S&G 18 (2023), pp. 115-130

S&G JOURNAL
ISSN: 1980-5160

CRITICAL SUCCESS FACTORS THAT INCREASE LEARNER AUTONOMY

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ABSTRACT

Highlights: Educational institutions increasingly need to deal with the responsibility of transmitting knowledge while promoting student development and qualifying them for the labor market. One of the key factors for students to improve their performance is increasing their autonomy outside the school environment. Therefore, educational managers should use strategies to improve and develop the school's organizational environment around this purpose. **Aim:** Contribute with data that corroborate student development outside the school environment, facilitating and even increasing student performance through the evaluation of Critical Success Factors. These factors involve the following aspects: study discipline, parental support, favorable environment, teaching tools, and psychological well-being. **Methodology:** The theoretical framework used to treat Rockart's (1979) Critical Success Factors is Kolmogorov-Smirnov (1979). As the Komolgorov-Smirnov method has a simplified application, Paraconsistent Logic will also be employed, as it allows the natural treatment of divergences, inconsistencies, and contradictions, in addition to obtaining more accurate results close to reality (Bispo and Cazarini, 2006). **Results:** It is concluded that both the use and prioritization of Critical Success Factors (CSF) positively influence student performance outside the classroom and increase their performance. Therefore, it was found that ordering the Critical Success Factors in degree of the following importance (1: perceived quality; 2: pedagogical political project; 3: training; and 4: teaching tools) improved student performance. **Limitations:** This paper is restricted to the ten best schools in the city of Niterói, according to the National High School Examination (ENEM) concept. This delimitation means that the results obtained are subject to standards such as behavior and market requirements. **Practical Implications:** It is also expected, in addition to adding value to the current literature, to stimulate studies around the proposed theme, aiming to assist students increasingly in improving their autonomy. **Value and Originality:** Few studies were found in the literature proposing the use of CSFs in driving the improvement of student autonomy. Thus, this work has the following purpose: to describe innovative proposals for this segment; to give the educational manager a prominent role in the process of increasing student autonomy by identifying and prioritizing the CSFs; and, lastly, to contribute to other works that evaluate the quality of student care.

Keywords: Critical Success Factors; Study Discipline; Parental Support; Enabling Environment; Teaching Tools; Psychological Well-Being.

PROPPI / DOT
DOI: 10.20985/1980-5160.2023.v18n2.1607

S&G Journal
Volume 18, Number 2, 2023, pp. 115-130
DOI: 10.20985/1980-5160.2023.v18n2.1607

INTRODUCTION

According to Piaget (1969), learning is based on how intelligence develops. Intelligence, in turn, is a biological element dependent on physical and cerebral capacities and subject to organism maturation. In other words, students need to be constantly stimulated during their growth because learning is a process of continuous evolution that occurs through the organism's interaction with the environment. Therefore, the school manager must create pedagogical practices to engage students, making them create a daily study routine and, consequently, learn continuously. In this way, they will be able to enter the labor market more easily.

For students to perform better at school and perceive studying as something enriching and not exhausting, schools use some teaching tools, such as technologies and learning, multimedia, collaborative environments, robotics, design thinking, visual thinking, mind mapping, and systems thinking. They also employ some interdisciplinary and collaborative study strategies that can significantly reflect the student's evolution during the learning process.

In addition to personal and professional factors, such as lack of parental encouragement for study habits and uncertainty regarding career choice and job market opportunities, students can also rely on the role played by school management on a daily basis to increase interest in maintaining study discipline. Therefore, regardless of the area, the subject, or the region in which one teaches or studies, any student needs motivation because, without this element, it is strenuous to remain focused during the school term and, consequently, to succeed academically.

For López (2009), extracurricular activities and homework must be a priority part of everyday relationships with parents since no other social relationship replaces their educational role. The author also asserts that current education lacks authority, and consistency in correction is necessary, as children tend to test and manipulate paternal limits or any other authority figure. For this reason, it is essential to set definite limits, say no, and correct them because only in this way can parents know the characteristics that shape their children's character and their strengths and weaknesses, tastes, and preferences in the learning process.

The school has a very traditional relationship in the student's learning process, in which the teacher appears as an agent of the content to be learned in a very passive relationship. In the out-of-school context, new technologies present information in an agile, attractive, and quite different way from the school environment. This situation leads to a dissonance between the learning process at school and the possibilities of learning outside the school environment. According to the studies by Hayward (2019), the advantage of information being accessed by students instantly is quite convenient; however, it hinders students from developing more complex and critical thinking. That is, when the student searches the internet to solve a problem, he stops using his brain to overcome any obstacle, and this is a disadvantage. In this way, young people become increasingly dependent on machines, becoming incapable of complex cognition. However, the use of new technologies is an obstacle to be solved, and the key issue is how to implement such a tool to be effective in this learning process.

Due to globalization and, consequently, the speed with which information flows through our society, today's students no longer allow themselves to be mere spectators or recipients of knowledge but want to have a greater say in the educational process. Therefore, the company--school should encourage discussion and interaction between students, teachers, directors, and staff in general within the institution in favor of a more harmonious and participatory educational project.

