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Bachelor Thesis

Digitalisation and inequality in Higher Education—

An analysis of Covid-19s impact on students at Federal Universities in southeastern Brazil.

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Abstract

The coronavirus pandemic, classified by the World Health Organisation on 11 March 2020 as a global pandemic, has brought consequences for various aspects of the society, such as health care, economy and education of all countries in the world. This pandemic meant a drastic change in daily life, with the closing of borders and businesses, cancellation of events and the suspension of classes in educational institutions, all with the aim of avoiding crowds and reducing contamination with the COVID-19 virus. In the area of Higher Education, many educational institutions, to continue to provide their courses, have adopted the transition from face-to-face lessons to online learning. This study with the research question: *„What impact did the change to digital education due to COVID-19 have on the study success of students in Federal Higher Education Institutions in the Southeast of Brazil?“* aims, through a mixed approach of quantitative and qualitative analysis, to analyse the impacts of the transition to digital education, focusing on aspects such as study success and learning effectiveness. The findings of this research showed a rather negative impact on the transition to digital education for higher education federal students.

(KEY WORDS: COVID 19, EDUCATIONAL TECHNOLOGIES, REMOTE TEACHING & LEARNING)

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1- Introduction

In December 2019 a disease caused by the SARS-CoV-2 virus was first identified in the city of Wuhan in China, which was named by experts as the new Coronavirus or COVID-19. This disease brings symptoms such as fever, dry cough and breathing problems such as acute respiratory distress syndrome (ARDS) and in severe cases even Pneumonia. Although the new coronavirus has a relatively low fatality rate of approximately 5%, this disease has a high degree of contamination, increasing the dangerousness of this illness (Arruda, 2020). Due to its high degree of contamination, this virus has spread at a lightning speed throughout the world, being classified by the World Health Organization on March 11, 2020, as a global pandemic (WHO, 2020). As the variation of this virus can be considered as a new disease, there were still no proven drugs and vaccines for the treatment of COVID-19 (Ribeiro & Corrêa, 2021). Because of this, to contain the spread of this pandemic, non-medical measures such as physical distancing were adopted all over the world (Kuwahara et al., 2020; Ribeiro & Corrêa, 2021). In Brazil, where the number of cases of COVID-19 is considered to be really high, being the third country with the highest number of infections in the world (Elflein, 2021), the Ministry of State Education adopted on 17 March 2020 the closure of educational institutions, authorising in exceptional circumstances the replacement of classroom subjects, in progress, by classes that use information and communication media and technologies (Brasil, 2020).

The transition from face-to-face classes to digital distance learning has brought challenges for all participants, higher education institutions, teaching staff and students, all of them having to go through an extensive process to be able to be part of digital education. The first and therefore most important step is to meet the prerequisites to be able to study via digital platforms, which is having the digital equipment (computers, laptops, tablets, etc.) and a stable internet connection - these points are initially considered most

critical, since without them it is not possible to participate in the digital educational environment. Then the training and adaptation process, for the teaching staff, to be able to teach and assess students digitally, and for students, to attend classes and be able to study and perform exams, assignments and projects (Amaral & Polydoro, 2020). Although distance learning may be considered more accessible in parts, enabling digital teaching and learning from different parts of the country, statistics have shown that one in three people who have tried to enter university in the last five years do not have access to digital devices and internet, and that higher education institutions, especially public and federal ones, do not have the capacity to provide this structure to all of their students and teaching staff (Costa, 2020). With that said, it can be identified that the transition to digital education can be considered a barrier to access for many students to education (Castioni et al., 2021). What impact this possible barrier has had on student success will be developed further in the following chapters.

1.1-Relevance of the Study and Objectives

The social and academic relevance of this research is given for several reasons. First of all, the subject addressed is considered to be recent, considering that the coronavirus pandemic began in December 2019 and was classified as a global pandemic approximately one year ago, thus being a subject not yet fully academically researched. Furthermore, the region chosen for the research is an important aspect. The Southeast region of Brazil, comprising the states of Rio de Janeiro, Sao Paulo, Minas Gerais and Espirito Santo, is home to the country's largest economic centres and higher education institutions. According to statistics, 44.6% of students enrolled in higher education institutions in the country are located in the Southeast region of Brazil, making it the region with the largest student population in the country (Vestibular, 2014)**.** Therefore, the result of this research can be of great importance for other regions of the country and even for other countries as well, bringing a good reflection of problems analysed in part of the Brazilian society. Furthermore, this research will deal with issues such as digitalisation and its access in developing countries, inequality and academic and social integration as a cause of retention in study success. Finally, results, inputs and problems addressed in this research can serve as a basis and inspiration for further research, for scholars, governments and policy-makers to improve the perspective of digital education and digitalisation in the future.

1.2-Research Question

The aim of the proposed thesis is to understand how the mandatory transition due to the global coronavirus pandemic from classroom-based lectures to distance learning with use of technology has affected the study success of students at federal higher education institutions in the southeastern region of Brazil. To answer the above-mentioned problem, the following research question therefore arises:

„What impact did the change to digital education due to COVID-19 have on the study success of students in Federal Higher Education Institutions in the Southeast of Brazil?“

To answer this question, several steps will be taken such as analyzing theoretical background and the collected data. In the next section, the outline of this study will be presented more detailed.

1.3-Outline of the Study

In order to portray the problem and answer the question presented above, this thesis will be structured as follows:

Chapter Two – Theoretical Framework – theoretical background is reviewed. Aspects such as Higher Education and Digitalisation in Brazil and theories regarding study success will be discussed in this chapter.

Chapter Three – Research design and Data Collection – deals with the explanation of all research processes, such as research strategy, methodology, data collection and limitations.

Chapter Four – Research Results – The presentation of the research results is carried out.

In Chapter Five – Research Analysis – An analysis of the obtained results is conducted.

Chapter Six – Discussion and Conclusion - The role of research findings is discussed, as well as recommendations and the presentation of a conclusion to the theme and implications of this study.

2-Theoretical Framework

The aim of this chapter is to present and analyse data concerning the general situation of higher education and digitalisation in Brazil, as well as to review theories, studies, reports and testimonials on the transition to digital education and on study success. This theoretical background will make it possible to a better structure of the paper, helping to better observe the mentioned problems and to answer the research question.

2.1-Higher Education in Brazil

This section presents statistical data on higher education in Brazil, providing relevant information for this research at national level and for the Southeast region, which in terms constitutes the unit of analysis for this research. The data was extracted from the Map of Higher Education in Brazil 2020, by the Semesp Institute (Semesp, 2020), and from 2019s National Higher Education Census, developed by INEP, a national educational research institute linked to the Brazilian government and the ministry of education (INEP, 2020).

2.1.1-Demographic Information

The following tables and figures contain demographic information regarding the general population of the country, higher education population and its characteristics, higher education institutions, as well as information on gender, age, ethnicity, socioeconomic status, among others. By using this information, a better understanding of the situation of higher education in Brazil will be acquired.

*Table 1: Brazilian population and the number of enrolments in higher education in 2018**

Region	Population	% from Population	Number of Enrolments	% of Enrolments in total
North	18.430.980	8,8 %	691.639	8,2 %
Northeast	57.071.654	27,2 %	1.799.761	21,3 %
Southeast	88.371.433	42,1 %	3.755.825	44,4 %
South	29.975.984	14,3 %	1.429.029	16,9 %
Central-West	16.297.074	7,8 %	774.260	9,2 %
Brazil (Total)	210.147.125	100 %	8.450.514	100 %

Source:(Semesp, 2020)

**There were 1,234 enrolments of students from abroad in distance learning courses at Brazilian higher education institutions in 2018.*

Table 1 shows data related to the Brazilian population and the number of enrolments in higher education institutions in 2018. When looking at the data provided it is possible to observe that the national average of enrolment in higher education is approximately 4.0%, which is considered a reasonable percentage compared to other countries in Latin America (Semesp, 2020). One of the reasons for this percentage is due to the Brazilian educational system, which is mostly oriented toward higher education, where, in theory, all students who finish secondary schooling should be able to enter a higher education institution (INEP, 2020). However, research shows that this is not the case, as many school graduates do not achieve sufficient qualifications to secure a vacancy in higher education, due to poor quality of public secondary schools, and the number of school graduates who do not enter a higher education institution is considered high compared to the nearly 8.5 million students who enrolled in a higher education institution in 2018 (Semesp, 2020). Relevant for this research is mainly data concerning the southeastern region of the country — the unit of analysis of this thesis. The southeastern region can be considered a pioneer in several aspects, being the largest percentage of the country's population, with 42.1% of inhabitants and the largest population of higher education students, with 44.4% of the total number of enrolments in the country (Semesp, 2020). With that said, it is possible that an in-depth analysis of the southeastern region on the general situation of higher education in its transition to digital education due to the Covid-19 pandemic could bring results of importance and relevance to the rest of the country as well.

The next table concerns the number of higher education institutions spread throughout Brazil and character of these institutions.

Table 2: Number of Higher Education Institutions and their character

	Total	Total Public	Federal	State	Municipal	Private
Number of HE Institutions:	2608	302	110	132	60	2.306

Source:(INEP, 2020)

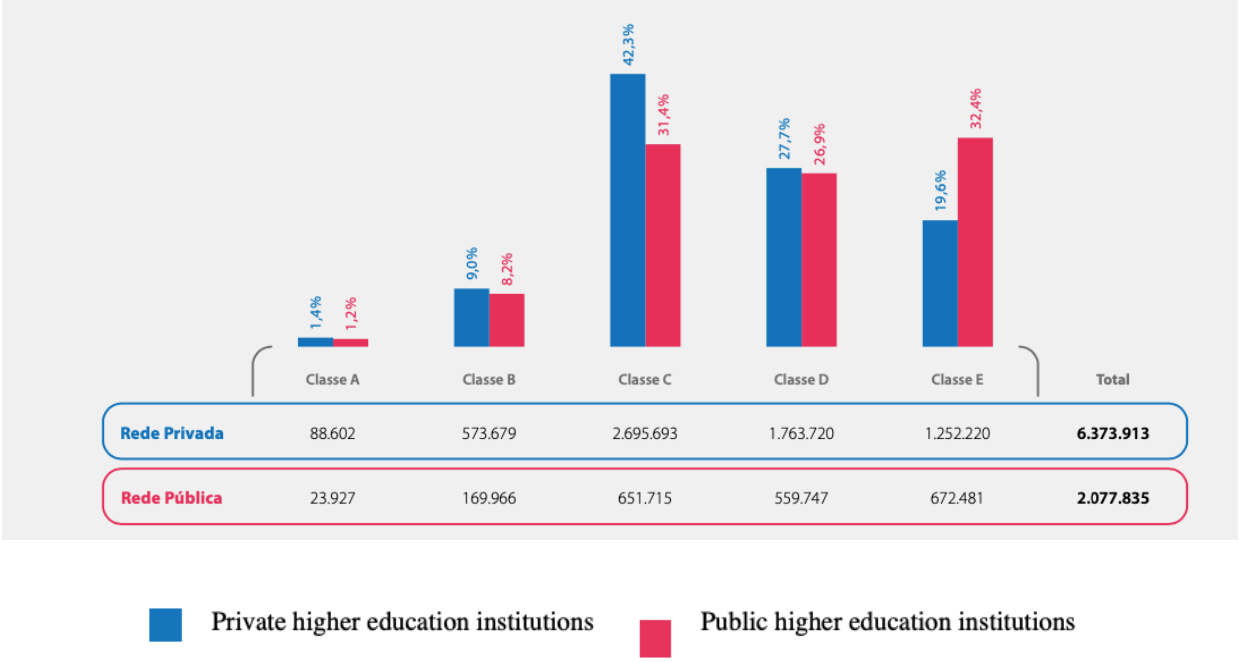
The information presented in *Table 2* provides relevant insights regarding the overall picture of Brazilian higher education. With a total of 2608 institutions of higher education in Brazil, the number of private institutions leads with approximately 88% of institutions nationwide (INEP, 2020), representing approximately 75% of total enrolments in 2018 (Semesp, 2020). Despite their private nature, it is important to note that the growth of private higher education institutions occurred mainly due to several public policies of the Brazilian federal government, among others, in creation of scholarships and educational programs, enabling low-income students to attend these institutions (Semesp, 2020). An important fact to be mentioned is the reason for these developments. Private higher education institutions have a higher number of students from lower economic classes, because they have the majority of vacancies, together with government actions of educational programs (Semesp, 2020). These private institutions have a lower entry level due to the larger number of vacancies available (Semesp, 2020). Students from higher income families, due to their financial status, obtained a better quality high school education and were able to participate in preparatory courses and also take private classes. As a consequence, they scored better on qualifying examinations for access to higher education and were able to take up vacancies in public institutions, which are smaller and therefore more difficult to achieve.

