the students focused in the labor market. According to Detregiachi's (2012) research the difficulties faced by students in technological courses are: 33% have primary and secondary education basic deficiency (SOFTEX, 2012, p. 196), 18% showed lack of experience in the area of the course, 11 % had difficulty in the disciplines and other difficulties of minor relevance. Previous author's work and this work demonstrate the need to increase the quality of education, at all levels, especially in primary and high school, since the perception of a good learning provides positivity. The improvement on the College level, which still has low rates of evaluation (SOFTEX, 2012, p. 195) and especially in technology courses (SOFTEX, 2012, p. 196), lead to an increase in the IT professional productivity, enabling the decrease of school dropout, leading to a rise in freshmen as well as the graduates.

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