In this way, this article aims to expand academic knowledge about the CSFs, their innovative application, and their influence on student development. It is considered through the research that study discipline, parental support, a favorable environment, encouragement from teachers, teaching tools, and students' psychological well-being are the CSFs for improving student autonomy.

Almeida (2002) argues that the development of some skills can enable students or provide them with a range of procedures that allow them to create autonomy in their studies, thus qualifying their learning. These skills include: 1) habits of searching for information aimed at complementing the subject covered in each discipline; 2) organizing information through schemes on the subject learned or key ideas; 3) recording notes from classes; 4) structuring the work environment, i.e., organizing the place and time of study; 5) creating habits of reviewing information on subjects and making summaries.

Parental support is important and necessary throughout a child's school career. Therefore, when children feel supported by their guardians, their development as students becomes easier, and their learning is substantially improved.

When carrying out any daily task, it is important to have an appropriate place to do it. It is no different for students because when they have an environment conducive to studying, their routine or habit becomes easier

to acquire because their level or state of concentration increases as they become accustomed to their learning environment.

Brooks (2019), in his survey of numerous students, classified a number of items as being the most crucial for creating a perfect study environment, with a view to better learning outcomes. Therefore, in his view, to build an excellent learning environment, one must:

1. Reduce distractions to acquire the focus needed to study. However, there is no specific recommended location; everyone should experiment and decide where they find it easiest to concentrate and promote this location as their daily study habitat;

2. Develop a study routine to help with concentration;

3. For some, creating study groups is more effective, as they can create environments for exchanging information and clarifying ideas, helping with learning;

4. Do not hesitate to change your study location when necessary.

When people know why they do something, it makes the task more effective. Therefore, if educators encourage their students, showing them how important and rewarding their dedication to study is, it makes it easier to achieve professional success.

According to Greeno, Collins, and Resnick (1996), encouraging learning is a constructive process of growth and understanding of cognitive skills, like a metacognitive problem-solving strategy. In other words, teachers aim to guide and make their students reflect, reorganizing themselves around a particular study.

A functional incentive is one that creates reflection. Thus, when a teacher advises students about their professional future, it is not enough to report success stories; students must be convinced of the need to prepare for the job market by accumulating knowledge during their student life because only then will they be able to compete for a better position and, consequently, reach a professionally satisfactory level.

When it comes to improving teaching, there are various suggestions, such as improving teaching materials, training teaching staff, and using some teaching tools. However, these tools are the most debated subject when discussing learning improvement through innovation.

Eady and Lockyer (2013) state that technological advances have influenced how people create, share, and develop information in today's society. Therefore, the school environment underwent significant changes, with some teaching tools linked to technology. Moreover, by becoming more collaborative, more adept at developing talent, being able to bring different types of students together to work towards the same project, and improving the level of communication between students, the quality of teaching has improved.

Another essential variable in the student's learning process is their psychological well-being because, for students to dedicate themselves to their studies, they must develop concentration, focus, and commitment, among other factors. Otherwise, they will not succeed.

According to Davies (2019), there is a significant improvement in student performance when teachers help them to reduce their stress levels, improve their mental health, and consequently improve their psychological well-being.

According to Almeida (2014), when students feel valued, motivated, and stimulated by their parents, their psychological well-being improves, and consequently their school performance enhances. However, even though the family and the school are agents of socialization and pillars in students' formation, it is primarily the family's mission to guide and direct these young people towards life in society, always looking after their well--being.

In addition to students' psychological well-being, it is worth highlighting their well-being with the school environment, as this is also a relevant variable surrounding their pedagogical development. Therefore, the relationship between students and teachers and students and their peers can enhance issues related to health and well--being, both for the good and the bad.

Quintella (1994) believes a company's organizational environment should be pleasant and enjoyable, as it facilitates employee interaction. Therefore, it is vital for an educational institution to seek better integration between employees, teachers, and students to improve the learning environment.

Bonell et al. (2013) argue that a positive school environment, with good synergy between students and teachers, favors learning and develops cognition and is also crucial for students' psychological well-being.

The learning environment plays a significant role in determining a student's academic performance, i.e., their

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Volume 18, Number 2, 2023, pp. 115-130
DOI: 10.20985/1980-5160.2023.v18n2.1607

achievement and learning. Therefore, it becomes relevant to investigate students' perceptions of their learning environments and the various building blocks that influence learning in such an environment.

Prayoonwong and Nimnuan (2010) define the learning environment as everything happening in the classroom or in a particular place set aside for studying at home. In other words, it can be described as the various physical locations, contexts, and cultures in which students learn.

The concept of psychological well-being and its study are essential to this work as they show how much a student's good relationships, inside and outside of school (at home), are essential for their better psychological and intellectual development. In other words, the greater the level of autonomy, environmental mastery, personal growth, positive relationships with others, purpose in life, and self-acceptance, the better the degree of emotional balance, which can thus enhance their pedagogical development.