The numbers regarding public higher education institutions total approximately 11.5% of the country's institutions (Semesp, 2020). Public higher education institutions in Brazil are divided into three sub-categories: federal, state, and municipal institutions, which differ basically with respect to the agency responsible for their administration and with respect to where the funds of each one derive from (INEP, 2020; Semesp, 2020). Federal institutions total 110 institutions, corresponding to 11.5% of Brazil's higher education institutions, 19 of them (approximately 17.2%) located in the Southeast region.

The next section is dedicated to presenting data concerning the socioeconomic status of higher education students in Brazil.

2.1.2-Socio-economic Status

Figure 1 and Table 3: Socio-economical Status from students in Higher Education Institutions in 2018/Per capita household income.



Per capita household income	
Class A	8 minimum wages or more
Class B	From 3 to 8 minimum wages
Class C	From 1 to 3 minimum wages
Class D	From 0.5 to 1 minimum wage
Class E	Up to 0.5 minimum wage

Source:(Semesp, 2020)

Figure 1 presents data related to the financial status of students in higher education, in private and public institutions. The research divides students into socioeconomic categories based on each household's per capita income, considering the Brazilian minimum wage, which currently stands at approximately 1,100

BRL (approximately 178 EUR) (Oliveira, 2021; Semesp, 2020). Analyzing the results, it is possible to observe that regardless of the educational institution, classes C and D are predominant in higher education in Brazil (Semesp, 2020). A big difference in percentage in relation to private and public institutions can be found only in class E, which is considered the most underprivileged class of the Brazilian population. The majority of students from class E attend public educational institutions, as they are the target public policies, such as the quota system (Semesp, 2020). The survey shows that private higher education system is the main channel of access to higher education for lower income groups, having consequences on the percentage of students who have to work (Semesp, 2020). While approximately 62% of students in private education system work and study, only 40% of students in the public system have this need (Semesp, 2020). The data also shows that on average 20% of private higher education students are responsible for the income of their entire family (Semesp, 2020). While these students need to work to support their families and pay fees at private institutions, public higher education students, in many cases, work less and mainly to gain market experience (Semesp, 2020). This shows a great contradiction at the country's higher education system: on one hand, low-income groups attend private higher education institutions, because their level of education was not enough to guarantee a vacancy in public education thus requiring an income to pay their tuition fees (Semesp, 2020). On the other hand, students with a higher earning capacity and better basic education have secured a vacancy in free public education and, therefore, do not need to work (Semesp, 2020).

After presenting relevant data regarding higher education institutions and specific data on students' socioeconomic status, the next section will deliver a short introduction to more recent and possibly connected information regarding the covid 19 pandemic in federal higher education in Brazil.

2.1.3-Federal Higher Education

The data in the previous sections presented information concerning the Brazilian higher education system, taken from the Map of Higher Education in Brazil 2020 (Semesp, 2020) and 2019s National Census of Higher Education (INEP, 2020). In both studies, data presented is from the time period up to 2020, before the

start of the Covid-19 pandemic, thus bringing only an overview of the situation of Brazilian higher education without presenting consequences of facing the transition to remote digital education.

This section aims to present information about the federal higher education in Brazil in times of pandemic, with data developed by the Federal Government and the Ministry of Education (Governo Federal, 2021). Entitled: "Coronavirus: Monitoring in the Federal Education System ", the dataset provides information such as the functioning of federal educational institutes, epidemiological data, digital inclusion, the federal education general dashboard, biosecurity protocol, countermeasures, and anticipated graduations (Governo Federal, 2021). The major focus of this section will be placed on aspects of digital inclusion and in the federal education dashboard.

According to academic data provided by educational institutions, in the year 2020, approximately 1.5 million people enrolled in federal higher education institutions in undergraduate and graduate programs (Governo Federal, 2021). However, most of these enrolments occurred at the beginning of 2020s academic year, which began before the Covid-19 pandemic, thus not being influenced by the pandemic. Numbers developed over the course of 2020 and 2021 primarily due to the pandemic and were related to students dropping out of higher education, cancelling their enrolment, and suspending their enrolments (Governo Federal, 2021). In Brazilian higher education, students after attending at least one or two semesters of school have the possibility of suspending their enrolment, which means distancing themselves from the course, not being required to take on academic responsibilities, and if they attend private institutions, not being required to pay tuitions (Silva, 2020). Recent data on federal higher education shows approximately 123,000 cancellations and about 116,000 suspensions, which amounts to approximately 239,000 students who dropped out of higher education, partially or completely, during the coronavirus pandemic (Governo Federal, 2021). The possible reasons for these dropouts will be discussed further.

The next information of relevance extracted from this dataset is related to digital inclusion during the Covid-19 pandemic in federal higher education (Governo Federal, 2021). With the transition from face-to-face to digital distance learning, many students did not have access to the necessary tools, such as internet access and possession of digital equipment, that would enable them to participate in online classes (Castioni

et al., 2021). Nevertheless, it is possible to observe actions taken by the government and federal higher education institutions to assist low-income students (Governo Federal, 2021).

According to the dataset, the federal government has been carrying out several actions to ensure that low-income students are able to participate in digital education (Governo Federal, 2021). The largest project to date is delivering mobile data chips for Internet access, which has already enabled approximately 144,000 students to access the Internet (Governo Federal, 2021). Among other projects, electronic devices have been granted by the federal government and higher education institutions, as well as financial actions through partnerships for donation and loan of equipment for students (Governo Federal, 2021). Despite the existence of several digital inclusion actions allowing many students to take part in digital education, the coverage of these actions can still be considered very low and insufficient, possibly being the cause of many enrolment cancellations and suspensions in the years 2020 and 2021 (Governo Federal, 2021).

The next section will deal more in depth with the digitalisation issue in Brazil in general, demonstrating why many digital inclusion actions for low-income groups are necessary and need to be prioritised by the federal government.

2.2-Digitalisation in Brazil

This section is dedicated to providing information regarding digitalisation in Brazil, focusing first on general information to get a better overview of the country's situation and then on insights and statistical data relevant to this thesis. The concept of digitalisation in this analysis is primarily understood as possession, access and use of digital electronic devices and the Internet.

Digitalisation in Brazil has been advancing at a rapid pace in recent years, especially the use of the internet, where latest surveys show that three out of four Brazilians, which corresponds to approximately 134 million people, have access to the internet (Valente, 2020). This corresponds to approximately 75% of the population using the Internet, which can be considered a reasonable indicator for a country that is located in the "global south“ (Valente, 2020). It is important to demonstrate the speed of growth of Internet use in Brazil, whereas

in 2010 the use results showed that only 41% of the Brazilian population had access to the Internet, meaning that the advance of the last decade was an average of 3.3% per year (Valente, 2020). However, when compared to European countries such as Germany, where 94% of its population declared itself internet users in 2020 (Statista, 2020), and the Netherlands with 94.16% (H.Tankovska, 2021), it is possible to observe the existing difference between these countries and consequent technological advance (Silveira, 2020). Due to its large population, the number of non Internet users in Brazil, although statistically small (25%), concerns in reality a significant number of people, meaning that approximately 46 million people do not use Internet in the country (Silveira, 2020; Tokarnia, 2020).

An important aspect to analyse among the non-users of the Internet in Brazil is the reasons why they do not use the Internet. According to research, of 46 million internet non-users:

-32% do not use the Internet because they lack interest,

-26% find the service expensive,

-25% lack the knowledge to use the Internet (IBGE, 2019; Silveira, 2020)

Another fact is the availability of the Internet service. While the representation of Internet users shows that 77% of urban area residents use the Internet, only 53% of rural area residents uses the Internet (Costa, 2020). Among the 47% of rural area residents who do not use the Internet, approximately 19% justify the unavailability of Internet service in their region (IBGE, 2019). Although the use of the Internet is distributed in a good part of the Brazilian households, research shows that one out of every five people who access the Internet does not have its own Internet and uses Internet of its neighbour (Raquel, 2020). This is justified by the population that 45% of them believe that the service is too expensive to have their own and 37% do not have the necessary structure at home (Raquel, 2020).

After presenting statistical data on the population's internet use, it is important to show where and how internet is used. Research shows that the smartphone is the main means for surfing the internet, being used by 99% of internet users in Brazil. Smartphones according to the Brazilian Institute of Geography and Statistics, were in 2018 the only means of internet access in 45.5% of households in the country (IBGE,

2019; Silveira, 2020). In second place comes the computer, which represents 42% of internet users, having together with the tablet, which ranks fourth with 10% of internet users, a significant drop in its use in recent years (IBGE, 2019; Silveira, 2020). In third and fifth place are, respectively, televisions with 33% and videogames with 9% (Costa, 2020; Valente, 2020). The computer is considered the only tool of access to the Internet at home for only 0.9% of the Internet-using population (Silveira, 2020).

The percentage of which devices are used in combination with internet use is of great relevance to this research, because the results showing the high use of smartphones and the low and declining usage of computers and tablets which could be questionable whether the Brazilian higher education population has the necessary structure to use these digital means for the purpose of studies, specifically for digital education in higher education. This question arises with statistical data regarding how the internet is used. Reports show that the internet is mostly used for communication on platforms such as Skype, WhatsApp and Facebook by 92% of the population, followed by contracting and purchasing services and products (59%) and, lastly, only 41% use the internet for work and academic purposes (Raquel, 2020; Valente, 2020). With regard to education in general, access to the internet and electronic devices can be considered quite low. Only 64.8% of public institution students have internet access and own a smartphone. Out of the students that have no access to internet, 95.9% of them are from public educational institutions (IBGE, 2019; Raquel, 2020).

The results presented above show that, although Brazil can be considered a country with a stable percentage of Internet access, there are still several factors to be considered. Firstly, there is a significant number of people that do not have access to the Internet, a large portion being of students from public educational institutions (IBGE, 2019). Next, there is the fact that internet is predominantly used via smartphones and that the number of computer and tablet users can be considered low and with a degressive trend in recent years (IBGE, 2019). Finally, how the internet is used and its quality are factors that must be observed, given that the rate of internet use for academic purposes is relatively low and that a high percentage of the population shares the internet with their neighbours, possibly impacting network quality (Raquel, 2020). All of these facts may be considered barriers to entering and pursuing online study in higher education. How these factors related to digitalisation in Brazil have represented advantages or disadvantages and possibly even barriers to the access to online higher education will be analysed in the next section.

2.3-Transition to Online Education in Covid times

This section will present a review of studies, reports, theories and testimonials on the transition to online education in Brazil. Since the problem presented is recent, access to current literature is a challenge and a limitation. However, due to the severity and scale of the issue, which was a common matter around the world, several scholars have published papers aiming to inform the public and giving recommendations to reduce the possible effects of the pandemic on the higher education sector.

Firstly, it is important to mention that the Brazilian higher education system already suffered a crisis before the pandemic, with problems of inefficiency in the educational process, especially in federal higher education institutions, which experienced financial cuts in resources and infrastructure, making it difficult for those institutions to establish themselves, further intensifying the problem at the transition to emergency remote education (Rangni & Martins, 2020; Sathler, 2020). Although the suspension of in-person classes was simultaneously everywhere in the world, how the return to education would occur and the strategies were not a common decision, but an independent by each country and its government. The study by Crawford et al. (2020) analysed the agility of governments in strategies for the return to classes (Amaral & Polydoro, 2020; Crawford et al., 2020), where it was observed that in several European countries, China and the United States, the migration from in-person classes to digital learning occurred quickly, as they developed plans and tools for digital transition, due to previous experience with pandemics and natural disasters (Castioni et al., 2021). On the other hand, Brazilian higher education had difficulty in developing strategies for returning to classes in digital format, where many universities, especially public and federal, were against the implementation of remote teaching, declaring themselves unprepared to reorganize their academic activities and to assist students digitally and ensure the quality of education (Bezerra et al., 2020; Mélo et al., 2020; Schimiguel et al., 2020). Due to the structural unpreparedness of these institutions, many of them suspended their classes for approximately 5 months, starting the transition to emergency remote learning around August/September 2020 (Castioni et al., 2021; Mélo et al., 2020). The study from Bezerra et al. (2020) showed that 47.5% of the institutions were offering remote teaching, 40% were still in the planning stage, and 12.5% did not offer it or had the website unavailable (Bezerra et al., 2020). The Brazilian universities considered pioneers on the remote teaching are located in the Southeast and Northeast regions (Mélo et al.,

2020). The delay for the return of remote classes occurred mainly due to the need of Brazilian universities to conduct investigative research on the social situation of students and educators, for training on the use of digital technologies, and to assess the availability of students and faculty members to digital equipment and internet access (Bezerra et al., 2020; Carneiro et al., 2020; Castioni et al., 2021; Mélo et al., 2020).

