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What we learned from the pandemic: The social representations of the emergency remote education

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M
2022

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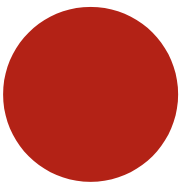

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June 2022

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Abstract

In 2019 a new infectious disease named COVID-19, caused by the SARS-CoV-2, a recently detected coronavirus, emerged. Education went through a forced transition from face-to-face education to emergency remote education with limited time and resources, and little is known regarding the impacts of this process in education and stakeholders. The goal of this study is to explore academic production, social representations in circulation in the social network Twitter, and social representations in circulation in a public school in Portugal regarding the implementation of emergency remote education during the pandemic of COVID-19. To achieve these objectives, this dissertation was divided into three interconnected and structuring components: a scoping review focused on studies addressing emergency remote education until November 2019, an analysis of posts from the social network Twitter containing the word *Ensino*, which is associated with formal education in Portuguese, in a time range that went from before the pandemic until after classes returned to the face-to-face modality, and a survey with 10th grade students in a Portuguese high school. Results indicate that emergency remote education was conduct replicating face-to-face strategies, sub-utilizing available platforms. The themes being discussed in the studies analysed, such as *Teaching and abilities*, *Institutional support*, and *Student engagement*, have already been addressed in similar ways in the past, except for *Cultural or socioeconomic circumstances*. Social representations in circulation both in the social network Twitter and in a Portuguese classroom indicate that emergency remote education was anchored to distance education, which may have influenced pedagogical choices. This study offers four recommendations based on pedagogical approaches and taking into consideration the findings to better prepare for future similar situations: (i) propose curricular changes focusing on core skills and contents, (ii) adapt evaluation moments, (iii) utilize

previous frameworks and literature, and (iv) focus on equity. The relevance of this research lies in generating new evidence that can assist in the development of pedagogical practices, in the directing of education politics, in the application of emergency remote education in future contexts, and the use of e-learning in education.

Resumo

Em 2019, surge uma nova doença infeciosa chamada COVID-19, causada pelo SARS-CoV-2, um coronavírus recentemente detetado. A educação passou por uma transição forçada do ensino presencial para a educação remota emergencial com tempo e recursos limitados, e pouco se sabe sobre os impactos desse processo na educação e nos indivíduos envolvidos. O objetivo deste estudo é explorar a produção acadêmica, as representações sociais em circulação na rede social Twitter e as representações sociais em circulação em uma escola pública portuguesa sobre a implementação da educação remota emergencial durante a pandemia do COVID-19. Para atingir esses objetivos, esta dissertação foi dividida em três componentes interligadas e estruturantes: uma scoping review focada em estudos sobre a educação remota emergencial publicados até novembro de 2019, uma análise de mensagens da rede social Twitter contendo a palavra ensino e publicadas entre 2019 (antes da pandemia) até 2021 (depois das aulas regressarem à modalidade presencial), e um inquérito com alunos do 10.º ano de uma escola secundária portuguesa. Os resultados indicam que a educação remota emergencial foi implementada replicando estratégias presenciais, subutilizando as plataformas disponíveis. Os temas discutidos nos estudos analisados na scoping review, como *Ensino e habilidades*, *Apoio institucional* e *Engajamento dos alunos*, já haviam sido abordados de maneira semelhante no passado, exceto pelo tema *Circunstâncias culturais ou socioeconômicas*. As representações sociais em circulação tanto na rede social Twitter quanto nas salas de aula portuguesas indicam que a educação remota emergencial estava ancorada na educação a distância, o que pode ter influenciado as escolhas pedagógicas. Este estudo oferece quatro recomendações baseadas em abordagens pedagógicas e que levam em consideração os resultados encontrados, para que seja possível uma melhor implementação do ensino remoto emergencial em situações semelhantes

no futuro: (i) propor mudanças curriculares com foco nas habilidades e nos conteúdos académicos principais, (ii) adaptar os momentos de avaliação, (iii) utilizar *frameworks* e literatura académica relevante, e (iv) focar na equidade. A relevância desta pesquisa está em gerar novas evidências que possam auxiliar no desenvolvimento de práticas pedagógicas, no direcionamento de políticas educacionais, na aplicação da educação a distância emergencial em contextos futuros e no uso do e-learning na educação.