A student-friendly environment, whether at school or at home, is crucial for their pedagogical development because, in addition to improving concentration and creating an environment more conducive to studying, it also improves their psychological well-being, facilitating discipline in the planning and execution of learning.

According to Hargreaves (2003), an autonomous student is creative, spontaneous, has a deep understanding, has critical thinking, and develops various forms of learning.

Initiated by Professor Heitor Quintella in 1997 at the Fluminense Federal University, the FHTC project aims to study and apply concepts, methodologies, and techniques to evaluate the potential for increasing competitiveness in companies. It is thus of utmost importance to draw on the experience of this project to delve into the interests relevant to this article.

According to Quintella and Rocha (2006), assessing organizations' level of maturity in their product or service development processes is highly relevant to project development because, by planning, executing, measuring the results, and controlling their application, the experience can be repeated in new projects when necessary. In other words, as an educational institution sometimes needs to adapt to new teaching-learning models, it is essential to store information and experiences due to the need to reshape management and performance.

This research also hopes to demonstrate the applicability of the CSFs based on the theoretical framework developed by Rockart (1979) for analyzing improvements in student autonomy performance. Therefore, to the extent that the Critical Success Factors (study discipline, parental support, a favorable study environment, encouragement from educators, teaching tools, and the student's psychological well-being) are prioritized, i.e., ranked by degree of importance according to the choice of teaching managers, the operationalization of the development of student autonomy will be more effective.

Therefore, this article aims to increase student autonomy with the help of prioritizing the CSFs mentioned above to minimize the problems they face, as previously described.

Bullen and Rockart (1981) state that Critical Success Factors (CSFs) are instruments capable of helping and acting in key areas of an educational institution aimed, for instance, at prospering the business and achieving entrepreneurial success by reaching targets imposed by a manager (educational manager).

Specifically for this work, the method-by-product approach, in which an operating system is developed to take care of all the company's bureaucracy, will provide more precise systematization for students since, as the Critical Success Factors are chosen by degree of importance, in other words, as they are prioritized, students will achieve autonomy more easily. Therefore, this work aims to identify, describe, and analyze the CSFs that can contribute to improving student autonomy. Through this approach, databases can be created and stored in the operating system to assess how students relate to the CSFs (study discipline, parental support, favorable environment, teacher encouragement, teaching tools, and psychological well--being). Based on this relationship, it is also possible to devise strategies to improve student performance.

According to Furlan (1991), "A CSF, as a rule, is related to the decision-making process because, by making the right decisions, it is possible to achieve the desired outcome."

In particular, as this work deals with solving a problem in education through the training and procedural improvement of students, the identification, ordering, and prioritization of the Critical Success Factors must be taken as standard before making any decision regarding the development of student autonomy. The aim of this study was to identify the determinant CSFs for improving student autonomy development.

METHODOLOGY

The main basis of this research is Popper's (1975) hypothetico-deductive method. All the steps to achieve the objectives of this study will be described below. The Komolgorov-Smirnov model developed by Rockart (1979) will be used to identify and describe the CSFs that help improve school management performance.

According to Marconi and Lakatos (1991), the choice of methodology must be determined by the proposition of the problem and its respective specificities, such as the nature, object, and resources of the research. For the purposes of this work, the specifics are detailed:

1. Nature: to identify the premises that will lead to a conclusion by verifying the analysis, identification, and description of the CSFs (psychological well-being, teaching tools, favorable environment, encouragement from teachers, and support from parents) so that the hypotheses can be confirmed. In other words, by prioritizing and using the CSFs, student autonomy will improve.

2. Aim: This research analyzes the CSFs that should be considered to increase the efficiency of school management based on the instruments (Komolgorov-Smirnov, 1979), and its premises are tested and validated through data collection and analysis in a process inverse to that of the inductive method.

3. Available resources: generalizations will be used as this is an innovative field for the educational institution sector. Therefore, as the bibliographic base is still restricted and due to the difficulty of relating the work to another research method and the need to achieve the proposed objectives, the works of various authors on human resources, human and technological factors, critical success factors, psychological well-being, teaching tools, a favorable environment, and student autonomy will be used in this study.

- Existing theory: application of the CSF methods of Rockart (1979) with the aim of improving student autonomy;

- Problem: to demonstrate how CSFs can improve student autonomy outside the school environment;

- Deductions: Lakatos (1982) asserts that a scientific hypothesis must contain the ability to be demonstrated to be false;

- Refutability technique: based on Mattar (1996), to prove or disprove a hypothesis, it is necessary to follow specific procedures and have clear objectives. The author proposes, as a first step, the determination of a hypothesis that denies the thesis in question.

- Testing: to determine the hypothesis' validity, a questionnaire will be drawn up to collect data and then sent to the educational manager.

- Analysis of results: the results obtained in the testing stage will be studied using statistical inference.

- Evaluation of the hypotheses: the product of the results analysis stage will allow conclusions to be drawn that corroborate or refute the hypotheses formulated.