The qualification training of educators and students was a reality in most of the Brazilian higher education institutions. Despite the small familiarity with virtual learning environments, these were not common practice and instructional policy in most institutions in Brazil (Amaral & Polydoro, 2020). The need for investment in faculty training in the pandemic moment and for future times has become a common practice and necessity in public universities (Castaman & Rodrigues, 2020), considering that the strategy presented could impact positively or negatively on student learning (Carneiro et al., 2020; Gomes et al., 2020). While many professors received only basic training on how to use digital tools to teach classes, some professors reported not having any kind or only insufficient training (Costa et al., 2020), directly compromising the teaching quality (Limeira et al., 2020; Mélo et al., 2020; Moreira et al., 2020). The study by Limeira et al. (2020) points out that 91% of the teachers interviewed state that remote classes are worse than in person classes and that due to the bad structure and teaching quality 76% of the teachers present delays in teaching process in relation to face-to-face classes (Limeira et al., 2020). The quality of studies according to research has been affected due to the transition to digital education by several factors. According to Costa et al. (2020), educators are finding it difficult to keep students' attention and concentration, since digital classes are often given through platforms also used for informal conversations (such as WhatsApp and other social media), and many students do not take the class seriously (Costa et al., 2020). The issue of supervision and control of students' attendance and participation becomes questionable and consequently the learning quality is affected (Torres et al., 2020). This becomes aggravated as many higher education institutions, due to lack of investment, have not been able to contract official software services for academic purposes and use informal platforms for communication and teaching purposes. In addition, the exhausting period of work for professors without guarantee of effectiveness and feedback from students is one of the causes resulting in much stress and emotional overload, discouraging the teaching and learning processes by both parties (Castaman & Rodrigues, 2020).

Another aspect that affected the quality of teaching and learning for students and education was their home situation. Albuquerque et al. (2020) collected relevant data on the difficulties of remote classes, where 17.2% of the participants found themselves unmotivated by not having a classroom environment, 14.1% unmotivated in participating in classes and performing academic and domestic tasks, 7.8% because of working in the Covid-19 combat assistance, and 4.7% were without psychological conditions to follow remote classes (Albuquerque et al., 2020). The study environment at home, together with challenges of the routine, residences with few rooms and presence of elderly and children who need care are factors that complicate learning and teaching in this period of digital education (Castaman & Rodrigues, 2020; Dosea et al., 2020; Gomes et al., 2020; Rangni & Martins, 2020). In many cases, the socio-economic situation of the students also worsened, where many families lost their monthly income due to the forced physical isolation and many family providers died or became ill due to Covid-19 (Costa et al., 2020). The financial assistance provided by the government, a tool to minimize this problem, has come insufficient and long overdue for most Brazilian families (Castioni et al., 2021).

However, many of the problems above, excluding socio-economic, are faced only by a portion of the population, those that were able to participate in digital education. One of the biggest problems observed was the issue of accessibility to digital inclusion. Higher education institutions, together with the Brazilian government, had to monitor the number of participants in vulnerability state and set up an action plan to offer emergency digital assistance, that they could follow virtual classes (Carneiro et al., 2020; Mélo et al., 2020). According to Mélo et al. (2020), regarding internet access supply, 73% of the higher education institutions opted for financial assistance to purchase internet plans and 46% provided chips with mobile data (Mélo et al., 2020). As for electronic devices, 55% of the institutions provided financial aid to purchase electronics and 22.2% lent digital equipment (Mélo et al., 2020). Although a large portion of the institutions have been trying to find ways to help their students and professors, through partnerships with private sector and government, the demand is so large that it was not possible to help everybody (Carneiro et al., 2020; Castioni et al., 2021). This long monitoring and complex process of digital inclusion was one of the causes of delay for the restart of classes digitally (Mélo et al., 2020). The digital inclusion affects a large portion of the Brazilian population, regardless of whether it is part of the academic sphere or not (Carneiro et al., 2020). According to Gomes et al. (2020), those who have access to digital classes have difficulty in participating

and learning, considering that 90% of the respondents follow lessons with smartphone and only 10% by computer (Gomes et al., 2020). The use of the smartphone as the main means of internet access and little use of computers is a common characteristic in a large portion of the population (Carneiro et al., 2020; Gomes et al., 2020). The low use of computers can be detrimental to the teaching and learning process digitally (Cavalcante et al., 2020). The quality of the internet is an aspect to take into consideration. The study by Crawford et al. (2020) points out that the precariousness of internet broadband is one of the main negative elements for emergency remote teaching and its absence as mentioned by Dosea et al. (2020) decreases student satisfaction and participation in remote classes (Crawford et al., 2020; Dosea et al., 2020; Gomes et al., 2020).

The number of students in Brazil affected by the pandemic is approximately 52,898,349, about 20% of these students are from institutions of higher education (Unesco, 2020). With such a significant number, the Brazilian government must take measures to make education one of the country's priorities along with fighting the pandemic. Digital inclusion actions and digital training for students and teachers were the most important aspects observed through literature reviewed above, and are necessary during and after the coronavirus pandemic. It was concluded in several of the studies, that students and educators agree that the quality of remote teaching is inferior to face-to-face teaching (Castaman & Rodrigues, 2020; Dosea et al., 2020; Limeira et al., 2020) and that the process of evolution of the use of technologies in education in Brazil becomes necessary in view of the technological advances made worldwide and the trend towards greater connectivity of technologies and higher education.

The next section is dedicated to a review of theories concerning study success with special focus on possible factors leading students to dropout of higher education institutions.

2.4-Study Success

This section is dedicated to an in-depth analysis of study success. It is understood as study success, in the transition period to emergency remote education, as: an academic trajectory where the learning process, outcome in academic performance, and regular study period plan are successfully managed and not negatively influenced by the transition to digital education. The analysis of this concept and evaluation of which factors can influence the study success becomes important in the transition to digital education, considering that not achieving study success can bring further consequences to a student such as dropping out of higher education institutions.

To utilize a theoretical foundation that encompasses the results of the analysis and collected data into an existing theory (Collins & Stockton, 2018), this paper uses the theoretical framework of researcher Vincent Tinto, an expert in the field of higher education. Relevant to this research is the studies: "Dropout from Higher Education: A Theoretical Synthesis of Recent Research" from 1975, and "Research and Practice of Student Retention: What Next?" from 2006. His framework attempts to formulate a theoretical model explaining the process of interaction between individuals and the institution, and what could lead different individuals to dropout from higher education and distinguishes between those processes that result in different forms of dropout behaviour. According to Tinto, there are two different types of dropouts, the voluntary withdrawals and the academic dismissals, that differentiate themselves regarding to the level of integration and commitment with their studies (Tinto, 1975).

An important aspect of Tintos framework is the aspect of Integration, that is directly related to the study success and the dropout decision. Tinto elaborates his work noting that institutions are made up of social and academic systems, and both aspects influence an individuals' integration in the academic system and are correlated in continuing or dropping out of university (Tinto, 1975). Tinto divides the aspect of Integration into two different categories: the Academic and Social Integration and states that a certain level of integration in both categories turns to be necessary for a student to maintain its commitment in a higher education institution (Tinto, 1975). Next, a brief explanation of the integration categories is given.

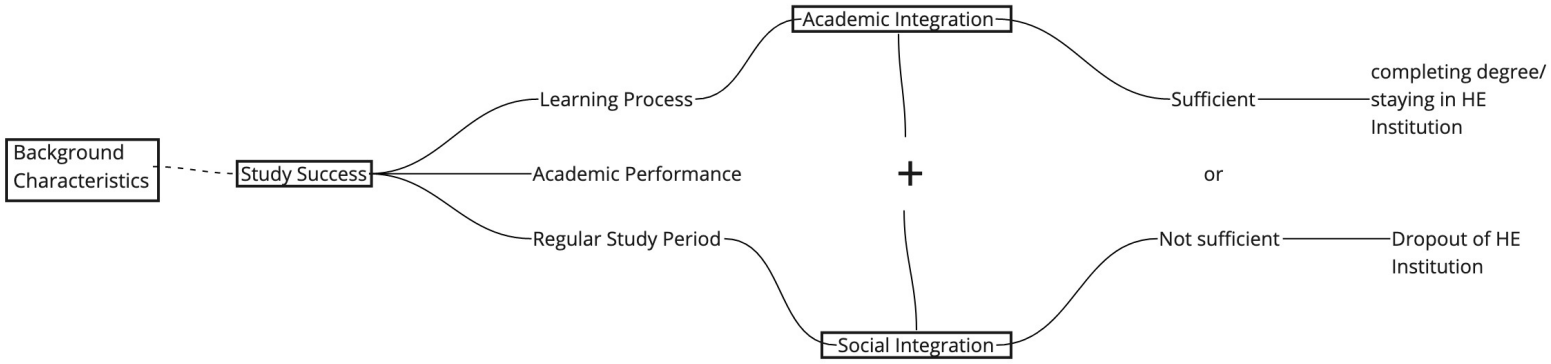
Academic Integration: according to Tinto, Academic Integration is composed of two variants, measured through grades received during the degree and through intellectual development (Tinto, 1975). Both aspects are directly connected, since a student's intellectual development has an impact on their academic commitment and on grades. A low level of academic integration may result in low performance and the student may be subject to academic dismissal by the institution or even voluntary withdrawal when they conclude that the level of commitment is not sufficient to achieve their goals (Tinto, 1975).

Social Integration: Tinto describes the social integration aspect as interactions of the student in their academic environment (Tinto, 1975). These interactions are between a variety of participants, students in classrooms, academic and social groups, and extracurricular activities, between the student and educators, tutors, with faculty staff in general (Tinto, 1975). Within the cases of dropout in higher education institutions, Social Integration can influence cases of voluntary withdrawal, since the lack of integration demotivates the student and consequently the decreases the commitment to continue in the educational institution (Tinto, 1975).

Other aspects that influence a student's level of integration are individual characteristics, including background characteristics such as social status, high school experience, and attributes such as gender, ability, race, and ethnicity (Tinto,1975). These aspects are of great importance, since they have a direct impact on how well a student will be able to integrate when entering an educational institution.

However, it can be said that Tinto's studies attempt to explain the process of student's integration and possible causes of dropout in an ordinary academic journey, with most classes taking part in a live environment, not taking into consideration, pandemic situations, such as the current coronavirus pandemic. In order to contextualize Tinto's theoretical framework with the current situation of the transition to digital education, the following framework was developed:

Figure 2: Own illustration based on Tinto's 1975 conceptual Schema for Dropout from College



Through this framework, it is possible to contextualize the transition to digital education and get a better overview of the connectivity of study success with academic and social integration and how the lack of these possibly causes a dropout from higher education. Next, factors that make up the concept of study success and its relationship to the social and academic integration in context of digital education will be explained.

Firstly, the concept of Study success. Composed by the learning process, academic performance and the regular study period, two of the three concepts (learning process and academic performance) are directly related to academic integration, which according to Tinto is measured through grade performance and intellectual development (Tinto, 1975). The three aspects that make up the concept of study success are influenced in a regular academic period and in emergency remote education by several factors. Specially relevant for this research, is the teaching quality in higher education institutions. According to information presented in section 2.3, many of the Brazilian public universities were against the transition to digital education, as they claimed to be unprepared to assist students digitally and to ensure the quality of teaching (Bezerra et al., 2020; Mélo et al., 2020; Schimiguel et al., 2020). The unpreparedness to assist students digitally threatens the aspect of social integration, which is measured through students' interactions in their academic environment, (Tinto, 1975) and not guaranteeing teaching quality interferes study success and academic integration (Limeira et al., 2020).

Another aspect threatened by the transition to digital teaching was the regular study period. As mentioned previously, many of the Brazilian higher education institutions required a long period of class shutdown, to

monitor how many students and professors were able to participate in digital learning, followed by the distribution of digital infrastructure such as computers and chips with Internet access, and training for the use of digital academic platforms (Carneiro et al., 2020; Mélo et al., 2020). This paralisation period delayed the resumption of digital classes, causing delay in the regular study period for many students (Mélo et al., 2020; Limeira et al., 2020).