Acknowledgements

With the end of this cycle, which represents an important step in my professional trajectory, I would like to thank and recognize with gratitude and affection everyone who made this accomplishment possible.

I thank my supervisors Professor Luciano Moreira and Professor Carla Morais for the learning and opportunities during my master's period, for their guidance, patience, dedication and for the enthusiasm with which they teach science in the field of education.

To the Professors and colleagues from FEUP and FCUP, especially Professor Sara Ferreira, for trusting and encouraging my work as a researcher.

To the friends I made in Portugal, for making the whole journey lighter and making me feel welcome at my beloved Porto.

To the Brazilian friends who were always present, even from a distance, especially to Luis Flávio, Magela, Robson, Raquel, Virgínia and the friends from *Farândula*.

My family, especially my brothers, Izabela, Lucas, Thiago and Gustavo for always being with me, for all the inspiration and support.

To my parents, Flor and Márcio, for teaching me that sailing is necessary, for being impeccable parents, for believing in my potential, for their unconditional love, support, and wisdom.

To my grandparents Clea and Claudionor (*in memoriam*) for being such loving grandparents and for always supporting me.

To my wife Flávia, for helping me become the best version of myself.

To all of you, my thanks.

Bruno Cardoso

Agradecimentos

Com o fim deste ciclo que representa um importante passo na minha trajetória profissional, gostaria de agradecer e reconhecer com gratidão e carinho a todos que tornaram o meu mestrado possível.

Agradeço aos meus orientadores Professor Luciano Moreira e Professora Carla Morais pelo aprendizado e oportunidades durante o período do meu mestrado, pela orientação, paciência, dedicação e entusiasmo com que ensinam a ciência no campo da educação.

Aos Professores e colegas da FEUP e FCUP, em especial à Professora Sara Ferreira, por confiar e estimular o meu trabalho como pesquisador.

Aos amigos que fiz em Portugal por tornarem toda a jornada mais leve e me fazerem sentir em casa no meu amado Porto.

Aos amigos brasileiros que, mesmo na distância, sempre estiveram presentes, em especial ao Luis Flávio, Magela, Robson, Raquel, Virgínia e aos amigos da *Farândula*.

A minha família, em especial aos meus irmãos, Izabela, Lucas, Thiago e Gustavo por estarem sempre comigo, por toda inspiração e apoio.

Aos meus pais, Flor e Márcio, por me ensinarem que navegar é preciso, por serem pais impecáveis, por acreditarem no meu potencial, pelo amor incondicional, pelo suporte e pela sabedoria.

Aos meus avós Clea e Claudionor (*in memoriam*) por serem avós tão carinhosos e por me apoiarem sempre.

A minha esposa Flávia, por me ajudar a ser a minha melhor versão.

A todos vocês meu muito obrigado.

Bruno Cardoso

SUMMARY

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INTRODUCTION

In 2019 a new infectious disease named COVID-19, caused by the SARS-CoV-2, a recently detected coronavirus, emerged. The first cases were identified in the city of Wuhan on December 31st, and due to its high infection rate, it quickly spread throughout the world. On March 11th, 2020, it was classified by the World Health Organisation (WHO) as a pandemic due to the alarming levels of spread and severity of the virus. Though most people would only experience mild to moderate respiratory illness, older people, and people with underlying medical problems were more likely to develop severe illness (WHO, 2020). Strict responses were enforced, which included but were not limited to using a mask in public places, physical distancing, and even complete countrywide lockdowns. The latter would occur for predetermined periods, and citizens could only leave their homes in specific circumstances.

In Portugal, the first case of infection by the virus that causes COVID-19 was identified on March 2nd, 2020, and quickly spread. To respond to this public health situation, the Government adopted safety population-level measures (Nunes et al., 2020), including the declaration of a state of emergency on March 18th, 2020, to be effective as of March 19th, and lasting until May 4th, 2020. This state of emergency translated into a nationwide restriction policy of lockdown, for individuals to remain where they were, usually at home, being only allowed to leave their residences to acquire essential items or in case of being an essential worker.

Even before the official announcement of the state of emergency, the Portuguese Government already shared plans of closing all public and private schools starting from March 16th, 2020, to at least, mid-April, due to the possible risk of contagion in the scholar setting. Consequently, alternatives to face-to-face learning became indispensable for the academic year to continue (Santos Rutschman, 2020).