The survey was carried out at the following educational institutions: Abel Institute, Colégio São Vicente, Colégio Salesiano, Colégio Marília Mattoso, Gay Lussac Institute, Colégio pH, Colégio Pensi, Colégio Objetivo, Colégio Miraflores, and Colégio MV1, directly with the school managers, i.e., with their respective directors and coordinators during their working hours. Therefore, it was considered that the time used to answer the questionnaire could not be exceeded; otherwise, it would compromise the interviewees' work. As we cannot guarantee that these teaching professionals will be interested and motivated to answer the closed (multiple choice) and open (discursive) questions, we cannot guarantee the veracity of the closed answers or the absence of distorted discursive answers.

Another aggravating factor during the interview could be that the interviewer, a connoisseur, and admirer of the subject under analysis, could influence the answers given by the managers of the educational institutions (respondents). Thus, since he was responsible for presenting and explaining the items, he could influence the respondents' behavior and information.

A final factor that might influence the answers could explain why some of the interviewees do not agree with the Critical Success Factors pointed out for analysis in the questionnaire.

Data collection took place with prior consultation and scheduling at the educational institutions with the respondents because, as it is a questionnaire and answering it would require at least 20 minutes from each educational manager, it would be necessary to schedule the interview in advance.

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The data was processed as soon as the field research was completed in the ten Niterói schools mentioned above, using the questionnaires applied. To do this, we used Rockart's Komolgorov-Smirnov method (1979) and Paraconsistent Logic. This data was tabulated in Excel spreadsheets that generated results that were analyzed to refute or validate the hypotheses of this work.

The purpose of discussing the results was to assess how close the hypotheses were to the truth, i.e., the degree of veracity of the suggested hypotheses, because if the result deviates too far from the truth, the initial hypotheses will need to be altered. In this particular study, the following CSFs were investigated: study discipline, parental support, favorable environment, teaching tools, and psychological well-being, aimed at verifying whether they helped student development outside the school environment.

Statistical methods were important for validating our work using Rockart's Komolgorov-Smirnov method (1979). The analysis of the results and conclusions were made with the completion of the statistical methods and with the help of Paraconsistent Logic in refuting or validating the hypotheses of this work, which, after verifying each hypothesis related to the critical success factors, allowed analyzing the results related to the proposed problem and thus making inferences about the CSFs studied and the perceptions of the educational managers (respondents) in the sample. **Chart 1** below lists the proposed problem and the hypotheses mentioned above:

Thus, the general objective of this work is broken down into the following specific objectives:

Define the research methodology based on qualitative methods in the Komolgorov-Smirnov model (1979) for analyzing, identifying, and prioritizing the CSFs. This methodological model ensures that results are as close to reality as possible.

1. Research to provide educational managers with greater security when using this new paradigm of applying the CSFs in the organizational and managerial model of their work activities;
2. Evaluate how the CSFs can positively influence student performance in achieving autonomy;
3. Add value to the management of educational institutions and contribute to expanding this type of academic literature.

RESULTS AND DISCUSSIONS

This work describes the characteristics of the corpus under study, collects relevant data, and records variables, which, combined, will determine the answers to the problem. This exploration constitutes a significant competitive differentiator within organizations, in this case, educational institutions. It is also worth clarifying that the object of analysis in this study is non-probabilistic, i.e., the corpus that makes up the sample was determined according to the researcher's criteria (Pimentel, 2006).

According to Malta de Oliveira (2006), the sample size of the population studied must be finite. "To ensure that the sample size is representative of the population studied, the formula for calculating samples for finite populations will be used."

Where:

σ^2 = Established confidence level expressed in numbers of standard deviations;

n = Sample size (what I want to know).

Therefore:

$$n = \frac{\sigma^2 . p . q . N}{e^2 . (N - 1) + \sigma^2 . p . q}$$

(Oliveira, 2006, p.90)

Where: n (school managers questionnaire) = (1 * 3 * 97 * 20) / ((30 * 19) + (1 * 3 * 97)) = 8.26 n = 6.76 %

PROBLEM	HYPOTHESES	JUSTIFICATION
How will the use of CSFs improve student autonomy outside the school?	CSFs can positively influence student performance outside the classroom.	Analysis, identification, and description according to the Komolgorov-Smirnov Model (1979)
	CSF use by students increases their performance.	Analysis, identification, and description according to the Komolgorov-Smirnov Model (1979)

Chart 1. Relationship between the problem and the hypotheses.

Table 2 below shows the nominal sample of schools and the number of interviewees per area of activity in each educational institution.

According to Bispo and Cazarini (2006), Paraconsistent Logic is very important for the conclusive process because, in addition to enabling results that are more precise and closer to reality to be obtained, it also enables divergences, inconsistencies, and contradictions to be handled with simplicity.

Tabulation of the data from question 1

This question aimed to rank the five Critical Success Factors. These factors were then combined into ten pairs, so that each respondent chose the most significant critical factor according to their perception.

Table 3 shows the number and percentage of responses obtained for each critical factor in the sample. The last line of the table indicates the maximum points each factor could achieve.