In relation to the background characteristics, these have a decisive factor with regard to what conditions the student has to integrate academically and socially and consequently obtain study success. Students' social status is a factor that affects their integration in different ways, such as the study environment at home, presenting difficulty in concentrating and in balancing academic and domestic tasks (Castaman & Rodrigues, 2020; Dosea et al., 2020; Gomes et al., 2020; Rangni & Martins, 2020). The economic situation of students is an aggravating factor in integration, given that physical isolation meant the closure of numerous businesses and a crisis in various economic sectors (Costa et al., 2020). According to Tinto (2006), students from low-income families tend to need to work full time while attending college, and this need increased during the pandemic, as many students lost their jobs and many family providers died or became ill due to Covid-19 (Costa et al., 2020; Tinto, 2006). Digital inclusion is directly connected to background characteristics, which affect the student's commitment to academic and social integration and consequently interfere with study success. Although higher education institutions and the federal government have adopted measures to reduce this problem, many students are still excluded from digital education because they do not have technological structures like electronic equipment and Internet access (Carneiro et al., 2020). Nevertheless, many students who have this access claim to have difficulty in the participating and learning process, given the poor quality of digital equipment and internet (Gomes et al., 2020).

Social integration in the transition to digital remote learning can be severely affected, as the lack of interactions that the student experienced in their academic journey have been reduced to completely digital means due to the closure of universities. In these cases, learning communities, also addressed by Tinto (2006), becomes absent in a student's academic life, or decrease in effectiveness, if it happens digitally (Tinto, 2006). The absence or ineffectiveness of social integration and learning communities demotivates the

student and consequently decreases their level of commitment to their educational institution, bringing negative consequences for study success and possibly dropping out of university (Tinto, 1975; Tinto, 2006).

It can be initially observed, that the factor that most influences a student to integrate socially and academically concerns their background characteristics, especially their socioeconomic status, given that many students were not able to participate in digital education or participated presenting difficulties (Costa et al., 2020). The structural quality of digital classes, the teaching quality, academic platforms, and student interaction possibly affected students' social and academic integration, bringing difficulties in achieving study success in all three aspects (Gomes et al. 2020; Tinto, 1975). To decrease these problems, actions by educational institutions and the federal government regarding better preparation for the transition to digital education and more severe actions towards digital inclusion become necessary to achieve study success.
After concluding this analysis, the theoretical framework chapter has been completed. The next section will initiate the second stage of this study, dealing with the research design and data collection methods for this thesis.

3-Research Design and Data Collection

This chapter aims to describe aspects regarding the research design, methodology and data collection, focusing on research strategy, method, approach and the data collection and the selection of the sample.

3.1-Research Design

In order to develop a strong design method to analyse the problems presented and answer the research question, this thesis uses a mixed-method approach, triangulating different types of analysis (Oppermann, 2000). This means that different research methods will be used, such as qualitative analysis through literature review of secondary data sources, conducted in chapter two, and a quantitative analysis in the form of a survey and its interpretation, presented in the next chapter. Both research methods will be used to measure

the relationship between the two variables of the research question (Oppermann, 2000), transition to digital online learning and the study success of students from federal higher educational institutions in southeastern Brazil.

The research question being: *„What impact did the change to digital education due to COVID-19 have on the study success of students in federal higher education institutions in the southeast of Brazil?“* it is possible to observe that the analysis will occur between two variables: the transition to online education being the independent variable and the study success being the dependent variable. The operationalisation of the term study success becomes necessary in this research, to analyse which impacts the change to digital education had on the factors that make up the concept of study success. Study success is understood as an academic trajectory where the learning process, the outcome in academic performance, and the regular study period plan are successfully managed. The analysis of the secondary data sources performed in chapter two shows that there are factors directly related to the transition to digital education that affect study success, which means that the relationship between the two variables in the research question exists and it is the role of this research to analyse whether the impacts were positive, negative, or non-existent.

To ensure the quality of the data, several criteria were adopted such as the use of validated theories concerning higher education (Tinto, 1975, 2006) as well as the creation of an own framework developed on the basis of the theories to analyse the specific problem in the transition to digital education, in combination with the development of the survey to validate the information and obtain a more specific and targeted results.

A possible threat to the research design and limitation can be observed in the quantitative part, regarding the surveys. Not being able to reach students from low social status groups to answer the survey would make the research less representative for the whole higher education population analysed. This can happen due to the difficult access to internet and technology that these groups present and in the current circumstances of the coronavirus pandemic. However, insights presented in chapter two regarding the social status and internet + technology access (INEP, 2020; Semesp, 2020) showed that only a small percentage of the student population would not be able to answer the survey.

3.2-Research Methodology

This section deals with the methods used for developing this research, as well as the operation for data collection, research strategy and the data analysis.

The approach of this thesis is mainly empirical and explanatory, using frameworks and theories from previous studies and generating own data, investigating the topic, aiming to develop more knowledge and obtain a scientific explanation for the problem (Collins & Stockton, 2018). This present research goal is to understand how the mandatory transition due to the global coronavirus pandemic from classroom-based lectures to distance learning with the use of technology has affected the study success of students at federal higher education institutions in the southeastern region of Brazil.

In chapter two, theoretical framework, a qualitative research was conducted through the analysis of secondary data sources. Firstly, general data concerning higher education and digitalisation in Brazil were analysed. In a second step, further qualitative analysis was carried out, through the interpretation of studies, reports and testimonials on the transition from in-person to digital education lectures, as well as the analysis of theories and previous studies on study success. The analysis provided revealed relevant information concerning the overall experience of the transition to digital education from the point of view of scholars, students, and educators (Costa et al., 2020; Moreira et al., 2020; Rangni & Martins, 2020), as well as factors that hinder study success and possibly lead to dropout from educational institutions (Tinto, 1975, 2006). The use of the secondary data was helpful to enable developing a better approach to the problem, as well as a better research design and insights to create primary data (Creswell, 2009). To assist in interpreting the analysis carried in chapter two and obtain a better visualisation of the problem at regional level, a quantitative survey was carried out using a questionnaire, with the aim of generating primary data.

The quantitative research through the questionnaire was conducted with students from higher education institutions in the southeast of Brazil, comprising the states of Rio de Janeiro, São Paulo, Minas Gerais and Espirito Santo. The survey was conducted digitally, using the Google Forms platform, selected due to previous experiences and knowledge of the platform in the application of surveys for academic purposes. The choice of conducting the survey only via the internet was given due to insights generated in chapter two,

which showed that the Brazilian population mostly has access to the internet, enabling the majority of higher education students to at least answer the questionnaire digitally (IBGE, 2019; Silveira, 2020). As the analysis unit of this research is located in Brazil, language was an important aspect considered to avoid misunderstanding of the questions. The questionnaire was translated from English to Brazilian Portuguese and both versions will be available in the appendix of this thesis.

The survey consisted of 34 multiple choice questions, where 30 of the questions were single choice answers and the remaining 4 had more options that could be answered. This type of response was chosen to obtain greater sensitivity in the results, quickness to answer and interpret the results and to not obtain middle term results. The target respondents were students from federal higher education institutions in the Southeast region of Brazil who had experienced the transition their lectures from in-person to digital education. For this reason, two questions were added: *1: "Are you a student at a federal higher education institution in the southeast region of Brazil?"* and *2: "Have your classes been transferred to digital distance learning due to the Covid-19 pandemic?"*. If the answer to these questions was no, the participant was directed to the end of the survey, thus selecting only relevant participants for this research, increasing the quality of the results (Creswell, 2009). The survey was distributed to the respondents through social media platforms such as Facebook groups of the higher education institutions and through WhatsApp groups and private chats. The survey distribution period was from 2nd June to 22th June 2021 and received in total 375 responses. Because not all the surveys were completely answered, as some of the participants were not students from federal higher education institutions in the Southeast region, or did not have their classes transferred to digital education, the total of 371 responses were included in the analysis.

The margin of error detected for this research was calculated using the software SurveyMonkey. Considering that the student population of federal institutions in the southeast of Brazil is approximately 393.000, the confidence level according to the software is 95% and the sample size is 371 respondents, the margin of error is 5,09%.

The following table will present information regarding the survey questions, as well as the concepts behind and/or motivations why the questions were asked:

Table 4: Conceptual Framework/Motivation regarding survey questions:

Question Number	***Concepts*/Motivation**
1-5	gain demographic insights regarding participants
6-7	opinion regarding transition to digital education
8-12	social status, labour conditions and social condition at home (*Social Integration + Socioeconomic Status*)
13-21	digital inclusion
22-23	institutional assistance *(Socioeconomic Status + Social Integration)*
24-25	home conditions for digital education *(Academic Integration + Socioeconomic Status)*
26	participation in online education (*Academic + Social Integration)*
27-28	motivation and dropout considerations (*Academic + Social Integration)*
29-30	academic performance, learning process and study delay (*Academic Integration)*
31-33	evaluation of remote digital learning
34	improvement suggestions *(Social Integration)*

The Brazilian Portuguese and English versions of the questionnaire can be checked in Appendix A and B of this document. In the next section, the results obtained from this survey will be presented.

4-Research Analysis

In this chapter, the analysis of the survey results will be discussed and analysed, leading to the presentation and discussion of the results of this project. This will be done through the manipulation and interpretation of the data, with the aim of understanding the meaning of the results to answer the problem presented in this thesis (Creswell, 2009). The brief presentation of the results will then proceed, being delivered in eleven steps, based on the division into categories that was placed in the table 4.

4.1-Demographics

Questions 1-5 were focused on demographic questions to identify whether the respondents were part of the desired student population. Of the 98.4% of respondents who were students at a federal higher education institution in southeastern Brazil, 34.4% study in Rio de Janeiro, 30.7% in São Paulo, 28.3% in Minas Gerais, and 6.7% in Espírito Santo, bringing a good proportional representativeness of responses based on the overall number of students in higher education institutions in each state. The female students with 74.1% of the respondents was the largest respondent group, followed by 25.3% of the male public. Regarding the age range of the respondents, the predominant age group was between 18-24 years old with 77.8% followed by the 25-34 year old group with 14.4%. Most of the respondents (99.7%) had their classes transferred to digital teaching.

4.2-Opinion to transition to digital education

Questions 6 and 7 were asked to find out the opinion of Brazilian federal higher education students about the transition to digital education due to the coronavirus pandemic and regionally validate insights given in section 2.3 of this paper (Bezerra et al., 2020; Schimiguel et al., 2020). The results show that 79.2% of respondents believe that classes should take place at a distance via digital platforms, followed by 10.4% who believe the term should be cancelled and 10.4% responded that universities should wait for in-person lectures to be allowed without cancelling the term. Overall, as most respondents (83.5%) opined, there is a belief that digital remote learning is the best alternative given the current pandemic scenario.

4.3-Social status, labour and home condition

Questions 8 to 12 were asked to have more information that concerns the social status of the student respondents, given that information presented in sections 2.3 (Castaman & Rodrigues, 2020; Costa et al., 2020; Dosea et al., 2020; Gomes et al., 2020; Rangni & Martins, 2020) and 2.4 (Tinto, 1975, 2006) shows that the social status of a student is a crucial factor for study success. According to the responses, almost half (49.6%) of the students work and study at the same time, and of those students who work, 20.1% of them

lost their jobs during the pandemic. Regarding the economic class of the students, the majority (36.3%) classify themselves as members of class B, followed by 33.6% of class C and 20.5% of class A. As presented in section 2.1, the large number of students from higher social classes in federal higher education institutions is justified as their economic status enabled them to have a better secondary education and thus achieve vacancies in federal universities (Semesp, 2020). Another reason for the importance of the student's socioeconomic profile is to know how it influenced the online learning structure. According to the answers, 51.5% of the students stated that their socioeconomic profile influenced a lot on their learning structure, followed by 24.5% who said their structure did not influence them, and 24% were only slightly influenced. Within the reasons why there was an influence, 39.7% affirmed that the learning structure was positively impacted due to the privileges they had, 27.2% stated that they had no structure of room to study at home, 14% had no structure of digital devices and internet to study, and 5.1% of the students had to work and quit their studies to help their families financially.

4.4-Digital inclusion

This questionnaire had questions (13-21) regarding digital inclusion, about access to the internet and electronic devices, the quality of these, and the possible impact on digital education and study success. These questions were asked because of information in chapter 2.3, showing that the problem of digital inclusion could be an aspect affecting access to digital education and study success (Carneiro et al., 2020; Gomes et al., 2020). However, the questionnaire results showed that access to the Internet and possession of electronic equipment was not necessarily a barrier to digital study, as 100% of respondents said they had access to the Internet at home and also possessed electronic devices to participate in online classes. Rather the quality of these and their effect on digital education was an issue.