Education went through a forced transition from face-to-face education to distance learning with limited resources (Assunção Flores & Gago, 2020). Due to the severity of the situation, countries had little time to prepare for physical distancing and lockdown measures, and emergency strategies were adopted to offer distance education to the largest group of students.

The modality of distance education in an emergency context cannot be regarded in the same way as traditional distance learning since it was not planned from the start to be a non-presential course. Rather, it is a temporary shift of instructional delivery due to crisis circumstances, and it must be classified accordingly, as an emergency remote education (ERE) (Hodges et al., 2020).

Given the reduction in the number of COVID-19 cases and the flexibilization of educational restrictions, face-to-face classes gradually returned in Portugal in March 2022 (Lusa/TSF, 2021).

Previous literature shows that in Portugal and other countries, processes of ERE in the pandemic of COVID-19 presented some challenges such as, lack of online technology readiness and increased workload for teachers (Oliveira et al., 2021; VanLeeuwen et al., 2021).

The implementation of ERE in Portugal during the pandemic of COVID-19 is still underexplored and the success and challenges of ERE in the second and third cycle of education still need to be further investigated. Despite the progresses in public health to mitigate the impact of the new coronavirus in the population, thinking about the ERE is important in case it should be necessary to implement it once again in the context of COVID-19, or in future emerging situations. Therefore, it is crucial to understand the perception of the general Portuguese population, and students of second and third cycle of education regarding the modalities of education during the pandemic. To this extent, the social representation is an adequate theory to understand the ERE in Portugal during the pandemic of COVID-19, since it identifies the common sense regarding disruptive events through the detection of the central nucleus of the representation and, therefore, understanding how this event is perceived by a social group (Abric, 2003).

In this study, we aim to explore the social representation of the COVID-19 ERE in Portugal, and how this experience affected classes when education returned to a presential modality. To achieve this objective, this study will be divided into three structuring and interconnected components: (i) a scoping review, (ii) an analysis of posts from the social network Twitter, and (iii) a survey conducted with 10th grade students from a Portuguese public school. The first stage has the objective of mapping studies developed about the COVID-19 ERE to identify gaps and direct the next steps of this study, delimitating the analysis of the social representations of the second stage and guiding the development of the questionnaire utilized in the third stage. The second stage will identify the social representations of the ERE in circulation through an analysis of posts containing the term *Ensino*, which is associated with formal education in Portuguese, in the social network Twitter. The second stage will be relevant to the development of the questionnaires that will be utilized in the last stage. Finally, the third and last stage will consist of a survey conducted with students from a Portuguese public school. The relevance of this project lies in generating new evidence that can assist in the development of pedagogical practices, in the directing of education politics, in the application of ERE in future contexts, and the use of e-learning in education.

CONTEXT AND MOTIVATION

Education is a transformative tool that should be available and accessible to everyone, despite family income and social class. However, inequity in the access to education was an established challenge even before the pandemic of COVID-19 (Jenkins, 2009). Although the strategies to overcome the gap of access to education are well-known, including access to appropriate equipment and teaching the students relevant skills to be integrated in the world, the ERE during the COVID-19 pandemic has evidenced the inequalities in education in a broader extent (Kraft et al., 2021). For instance, in the context of the ERE, digital divide and digital literacy became limiting factors for students to be able to attend classes, obtain resources, interact with teachers and peers, and have access to education in a broader sense (Chirinda et al., 2021). Studies have shown that some students had to attend classes via mobile phones and in more extreme cases, students remained uncommunicable and did not attend classes at all (Chirinda et al., 2021).

Moreover, the access to internet, which is the key tool for the ERE, was one of the most worldwide discussed barriers students faced to progress with an appropriate educational training (Seabra et al., 2021). In Portugal, it is known that 84.1 % of household do not have proper access to broadband internet (PORDATA, 2021). To mitigate the issues regarding access to technologies in ERE, Portuguese authorities and local institutions utilized available equipment, such as laptops and portable internet, into hotpots. Nevertheless, teachers also had to overcome obstacles and claimed that some of the biggest difficulties faced during the COVID-19 were the lack of internet access, equipment, and relevant skills (Almeida, 2020; Assunção Flores & Gago, 2020).