Tabulation of the data from question 2

This question aimed to identify the rejections among the five Critical Success Factors. Therefore, the critical factors were listed, and respondents were asked to exclude those considered irrelevant. **Table 4** shows what each critical factor received in this question. The maximum possible number of rejections is the same number of respondents.

Tabulation of the data from question 3

This question aimed to identify new ones in addition to the five Critical Success Factors. Thus, the respondents included, as a suggestion, five additional CSFs, as shown in **Table 5**.

Tabulation of the data from question 4

Counting the frequency of the score attributed to each of the Critical Success Factors using the scale from 1 “strongly disagree” to 7 “strongly agree” - Question 4 of the field questionnaire;

Table 1. Relationship between population and sample of questionnaire respondents

QUESTIONNAIRE RESPONDENTS					
QUESTIONNAIRE	**POPULATION**	**SAMPLE**	**SAMPLE %**	**MINIMUM %**	**%**
EDUCATORS	20	10	50	6.76	APPROVED

Table 2. Relationship between the nominal sample and the educational manager

SAMPLE	**SCHOOL MANAGERS**	
	DIRECTOR	**COORDINATOR**
(A) ABEL INSTITUTE	1	1
(B) COLÉGIO SÃO VICENTE	1	1
(C) COLÉGIO SALESIANO	1	1
(D) COLÉGIO MARÍLIA MATTOSO	1	1
(E) GAY LUSSAC INSTITUTE	1	1
(F) COLÉGIO PH	1	1
(G) COLÉGIO PENSI	1	1
(H) COLÉGIO OBJETIVO	1	1
(I) COLÉGIO MIRAFLORES	1	1
(J) COLÉGIO MV1	1	1

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Table 3. Tabulation of Question 1 - H1

Critical Success Factors	Number of answers 20	
Referring to Hypothesis 01	**Score**	**%**
1.1 - Is study discipline a CSF that influences student autonomy?	46	23
1.2 - Is parental support a CSF that influences student autonomy?	32	16
1.3 - Is a favorable environment a CSF that influences student autonomy?	49	24.5
1.4 - Are teaching tools a CSF that influences student autonomy?	19	9,5
1.5 - Is psychological well-being a CSF that influences student autonomy?	54	27
1.6 - Is study discipline a CSF that influences student autonomy?	46	23
TOTAL SCORE	200	100

Source: The author

Table 4. Tabulation of Question 2 - H1

Critical Success Factors	Teaching management	
	Number of answers: 20	
Among those listed below, would you eliminate any CSF that can positively influence student autonomy?	Score	%
2.1 - Study discipline	1	5.0
2.2 - Parental support	6	30.0
2.3 - A favorable environment	0	0.0
2.4 - Teaching tools	3	15.0
2.5 - Psychological well-being	1	5.0
2.6 - No	9	45.0
TOTAL SCORE	20	100

Source: The author

Table 5. Tabulation of Question 3 - New CSFs

Critical Success Factors	Teaching management	
	Number of answers: 20	
In your opinion, is there any other CSF that enhances student autonomy as perceived by school managers? Which ones?	Score	%
1. There is no need to include new CSFs	8	40.0
2. Yes, include CSFs relating to innovations	1	5.0
3. Yes, include CSFs relating to educator competence	1	5.0
4. Yes, include CSFs in emotional management	1	5.0
5. Yes, include CSFs on playfulness	1	5.0
6. Yes, include CSFs relating to good customer relations	2	10.0
7. Yes, but no suggestions	6	30.0
TOTAL SCORE	20	100.0

Source: The author

1	Totally Disagree	2	Strongly Disagree	3	Partially Disagree	4	Neither Agree nor Disagree	5	Partially Agree	6	Strongly Agree	7	Totally Agree

Tabulation of hypothesis data 1

The aim of the question is to identify the Critical Success Factors that most positively influence the increase in student autonomy. Thus, five statements were made as possible influences, and for each of them, the respondent could inform:

- totally disagree, scoring 1 point
- strongly disagree, scoring 2 points
- partially disagree, scoring 3 points
- neither agree nor disagree, scoring 4 points
- partially agree, scoring 5 points
- strongly agree, scoring 6 points
- totally agree, scoring 7 points

For this question, we opted for a scale with seven options because the Kolmogorov-Smirnov method, the theoretical framework used to extract these influences, also uses a scale with a maximum of seven options. In this way, the maximum number that each influence indicated below could obtain is seven multiplied by the total number of respondents. **Table 7** shows the results obtained by the educational institutions under analysis.

Table 7 shows the total score for each item in question 4 and their respective percentages.

Table 8 refers to the total score obtained for each item in question 4 related to their respective CSFs according to **Table 7** and their respective percentages.

The data from question 4 was also treated using Paraconsistent Logic. This question used a scale ranging from 1 to 7 answer options. To enable the points to be plotted on the unit square of the Paraconsistent Logic Cartesian plane, the answers obtained were treated according to the belief and disbelief criteria shown in **Table 7**.