Regarding the type of internet access 49.3% of the respondents have access via wifi and mobile data, 41.3% via wifi, and 9.4% via mobile data only. Although 9.4% is a small portion of the respondents, those who only have internet access via mobile data may have worse internet quality for accessing digital education. In terms of the quality of the internet, 47.7% of respondents said they had good quality internet, followed by 30.7% with regular quality, 15.7% with excellent quality, and 5.3% with poor quality internet. The quality of the

electronic device was also evaluated, with 44% of respondents stating they have good quality electronic device, 30.9% excellent quality, and 20% regular quality. Only 5.1% demonstrated problems with the quality of their electronic device where 4% claimed to have a bad electronic device and 1.1% had a very poor quality one. Although the quality of the internet and electronic devices at first do not seem to have an influence on access to digital learning, 28.3% of respondents stated that the quality of the internet and 19.2% stated that the quality of the electronic device hindered their ability to follow the online classes, followed by 27.5% of respondents stating that they had difficulty using technological equipment and digital media to participate in digital remote learning.

4.5-Institutional assistance

Questions 22 and 23 were dedicated to gather information from students who received some kind of assistance from their university. According to section 2.3, higher education institutions tried to assist their students in times of pandemic, however, the demand was so large that many the students were unable to receive some type of assistance (Carneiro et al., 2020; Mélo et al., 2020). This issue was confirmed with the survey, which shows that only 12.5% of the students received some kind of help from their educational institution, and the form of assistance was for 77.1% financial incentive, 33.3% provision of internet access, and 14.6% loan or donation of electronic devices for the study purpose.

4.6-Home conditions for digital education

The condition of the home is also an important factor, since an inappropriate home study environment can affect the learning process and intellectual development, as well as performance, hindering academic integration (Tinto, 1975) and study success. According to the questionnaire, this may have been a problem for a good portion of the students, where 41.1% said their study space at home was not appropriate and 39.5% of the respondents said the quality of the study space at home hindered their ability to follow the online classes.

4.7-Participation in online education

Participation in online education is an aspect that can have consequences with respect to academic integration, where not attending online classes can generate poorer learning process and intellectual development and social integration, where not participating in classes can decrease students' interactions, with students themselves and with educators, tutors, etc., being a barrier to achieving study success (Tinto, 1975, 2006). Regarding the frequency with which students participate in online classes and perform activities, 48% of students claim to participate between 99%-75% of classes, followed by 23.2% of students who claim to participate in 100% of classes, and 13.9% who participate between 74%-50% of classes. Among the students who attend less than 50% of classes, 6.9% of them attend between 49%-25%, 5.6% attend less than 25%, and the number of them not attending online classes is 2.4%. It is worth noting that most Brazilian federal universities have a policy of mandatory class attendance, and an unjustified absence can mean a failure in this subject in the term and possibly an academic dismissal by the university. Through the answers obtained by the survey it is not possible to observe a tendency that leads to lack of social and academic integration and successively to possible barriers to study success because of participation in online education.

4.8-Motivation and dropout considerations

Evaluating the level of student motivation and the consideration of dropout from higher education is a very important issue, since motivation and dropout considerations are directly connected to the level of student commitment to their educational institution and thus can affect their academic and social integration (Tinto, 1975) and be an incentive for not achieving study success. Of the respondents, 75.2% stated that they do not feel motivated and interested to follow the online classes and 53.9% of them are considering or have considered quitting their studies or dropping them due to the current situation. These answers show a tendency of low student commitment due to the pandemic condition, being a possible barrier to meeting the prerequisites for study success.

4.9-Academic performance, learning process and study delay

This section can be considered one of the most important of the questionnaire, since questions 29 and 30 refer to academic performance and learning process (directly connected with intellectual development), aspects that make up the academic integration (Tinto, 1975), and study delay, an important factor with regard to study success. The answers to these questions show a trend of negative impacts that the transition to digital education had on students' study success. Regarding the academic performance and learning process compared to classroom education, 67% of the students said they have experienced a regression trend, where 42.7% had only slightly regression, and 24.3% had much worse academic performance and learning development compared to classroom education. Academic performance and learning development remained the same for 21.3% of the students and only 11.7% of them had some form of evolution.

Regarding study delay, it can be said that the negative trend is also existent for this aspect. The answers of the questionnaire show that 68.3% of the students will have delays in their study period, where 38.4% of the students will have one semester delay to graduate and 29.9% of the students will have more than one semester delay to graduate due to the transition to online education. Only 31.7% of students were not affected by the transition to digital education, stating that they will graduate in the standard period of their study.

4.10-Evaluation of remote digital learning

The students' evaluation of digital remote learning did not show very positive results, just as for the teachers (Limeira et al., 2020), presented in section 2.3. The results of the questionnaire show that 45.3% of the students do not believe that digital remote learning is effective and evaluate the experience of doing digital remote learning overall as: 42.9% regular, 28% bad, 13.9% good, 13.3% terrible. Only 1.9% evaluate the experience as excellent. The answers showed that digital learning is not considered an option for many in the future, as 72.8% of the respondents stated they would not take a distance learning higher education course again or recommend it to anyone.

4.11-Improvement suggestions

The last question concerns suggestions for improving the study experience for universities. This question encompasses aspects of social integration (Tinto, 1975, 2006) and better academic structure on the part of the university. Among the suggestions for improvement, 75.2% of the students would like better pedagogical support, followed by better interaction between professor and student and tutor and student, selected by 66.4% of the respondents. This shows that many students wish for better interaction, pointing a failure of social integration in digital education by universities. Students would also want better structure in form of platforms or systems used (65.3%) , better technical support (50.4%), as well as better professors and tutors (30.7%).

After completing the presentation and analysis of the questionnaire results, this chapter is concluded. The next and last chapter of will be dedicated to the discussion of the findings of this research, as well as the conclusion and recommendations for future research and the issues presented.

5-Discussion and Conclusion

This thesis presented during the theoretical framework chapter, firstly information regarding the overall image of Brazilian higher education (INEP, 2020; Semesp, 2020), as well as statistics about digitalisation in Brazil (Costa, 2020; IBGE, 2019; Raquel, 2020; Silveira, 2020; Valente, 2020). These data brought relevant information, such as social inequality in Brazilian public universities (Semesp, 2020), brief data regarding students suspending and canceling their enrolments during the pandemic (Federal Government, 2021), and problems regarding lack of access to internet, digital equipment, and poor quality of service (IBGE, 2019; Raquel, 2020; Silveira, 2020). These were initial problems that possibly impacted study success in the transition to digital education recognised in the first part. In a second step, a review of studies, reports, theories, and testimonials from scholars, students, and professors on the transition to online education was conducted. An analysis of Tinto's theory was developed, reviewing aspects of social and academic

integration, where it was proven that integration is directly linked to study success and can be the cause of dropping out of university, in case of insufficient commitment of the student (Tinto, 1975, 2006).

Findings in this second step showed that Brazilian institutions experienced several problems in the transition to digital education, such as structural unpreparedness (Bezerra et al., 2020; Mélo et al., 2020) and the need for digital training for students and educators (Carneiro et al., 2020; Castioni et al., 2021), causing a delay in returning to classes (Mélo et al., 2020). This generated problems in the teaching and learning process, resulting a lack of motivation by students and professors and lower quality of teaching compared to in-person education (Castaman & Rodrigues, 2020; Limeira et al., 2020; Torres et al., 2020). Students' socioeconomic problems and background characteristics were considered a problem, where the learning environment at home (Albuquerque et al., 2020), digital inclusion and the quality of internet and services were considered as barriers that impacted study success in digital learning (Cavalcante et al., 2020; Crawford et al., 2020). These factors impacted the student's social and academic integration, decreased their level of commitment to the institution, and hindered the achievement of study success.

To confirm and validate the findings of chapter 2 in regional context, focusing on federal higher education institutions in the Southeast, a quantitative analysis in the form of a questionnaire was developed. The findings of this survey served to validate the information described in chapter 2. While much of the information from the survey supported the findings of this thesis, other information was not in complete accordance with expectations and information provided in chapter 2.

While student opinion regarding the transition to digital learning was positive, with the majority of respondents stating that classes should take place via digital platforms and digital remote learning is the best alternative in the current pandemic scenario, student evaluation did not show similar results. According to the respondents, the digital learning experience was overall not positive, and most students would not take another distance learning higher education course or recommend it to anyone, showing a negative impact that the transition to digital education meant. As Tinto (2006) stated, background characteristics, especially socioeconomic status, are factors that can be barriers to study success. The survey responses were in accordance with this statement, as many the respondents stated they did not have the resources to study at home, did not have digital devices and internet to study, and that these reasons impacted their ability to

attend online classes. These results show negative impacts on academic and social integration, as well as study success.

The institutional assistance provided by the university, as described by Carneiro et al. (2020) and Mélo et al. (2020), although existing, was not sufficient to meet the demand of all students. The lack of assistance was supported by the answers of the questionnaire, where only a small percentage of students received some kind of support, and among the suggestions for improvement, the most selected were better pedagogical support and better interaction between professors, students, and tutors. This demonstrates negative impacts on social integration, with lack of interaction in the academic environment bringing consequences on academic integration, being an obstacle to achieve study success.

One aspect that was frequently mentioned throughout this thesis was digital inclusion, which refers to internet access and electronic equipment. In a significant part of chapter 2, digital inclusion was presented as a problem, which would negatively influence social and academic integration and the achievement of study success. However, findings of the questionnaire were not completely in accordance with the information gained. Regarding the possession of electronic equipment and internet access to participate in online classes, the respondents were not impacted in any way on the study success, as they all had internet access and electronic equipment in their households. Although this factor was not a problem, issues related to digital inclusion did impact a portion of the students, as there were questionnaire responses from students having difficulty using technological equipment and that the quality of the internet and electronic devices hindered the ability of some to participate in online classes. It is worth mentioning that the questionnaire was conducted digitally, justifying the fact that all respondents have access to the internet and digital equipment.

Students' level of motivation and dropout considerations are factors directly affecting their commitment to their studies and can impact academic and social integration, (Tinto, 1975) having negative implications achieving study success. The results of the questionnaire support this statement, as a considerable number of students declared they do not feel motivated and interested to follow online classes and more than half of them have considered or are considering dropping out their studies due to the current situation.

Other aspects that negatively affect student academic and social integration and impacted study success in the transition to digital education were problems in academic performance, the learning process (Tinto, 1975), and study delay. Results of the survey show that more than half of the students showed worse academic performance and learning process compared to in-person education and more than half of the respondents will experience delay of one semester or more to graduate.

The results of the analysis of the theoretical framework in conjunction with the questionnaire showed that social and academic integration in combination with the student's background characteristics have an impact on study success and findings shows that the impacts of the transition to digital education were predominantly negative. Brazilian federal higher education presented in this transition to digital education more barriers than advantages for students to achieve study success. These institutions and the Ministry of Education need a strong investment in training professors and students to use digital tools for academic purposes, and the Brazilian government needs to implement measures to strengthen digital inclusion, especially in rural areas and for low-income groups, in view of the future trend of increased use of technology in education.

This study can serve as basis and opportunity for future research for higher education institutions throughout Brazil, as well as for other countries, especially countries in the global south. For future research it is important to analyse findings with current data, such as the 2020 and 2021 higher education census, where there will be more specific and accurate information about the real impact of the pandemic on education, as for example, the dropout rate of students. A study with similar research design comparing public and private institutions would bring relevant insights about social inequality in the country's higher education sector.