The ERE repercussions are still being investigated, and its impacts on education are not fully known. Therefore, it is important to study the events that took place during the COVID-19 ERE, as they may provide an invaluable perspective that may support develop pedagogical practices and education policies that may guide future implementations of ERE and of e-learning. Furthermore, the events that took place during 2020 brought up important issues that should be discussed and addressed, and since ERE is not only relevant in the context of a pandemic, but in situations where access to education is limited due to natural disasters, war, or other crises (Crompton et al., 2021b), improvements in the knowledge of ERE are encouraged.

RESEARCH QUESTIONS

Considering the objectives of this study, the following research questions and sub questions were established to guide the development of this dissertation and of the three studies that it comprises:

A. What is already known, through existing literature, about emergency remote education before and during the pandemic of 2020?

    1. What are the main findings of studies that addressed the covid-19 emergency remote education aimed at middle and high school?
    2. What methodological tendencies exist in current literature regarding the COVID-19 emergency remote education aimed at middle and high school?
    3. What are the limitations identified by authors in current literature regarding the COVID-19 emergency remote education aimed at middle and high school?

B. What are the social representations of emergency remote education in circulation in the social network Twitter?
C. What are the social representations of emergency remote education of 10^{th} grade students from a Portuguese public school?
D. How has emergency remote education influenced classes when they returned to the presential modality in the selected schools?
E. How consistent are results across the studies?

METHODS

Overall, this study adopts a mixed-methods approach, due to embracing both quantitative and qualitative techniques. The first study, the scoping review, aims to address research question A and sub questions 1, 2, and 3. The second study, the analysis of social representations in Twitter, addresses research question B. The third study will focus on research questions C, D, and E. Finally, research question F will be answered through the comparison of the three different studies.

SCOPING REVIEW

Due to the emergent nature of this field of research, a scoping review was adopted instead of a systematic review. This choice is in line with the objectives of this study, which were to map the available evidence and identify gaps and tendencies (Daudt et al., 2013). The methodology adopted was first stablished by Arksey and O'Malley (2005), and later expanded by Levac et al. (2010) and Daudt et al. (2013), and its six stages consist of (1) identifying the research question, (2) identifying relevant studies, (3) study selection, (4) charting the data, (5) collating, summarising, and reporting the results, and the (6) consultation exercise.

BIG DATA ANALYSIS

Messages from the social network Twitter containing the word *Ensino* and published between 2019 and 2021, will be collected with Pythons' library Tweepy. These messages will be treated and converted into a corpus in order to be analysed with two different statistical software: Iramuteq 0.7, running over R (4.0.3).

SURVEY WITH STUDENTS

A survey will be conducted with 10th grade students from a Portuguese public school containing four different parts: (i) sociodemographic questions, such as gender, age, nationality, and course (physical education technician or computer technician), (ii) ranked association questions, (iii) Web-Use Skill Measure Index (Hargittai et al., 2018), and (iv) oped by the Beliefs on Education Scale and an adapted version of the Perceived Internet School Usage, and an open-end question asking students what they would change in education based on their experience with ERE (Moreira et al., 2021).

DISSERTATION STRUCTURE

Besides this initial chapter, this study contains six more, totalising seven chapters. Chapter contents are listed below:

Chapter 1: State of the art.

Presents relevant literature regarding ERE, E-learning, and social representations.

Chapter 2: Scoping review.

Scoping reviewed aimed at studying published academic papers focused on ERE.

Chapter 3: Social representations in twitter.

Big data study aimed at identifying social representations in circulation in Twitter.

Chapter 4: Social representations in the classroom.

Survey study aimed at identifying social representations in circulation in 10^{th} grade classes in a Portuguese high school.

Chapter 5: Final discussion.

Discussion aimed at comparing the results of the three studies conducted.

Chapter 6: Conclusion.

Conclusion and final remarks.

1. STATE OF THE ART

In this chapter the state of the art of ERE is described and relevant studies regarding ERE, COVID-19, and social representations are discussed.