Table 9 shows the respective answers and the corresponding score, as shown in **Table 6**. In addition, the degree of belief and disbelief for each CSF is indicated.

The values obtained for belief are represented in the Unit Chart on the Cartesian Plane, as shown in **Figure 1**.

As listed above, it was observed that all the CSFs (teaching tools, parental support, study discipline, favorable environment, and psychological well-being) obtained scores to be plotted in the graph area, which is considered almost true, tending towards the indeterminate.

Tabulation of hypothesis data 2

Table 10 shows the results obtained by the educational institutions in question 5.

Table 11 shows the total score for each item in question 5 and their respective percentages.

The data from question 5 was also treated using Paraconsistent Logic. This question used a scale ranging from 1 to 7 answer options. To make it possible to plot the scores in the unit square of the Cartesian plane of Paraconsistent Logic, the answers obtained were treated according to the belief and disbelief criteria in **Table 10**.

Table 12 shows the respective answers and the corresponding score, as shown in **Table 10**. In addition, the level of belief and disbelief for each CSF is indicated.

The values obtained for belief are represented in the Unit Chart on the Cartesian Plane, as shown in **Figure 2**.

Table 13 describes the relationship between the questions relating to the field questionnaire in question 5 and the dimensions of the SERVQUAL model.

Table 13 shows that all elements of Perceived Quality according to the SERVQUAL scale (1 - Responsiveness; 2 - Safety; 3 - Empathy) reached points to be plotted in the area of the graph considered almost true, tending to indeterminate.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions drawn from the results obtained suggest studies related to the topic researched that can be carried out in the future.

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DOI: 10.20985/1980-5160.2023.v18n2.1607

Table 6. Question 4 tabulation - H1

CSFs can have a positive influence on student performance outside the classroom.	1	2	3	4	5	6	7
4.1 - Does parental support help teachers improve students' learning and autonomy?	0	0	0	0	3	7	10
4.2 - Does a greater level of guidance from teachers to improve their use of teaching tools improve student autonomy?	0	0	0	1	3	6	10
4.3 - Is understanding students' specific needs, i.e., encouraging them to be committed to their studies, a critical success factor that improves student autonomy?	0	0	0	0	4	11	5
4.4 - Does the student's psychological well-being, whether inside or outside the school environment, influence their performance?	0	0	0	2	3	9	6
4.5 - Can a favorable study environment, whether inside or outside the school environment, improve student autonomy?	0	0	0	0	4	3	13
TOTAL SCORES	0	0	0	3	17	36	44

Header legend: (1) Totally disagree, (2) Strongly disagree, (3) Partially disagree, (4) Neither agree nor disagree, (5) Partially agree, (6) Strongly agree, (7) Totally agree.

Source: The author

Table 7. Question 4 tabulation

Hypothesis 1	**TOTAL**	
	Number of Answers 20	
CSFs can positively influence student performance outside the classroom.	Scores	%
4.1 - Does parental support help teachers improve students' learning and autonomy?	127	18.7
4.2 - Does more guidance from teachers to enhance teaching tools improve student autonomy?	125	18.4
4.3 - Is the understanding of the specific needs of your students, i.e., encouraging them to be committed to their studies, a critical success factor that improves student autonomy?	121	17.8
4.4 - Does the student's psychological well-being, whether inside and outside the school environment, influence student performance?	137	20.2
4.5 - Can a favorable study environment, whether inside and outside the school environment, improve student autonomy?	168	24.8
TOTAL POSSIBLE SCORES	678	100.0

Source: The author

Table 8. Question 4 tabulation - General Summary

CSFs can have a positive influence on student performance outside the classroom.	**Scores**	**%**
1.1 - Is study discipline a CSF that influences student autonomy?	121	17.8
1.2 - Is parental support a CSF that influences student autonomy?	127	18.7
1.3 - Is a favorable environment a CSF that influences student autonomy?	168	24.8
1.4 - Are teaching tools a CSF that influences student autonomy?	125	18.4
1.5 - Is psychological well-being a CSF that influences student autonomy?	137	20.2
TOTAL POINTS	678	100.0

Source: The author

Table 9. Belief vs. Disbelief criterion

Question 4: CSFs can positively influence student performance outside the classroom.	Totally Disagree		Strongly Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Strongly Agree		Totally Agree		Belief	Disbelief
	Pt	0	Pt	0.17	Pt	0.2	Pt	0.25	Pt	0.33	Pt	0.5	Pt	1		
1 – Does parental support help teachers improve students' learning autonomy?	0		0		0		0		3		7		0		0.58	0.42
2 – Does more guidance from teachers to enhance teaching tools improve student autonomy?	0		0		0		1		3		6		0		0.584	0.416
3 – Is the understanding of the specific needs of your students, i.e., encouraging them to be committed to their studies, a critical success factor that improves student autonomy?	0		0		0		0		4		11		0		0.629	0.371
4 – Does the student's psychological well--being, whether inside and outside the school environment, influence student performance?	0		0		0		2		3		9		0		0.625	0.375
5 – Can a favorable study environment, whether inside and outside the school environment, improve student autonomy?	0		0		0		0		4		3		0		0.558	0.442