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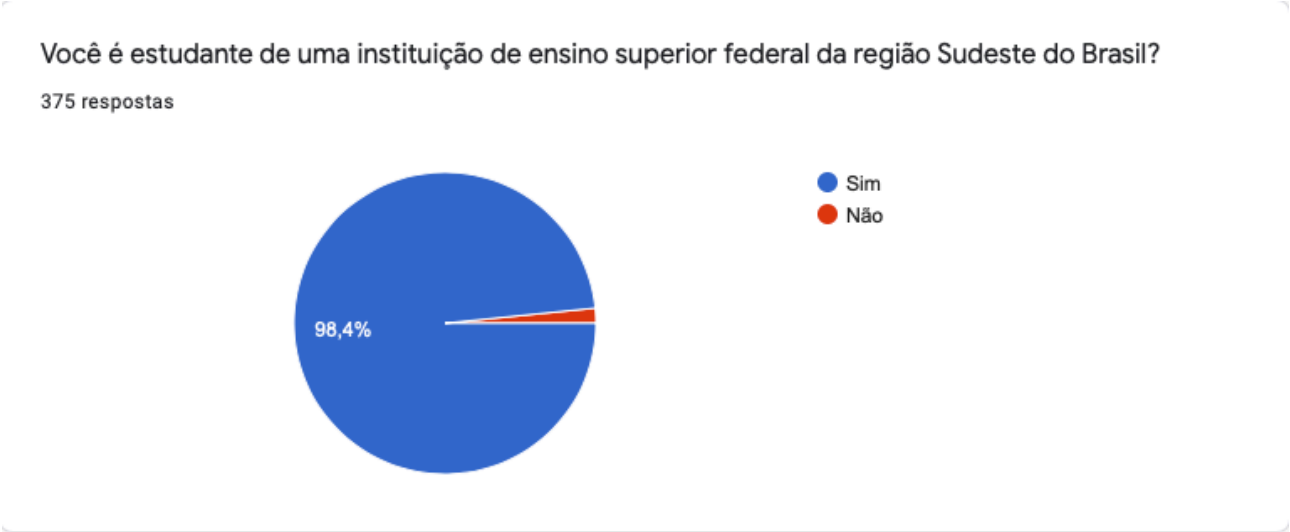
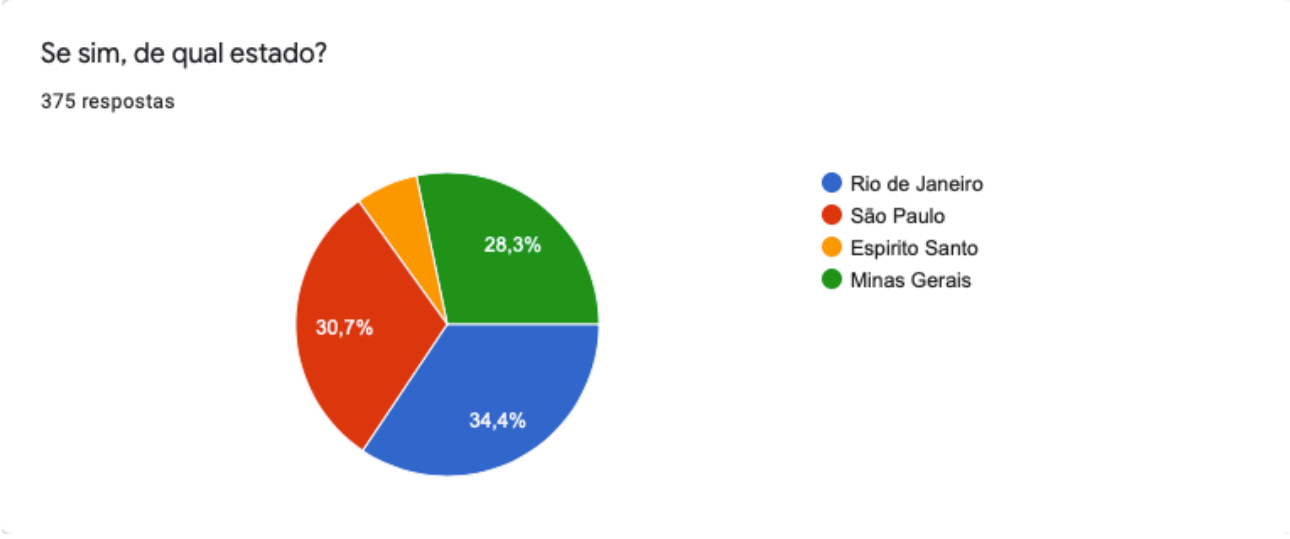
7-Appendix

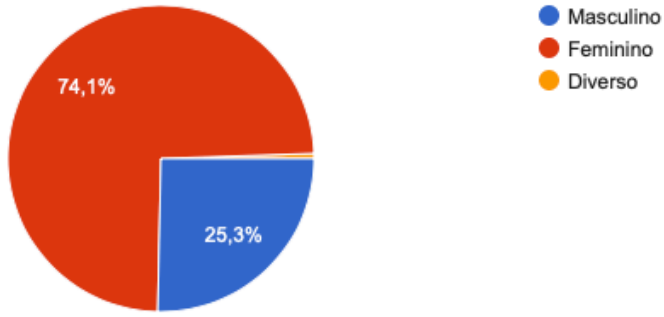
A-Survey questions in Portuguese + Results





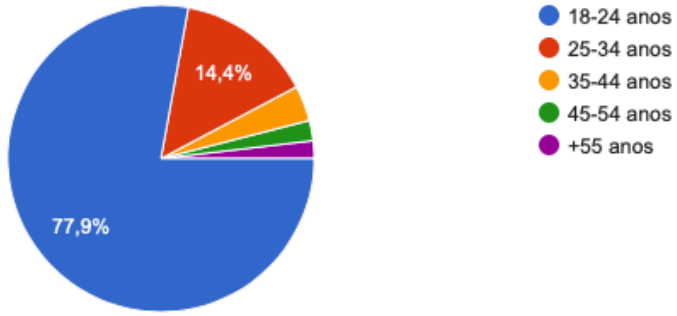
Com qual gênero você se identifica?

375 respostas



Qual a sua faixa etária?

375 respostas



Suas aulas foram transferidas para o ensino digital a distância devido a pandemia da Covid-19

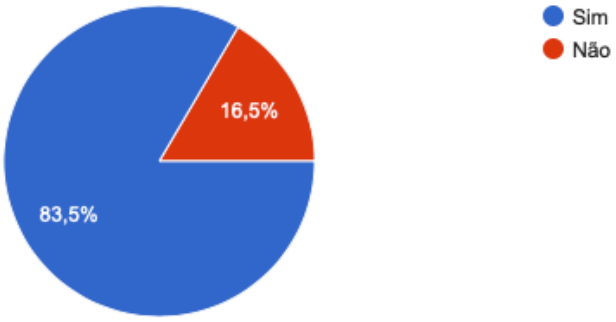
375 respostas

Sobre a suspensão das aulas devido ao Covid 19, você acha que:

375 respostas

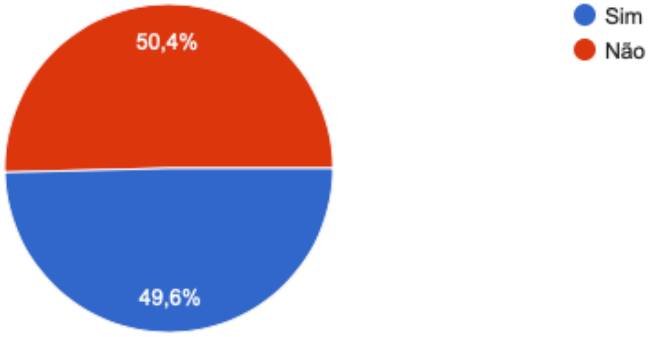
Você acredita que o ensino remoto digital é a melhor alternativa mediante ao cenário de pandemia atual?

375 respostas



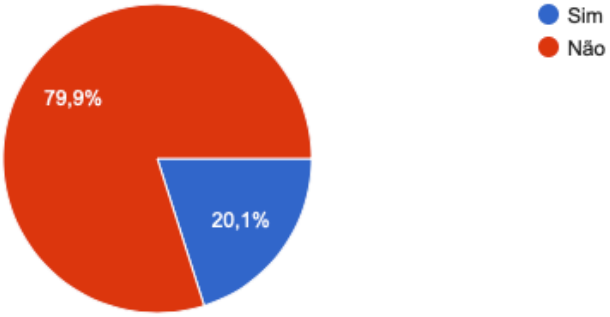
Você trabalha e estuda?

375 respostas



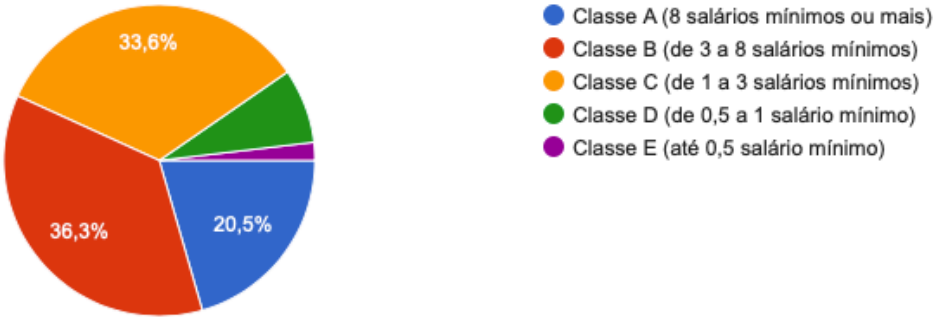
Se sim, você perdeu seu emprego durante a pandemia?

229 respostas



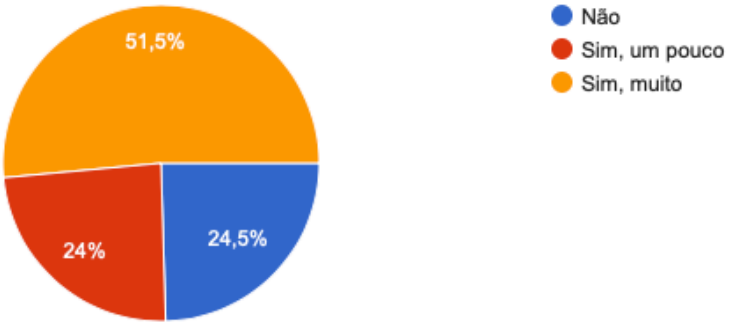
Qual a classe econômica você e sua familia se classificam?

375 respostas



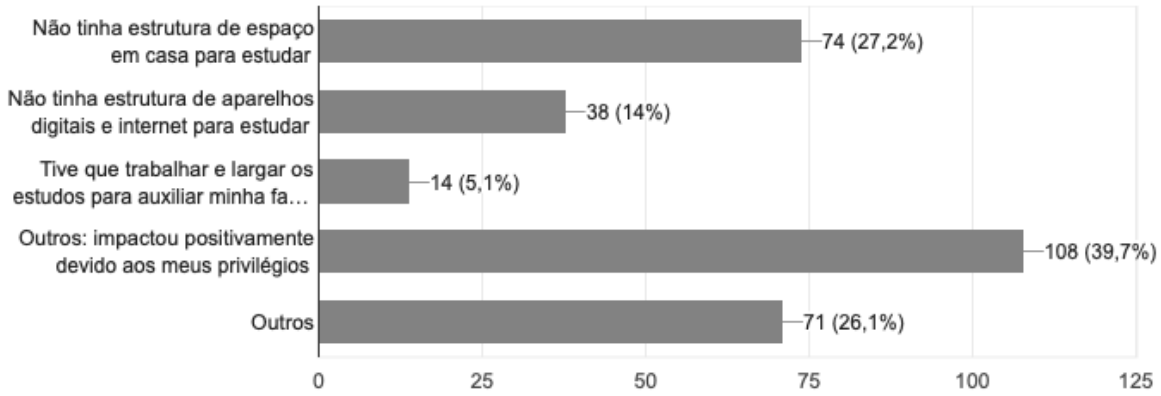
Você acredita que o perfil socio-econômico seu e de sua familia influenciaram na sua estrutura de aprendizado online?

375 respostas



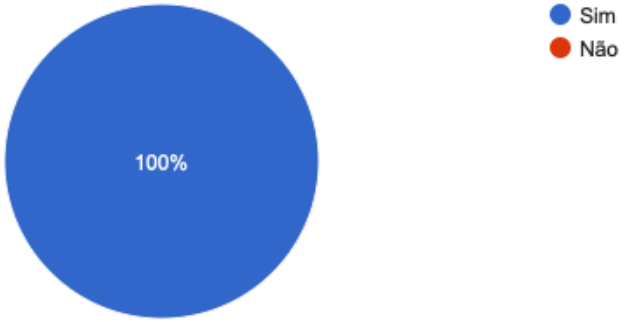
Se a sua resposta anterior foi sim, porque? (mais de uma resposta possível)

272 respostas



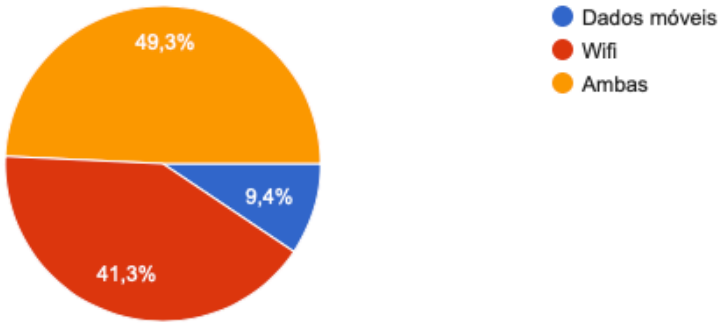
Você tem acesso a internet em seu domicílio?

375 respostas



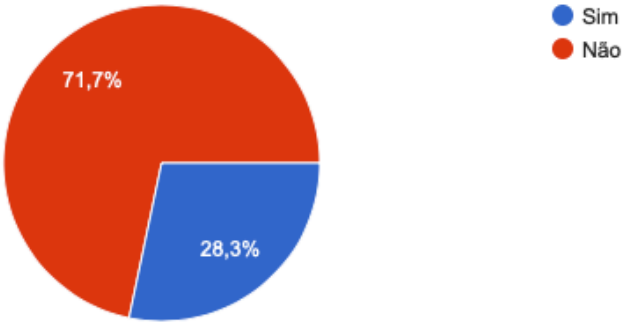
Se sim, qual é o seu tipo de acesso? (mais de uma resposta possível)

374 respostas



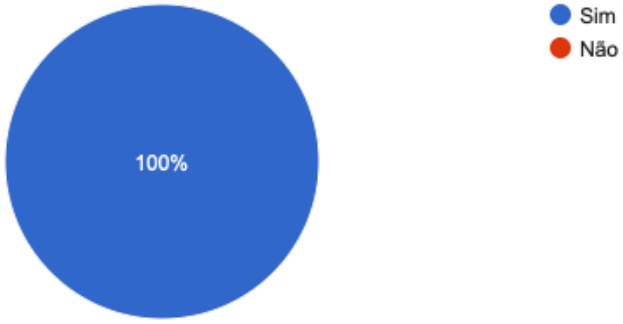
A qualidade da sua internet prejudicou o acompanhamento das aulas online?

371 respostas



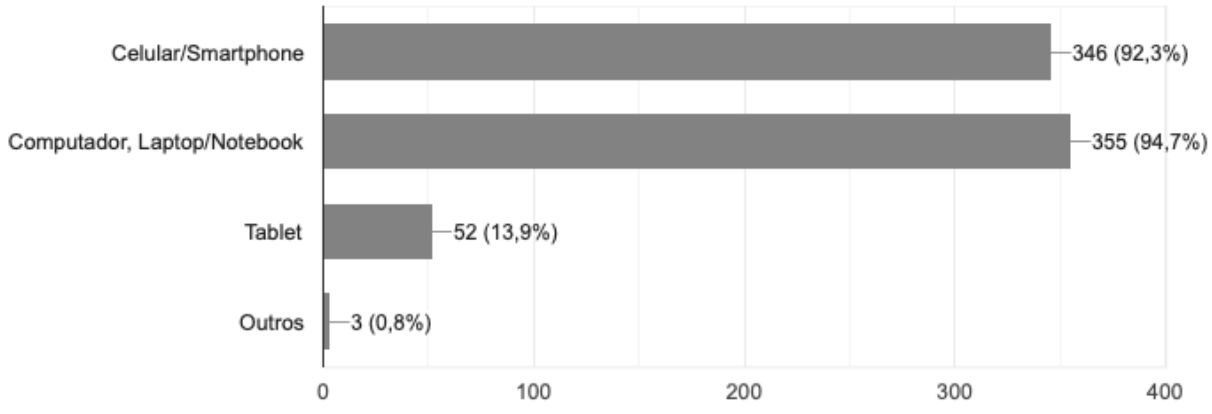
Você possui aparelhos eletrônicos para participar das aulas online?

375 respostas



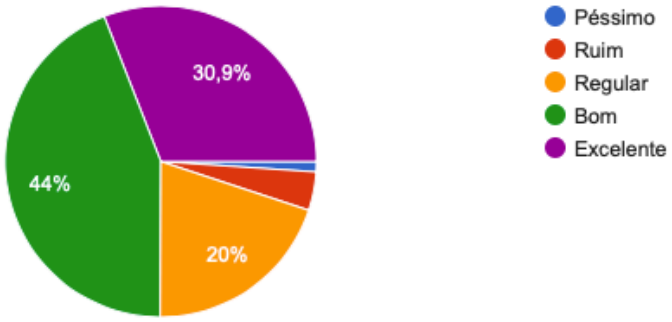
Se sim, quais deles? (mais de uma resposta possível)

375 respostas



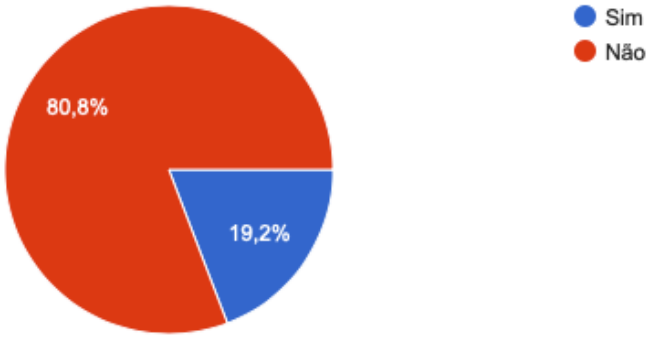
Como você avalia a qualidade do seu aparelho eletrônico com o intuito de participar do ensino online a distância?

375 respostas



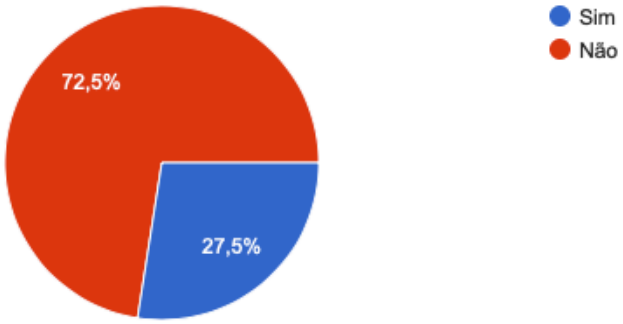
A qualidade do seu aparelho eletrônico prejudicou o acompanhamento das aulas online?

375 respostas



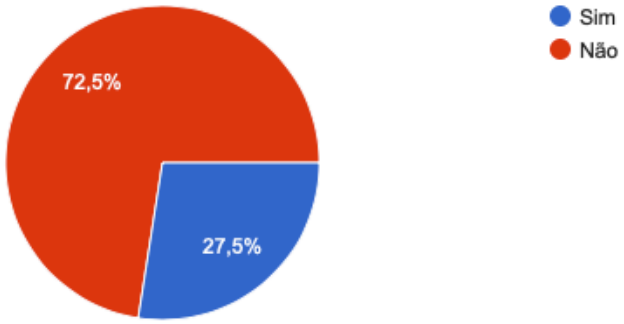
Você teve dificuldade para utilizar equipamentos tecnológicos e mídias digitais (apps, softwares) para participar do ensino remoto digital?

375 respostas



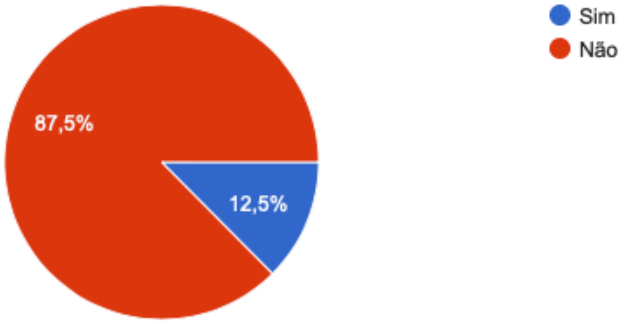
Você teve dificuldade para utilizar equipamentos tecnológicos e mídias digitais (apps, softwares) para participar do ensino remoto digital?

375 respostas



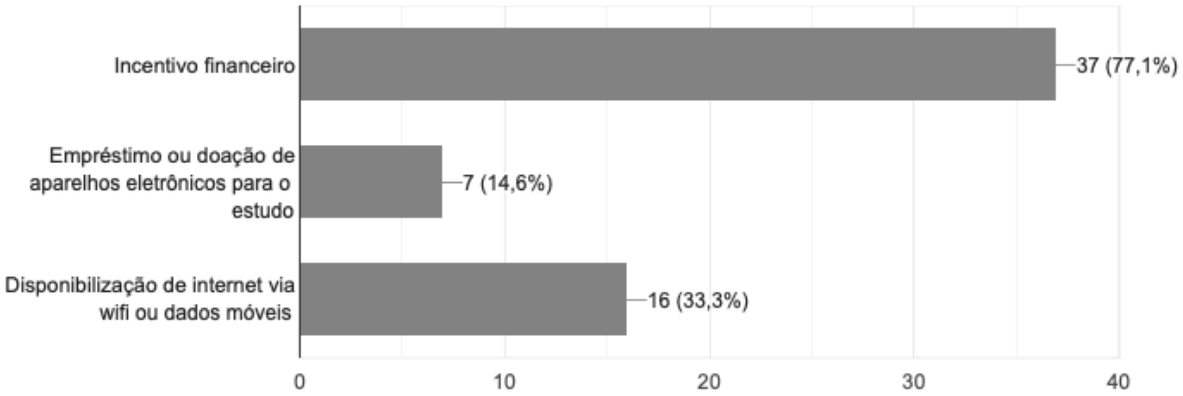
Você recebeu alguma forma de incentivo/auxílio da instituição de ensino para frequentar o ensino remoto digital?

375 respostas



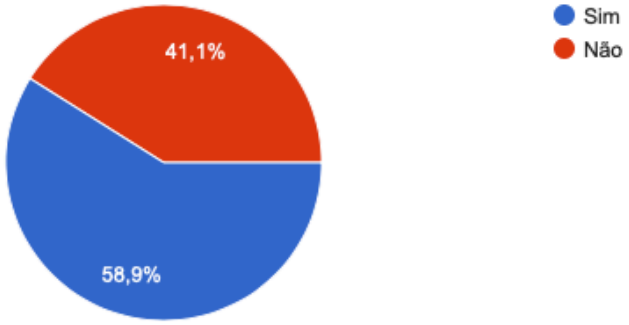
Se sua resposta anterior foi sim, qual deles? (mais de uma resposta possível)

48 respostas



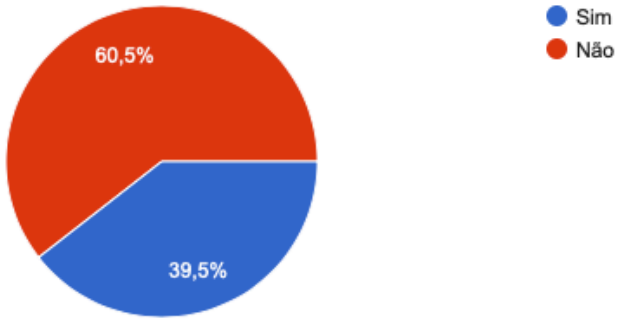
Você considera o seu espaço para estudo em casa apropriado?

375 respostas



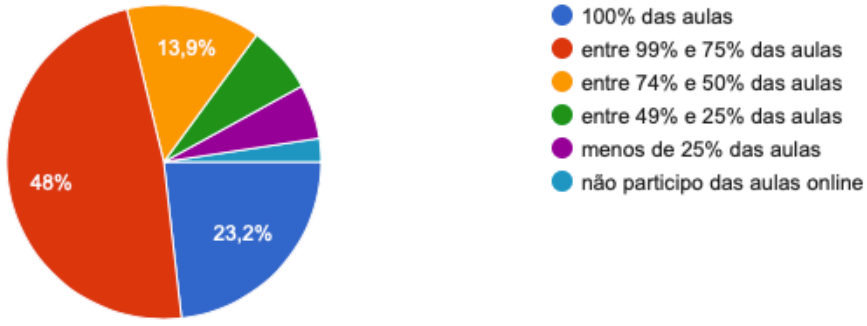
A qualidade do seu espaço para estudo em casa prejudicou o acompanhamento das aulas online?

375 respostas



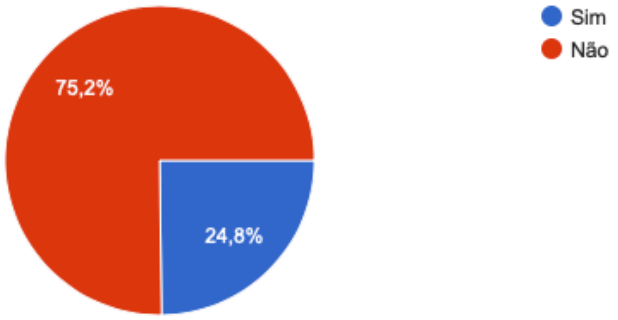
Com que frequência você participa das aulas online e realiza atividades dadas em aula?