Source: The author

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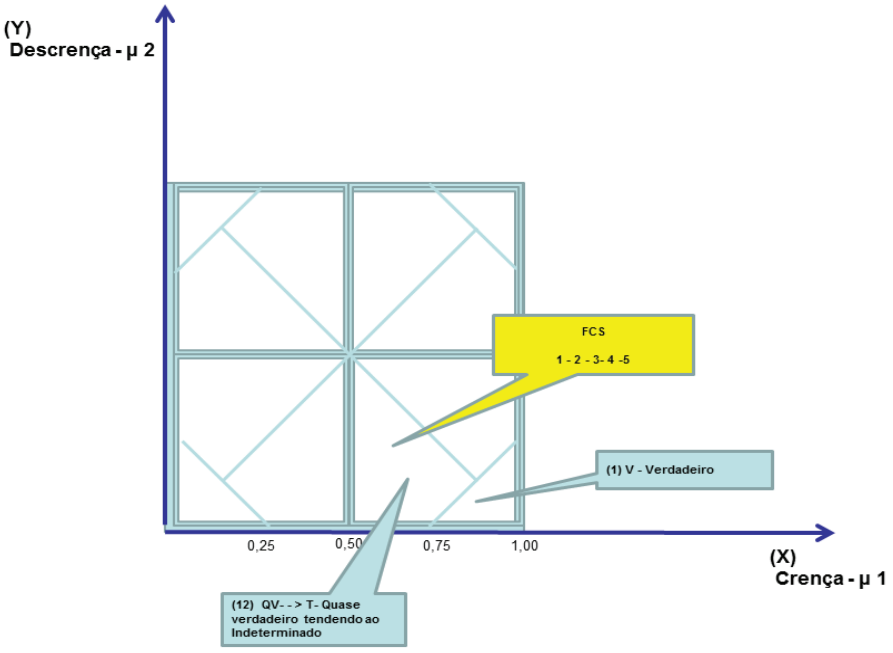

Figure 1. CSFs Plotted on the Unitary Chart in the Cartesian Plane of Paraconsistent Logic

Table 10. Question 5 tabulation - H2

The student's CSF use increases their performance	1	2	3	4	5	6	7
5.1 - Does better CSF use improve students' interest in acquiring knowledge, increasing their autonomy?	0	0	2	2	4	6	6
5.2 - Does increasing educators' understanding of providing the necessary support to students improve student autonomy?	0	0	0	1	5	4	10
5.3 - Does increasing students' understanding of commitment to their studies increase their autonomy?	0	0	1	1	2	5	11
5.4 - Does prioritizing critical success factors increase student autonomy?	0	0	0	3	4	2	11
TOTAL SCORE	0	0	3	7	15	17	38

Source: The author

Table 11. Question 5 tabulation - General Summary

Hypothesis 2	TOTAL	
	Number of Answers 20	
The student's use of the CSFs increases their performance.	Score	%
2.1 - Does better CFS use improve students' interest in acquiring knowledge, increasing their autonomy?	112	23.6
2.2 - Does the increased understanding of educators in providing the necessary support to students improve student autonomy?	117	24.7
2.3 - Does increasing students' understanding of their commitment to their studies increase their autonomy?	124	26.2
2.4 - Does prioritizing critical success factors increase student autonomy?	121	25.5
TOTAL SCORE	474	100.0

Source: The author

Table 12. Belief vs. Disbelief criterion

Question 5: The student's use of the CSFs increases their performance.	Totally Disagree		Strongly Disagree		Slightly Disagree		Neither Agree nor Disagree		Slightly Agree		Strongly Agree		Totally Agree		Belief	Disbelief
	Pt	0	Pt	0.17	Pt	0.2	Pt	0.25	Pt	0.33	Pt	0.5	Pt	1		
1 - Does better CFS use improve students' interest in acquiring knowledge, increasing their autonomy?	0	0	2	2	4	6	6	0.641	0.359	0	0	2	2	4	6	6
2 - Does increasing students' understanding of their commitment to their studies increase their autonomy?	0	0	0	1	5	4	10	0.590	0.410	0	0	0	1	5	4	10
3 - Does prioritizing critical success factors increase student autonomy?	0	0	1	1	2	5	11	0.578	0.422	0	0	1	1	2	5	11
4 – Does the student's use of the CSFs increase their performance?	0	0	0	3	4	2	11	0.587	0.413	0	0	0	3	4	2	11

Source: The author

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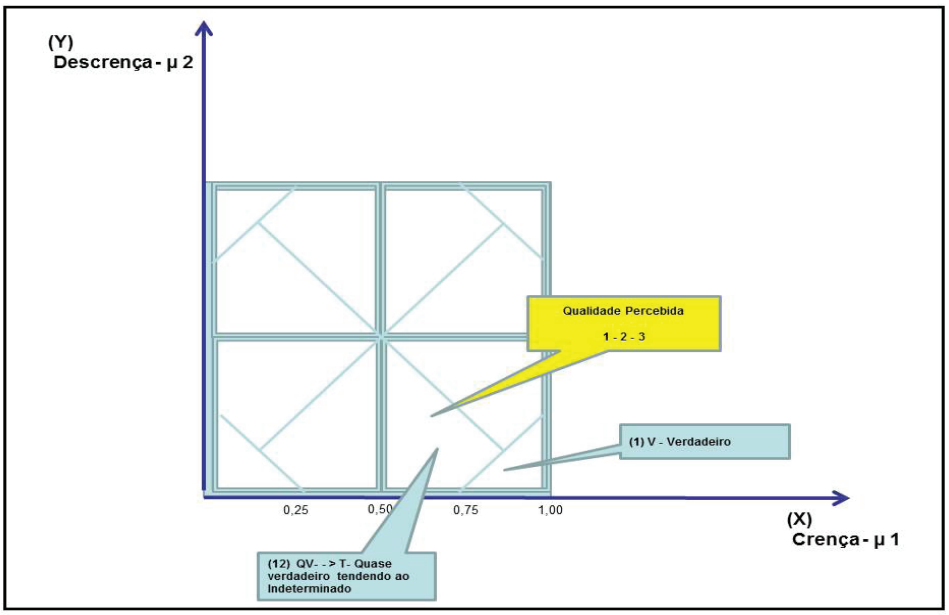

Figure 2. Elements of Perceived Quality Plotted on the Unitary Chart in the Cartesian Plane of Paraconsistent Logic

Table 13. Question 5 tabulation - Relationship between questions

Dimensions	Questions			
Tangible elements	5.1	5.3		
Reliability	5.2			
Responsiveness	5.3			
Professionalism	5.3			
Courtesy	5.3	5.4		
Credibility	5.4			
Security	5.1	5.2		
Accessibility	5.3			
Communication	5.3			
Customer understanding	5.1	5.2	5.3	5.4

Source: The author

In Question 1, where the teaching management was asked to check which of the ten pairs of CSFs would be most important for increasing student autonomy, the test allowed the Critical Success Factors to be ranked in terms of importance as follows: 1 - psychological well-being; 2 - favorable environment; 3 - study discipline; 4 - parental support; and 5 - teaching tools.

Question 2 aimed to identify the rejections among the five Critical Success Factors. It was found that most interviewees would not eliminate any of the CSFs mentioned. However, for the rest of the school managers, parental support, teaching tools, psychological well-being, and study discipline would be eliminated in ascending order of priority.

In Question 3, in which the teaching managers were asked to say whether there were any other CSFs that could increase student autonomy, it was found that, for the majority, there was no need to suggest other Critical Success Factors in addition to those presented. Some teaching managers were unable to say; however, the rest suggested five new CSFs (innovations, educator competence, emotional management, playfulness, and good customer relations) linked to the pedagogical management aimed at supporting the manager's work.

In Question 4, school managers were asked to give their opinion according to a questionnaire comprising five statements as possible influences on the key issues in Hypothesis 1, using a scale ranging from totally disagree

to totally agree. Based on this analysis, data verification indicated that no statistically significant differences existed between the CSFs that improve school management (Komolgorov-Smirnov test).

In Question 5, school managers were asked to give their opinion on a questionnaire comprising five statements as possible influences on the key issues in Hypothesis 2, using a scale ranging from totally disagree to totally agree. Based on this analysis, data verification indicated that no statistically significant differences existed between the CSFs that improve student performance (Komolgorov-Smirnov test). Paraconsistent Logic was also used and indicated that the CSFs are true, tending towards indeterminacy, according to the data allocated in the Unit Chart on the Cartesian Plane.

The research problem (How CSF use will improve student autonomy outside school) related to the ten best-placed educational institutions in Niterói, according to the ENEM ranking of the last five years shown in **Table 2**, was presented through the following two questions:

Critical Success Factors (CSFs) can positively influence student performance outside the classroom.

By prioritizing the Critical Success Factors (CSFs), the student increases their performance.

Therefore, both hypotheses were analyzed by the Kolmogorov-Smirnov test and validated by Paraconsistent Logic through the Unitary Framework in the Cartesian Plane of Belief and Disbelief.

The investigations on Critical Success Factors and their influences on student autonomy performance do not finalize this discussion. Some other studies should and could be further developed. Possibilities include:

1. A thorough analysis of the role of each CSF in pupils' daily lives;

2. Mapping and training for better utilization of the CSF by parents and students;

3. A study on innovations, educator competence, emotional management, playfulness, and good customer relations as Critical Success Factors leading to improved learner performance.

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Received: January 27, 2020

Approved: August 2, 2023

DOI: 10.20985/1980-5160.2023.v18n2.1607

How to cite: Araújo, N.F., Quintella, H.L.M.M. (2023). Critical success factors that increase learner autonomy. Revista S&G 18, 2. https://revistasg.emnuvens.com.br/sg/article/view/1607