375 respostas



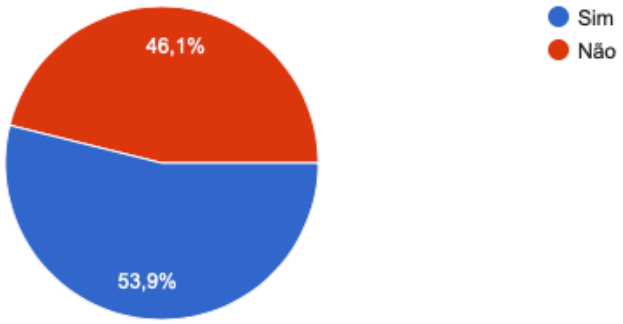
Você se sente motivado e interessado para acompanhar as aulas online?

375 respostas



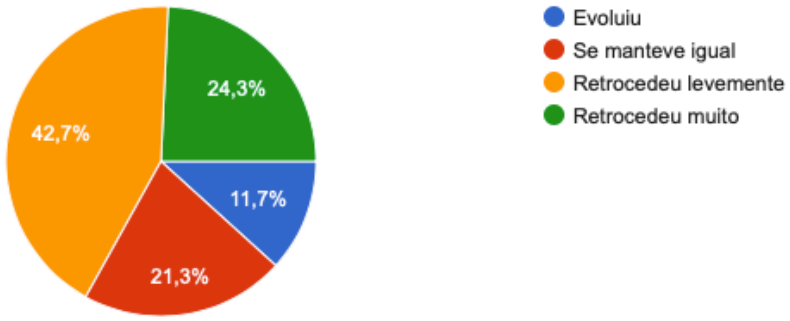
Você considera ou já considerou trancar o seu curso ou até mesmo largá-lo devido a situação atual?

375 respostas



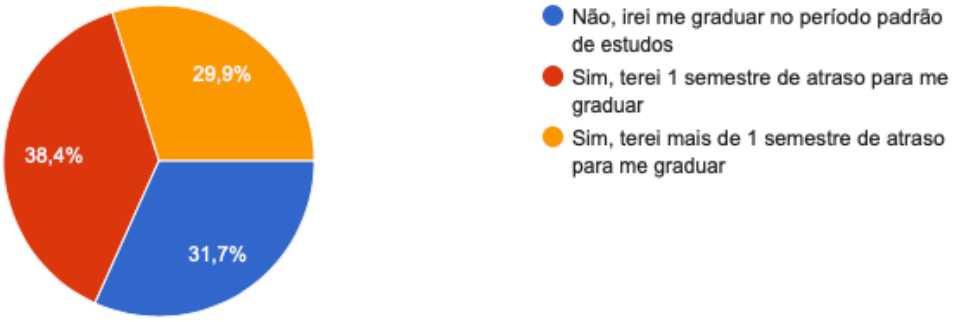
Seu desempenho acadêmico e aprendizado em relação ao ensino presencial:

375 respostas



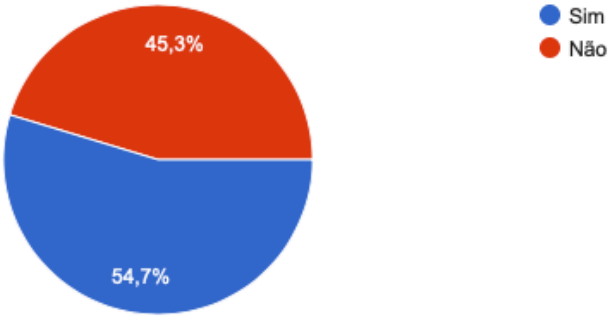
Devido a transição para o ensino online haverá alguma alteração na duração do seu período de estudos?

375 respostas



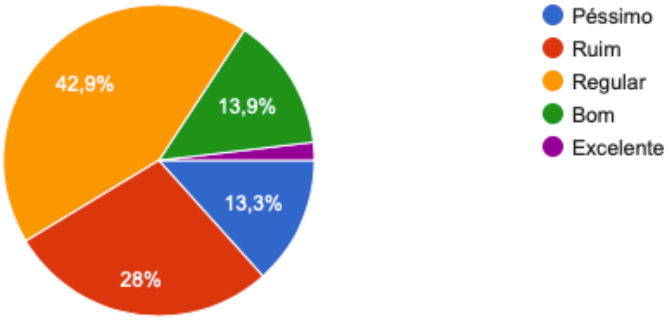
Você acredita que o ensino remoto digital tem eficiência?

375 respostas



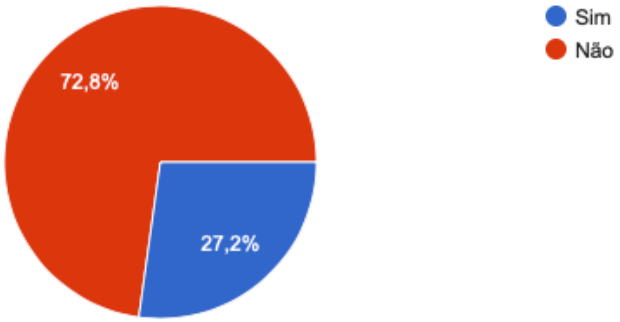
Como você avalia a experiência de realizar o ensino remoto digital de um modo geral?

375 respostas



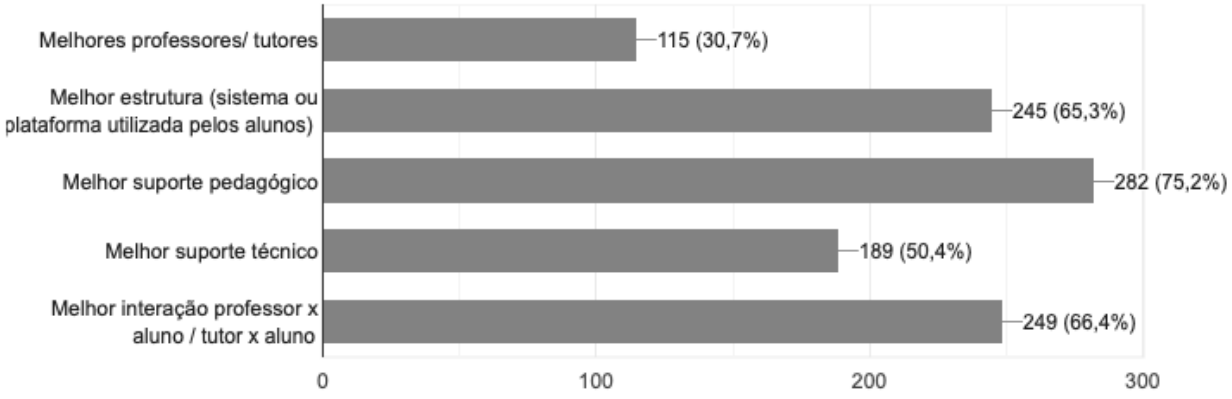
Você voltaria a fazer um curso superior a distancia ou indicaria a alguém?

375 respostas



No que as universidades poderiam melhorar a experiência do curso? (mais de uma resposta possível)

375 respostas



Appendix B-survey questions in English

Questionnaire on experience in remote digital learning during Covid-19 in Federal Higher Education Institutions in Southeastern Brazil

Hello, this questionnaire will be used as the basis for my bachelor thesis for my double degree in Public Governance across Borders at the University of Münster in Germany and the University of Twente in the Netherlands. All answers will be anonymous and used only for the development of this work. Thank you very much for your participation and if you have any questions, criticisms or recommendations, please feel free to contact me! My email address is m.beckmann-2@student.utwente.nl

Q1: Are you a student at a federal higher education institution in the Southeast region of Brazil? *

- ◯ Yes
- ◯ No

Q2: If yes, from which state? *

- ◯ Rio de Janeiro
- ◯ São Paulo
- ◯ Espirito Santo
- ◯ Minas Gerais

Q3: Which gender do you identify with? *

- ◯ Male
- ◯ Female
- ◯ Diverse

Q4: What is your age group? *

- ◯ 18-24 years old
- ◯ 25-34 years old
- ◯ 35-44 years old
- ◯ 45-54 years old
- ◯ +55 years old

Q5: Your classes have been moved to digital distance learning due to the Covid-19 pandemic *

- ◯ Yes
- ◯ No

Q6: About the suspension of classes due to Covid 19, do you think: *

- ◯ term should be canceled
- ◯ classes must take place via digital platforms
- ◯ wait for the in-person classes to be released, without canceling the term

Q7: Do you believe that digital remote learning is the best alternative in the current pandemic scenario?

- ◯ Yes
- ◯ No

Q8: Do you work and study? *

- ◯ Yes
- ◯ No

Q9: If yes, did you lose your job during the pandemic? *

- ◯ Yes
- ◯ No

Q10: Which economic class do you and your family belong to?

- ◯ Class A (8 minimum wages or more)
- ◯ Class B (3 to 8 minimum wages)
- ◯ Class C (1 to 3 minimum wages)
- ◯ Class D (0,5 to 1 minimum wage)
- ◯ Class E (until 0,5 minimum wage)

Q11: Do you believe that your and your families socio-economic profile have influenced your online learning structure?

- ◯ No
- ◯ Yes, a little
- ◯ Yes, a lot

Q12: If your previous answer was yes, why? (more than one answer possible) *

- [ ] I had no space structure at home to study
- [ ] No structure of digital devices and internet to study
- [ ] I had to work and quit my studies to help my family
- [ ] Other: positively impacted due to my privileges
- [ ] Others

Q13: Do you have Internet access at home?

- ◯ Yes
- ◯ No

Q14: If yes, what is your access type? (more than one answer possible)

- ◯ Mobile Data
- ◯ Wifi
- ◯ Both

Q15: How do you rate the quality of your internet?

- ◯ Terrible
- ◯ Bad
- ◯ Regular
- ◯ Good
- ◯ Excellent

Q16: Has the quality of your internet hindered your ability to follow the online classes? *

- ◯ Yes
- ◯ No

Q17: Do you have electronic devices to participate in online classes? *

- ◯ Yes
- ◯ No

Q18: If yes, which ones? (more than one answer possible) *

- [ ] Cellphone/Smartphone
- [ ] Computer, Laptop/Notebook
- [ ] Tablet
- [ ] Others

Q19: How do you rate the quality of your electronic device for the purpose of participating in online distance learning? *

- ○ Terrible
- ○ Bad
- ○ Regular
- ○ Good
- ○ Excellent

Q20: Has the quality of your electronic device hindered your ability to follow the online classes? *

- ◯ Yes
- ◯ No

Q21: Have you had difficulty using technological equipment and digital media (apps, software) to participate in digital remote learning? *

- ◯ Yes
- ◯ No

Q22: Have you received any form of incentive/aid from your educational institution to attend digital remote learning? *

- ◯ Yes
- ◯ No

Q23: If your previous answer was yes, which one? (more than one answer possible) *

- [ ] Financial Incentive
- [ ] Loan or donation of electronic devices for study
- [ ] Availability of internet via wifi or mobile data

Q24: Do you consider your study space at home appropriate? *

- ◯ Yes
- ◯ No

Q25: Did the quality of your study space at home hinder your ability to keep up with online classes? *

- ◯ Yes
- ◯ No

Q26: How often do you participate in online classes and perform activities given in class? *

- ◯ 100%
- ◯ between 99% and 75%
- ◯ between 74% and 50%
- ◯ less than 25% of the lectures
- ◯ I do not participate in online lecture

Q27: Do you feel motivated and interested to follow the online classes?

- ◯ Yes
- ◯ No

Q28: Are you considering or have you ever considered dropping out of university course due to the current situation? *

- ◯ Yes
- ◯ No

Q29: Your academic performance and learning development compared to face-to-face teaching: *

- ◯ Developed
- ◯ Remained the same
- ◯ Regressed slightly
- ◯ Regressed a lot

Q30: Due to the transition to online education will there be any changes in the length of your study period? *

- ◯ No, I will graduate in the standard period of study
- ◯ Yes, I will have 1 semester delay to graduate
- ◯ Yes, I will have more than 1 semester delay to graduate

Q31: Do you believe that digital remote teaching is effective? *

- ◯ Yes
- ◯ No

Q32: How would you rate the experience of doing digital remote teaching overall? *

- ◯ Terrible
- ◯ Bad
- ◯ Regular
- ◯ Good
- ◯ Excellent

Q33: Would you take a distance learning higher education course again or would you recommend it to someone else? *

- ◯ Yes
- ◯ No

Q34: How could universities improve the course experience? (more than one answer possible) *

- ☐ Better teachers/tutors
- ☐ Better structure (system or platform used by students)
- ☐ Better pedagogical support
- ☐ Best technical support
- ☐ Better teacher x student / tutor x student interaction