1.1 EMERGENCY REMOTE EDUCATION

ERE can be defined as a "temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances" (Hodges et al., 2020, p. 6). This change of instructional delivery refers to a forced shift from face-to-face or blended education to a complete remote modality in order to adapt to a context where students are unable to physically attend classes. While ERE can be seen a solution in an emergency context, its main objective is not to re-establish the same education that was practiced before the emergency in a remote manner, but to offer a temporary solution to mitigate the negative effects of said crisis on education. Moreover, it is important to stress that this modality of education shouldn't be judged by the same standards of traditional remote education, since ERE focuses on velocity and reliability, while the latter is developed from the beginning taking into consideration a distance component into their instructional model. This focus on velocity and reliability is based on the necessity of quickly re-establishing an educational network and guaranteeing that this network will be stable, so that students and teacher may rely on them without having issues or insecurities (Hodges et al., 2020).

One of the main considerations while implementation ERE is that it requires not only equipment, but also technological knowledge and skills from education professionals. Teachers must be familiar with the use of information and communication technologies to successfully implement ERE that relies on these technologies, which isn't always the case (Crompton et al., 2021a). While there have been projects to teach relevant skills and help to implement information and communication technologies in classes in some education institutions before COVID-19, these initiatives weren't prepared for an event on the scale of a pandemic (Crompton et al., 2021a). In Portugal, a common complaint of teachers was the sense that this lack of relevant skills had a negative impact in their classes and, ultimately was another layer of pressure on an already overloaded individual (Assunção Flores & Gago, 2020).

Even tough ERE does not necessarily implicate in the use of internet technologies, its use greatly improves efficiency and cost-effectiveness by providing a way to interact and share information remotely (Crompton et al., 2021a). Conferencing tools such as Zoom and Microsoft

Teams provide a virtual space for students and teachers to interact in real-time. Online document editors are a solution to provide a means for collaborations between students. The possibility of sharing audio, video, pictures, and texts adds new options to teacher utilise, besides conventional expositional classes (Nonato et al., 2021).

1.1.1 EMERGENCY REMOTE EDUCATION BEFORE COVID-19

As of February 15th of 2022, a Boolean search with the operator *"emergency remote education" OR "emergency remote teaching" OR "emergency remote learning"* yields a total of 2.035 documents in the platform Scopus. If we analyse the year of publication of these studies, they range from 2019 to 2022. Even though the use of the terms ERE, emergency remote teaching, and emergency remote learning are recent, education in times of crisis has been discussed for decades. Nevertheless, emergency education does not focus exclusively on distance learning, but in re-establishing education in moments of crises.

Studies in the past (Baytiyeh, 2019; Kumar et al., 2017) have identified two types of emergencies: natural and man-made. The first one includes earthquakes, tsunamis, floods, cyclones, volcanic, eruptions, fire, and epidemics. Man-made are usually comprised of conflicts, wars, violence, and accidents. Regardless of the type of crisis, re-establishing education usually comes after securing basic needs and the security of the children and adolescents (Kumar et al., 2017).

Re-establishing school operations and providing face-to-face classes in times of crisis can present several positive effects to the community besides providing access to education, such as providing shelter or a routine to students. Some studies bring up the importance of students having a physical school to attend, as they can be regarded as a place that can provide shelter and offer a space for understanding and conflict resolution. Moreover, offering a routine and a space for children to engage in education offers other benefits, such as parents being able to stand in queue for water, food, clothes, and other essential supplies (Kumar et al., 2017). However, it isn't always possible to re-establish face-to-face classes, and in these cases, other solutions must be utilised. More recent studies (Baytiyeh, 2019) have identified that mobile technologies, through the use of information and communication technology (ICT), are a powerful tool in mitigating the effects of crises in education, especially when mobility or facilities are compromised .

The difficulties imposed by these extreme conditions may implicate in a long period before traditional education may be restored. This delay may negatively impact the performance and

interest of students in education, resulting in higher number of students failing or dropping out of school (Baytiyeh, 2019). Education is a human right, as important by itself as an enabler of other rights. Therefore, it is vital to re-establish education as quickly as possible, as a way to give hope to affect children and adolescents (Sinclair, 2001).

1.1.2 E-LEARNING

Since the use of ICT are relevant in the context of ERE, it is important to understand these tools and how they can positively impact education. E-learning refers to the use of ICT in education. Though we might associate it with distance learning, that might not always be the case. ICT may be used both in distance and blended (mixed mode) education. The latter modality refers to a course that has both face-to-face and distance components. Since e-learning is very broadly defined, teachers may adopt different approaches to it, and there is not a single or correct way of implementing ICT in education. (Fry et al., 2008).

Moreover, in an effort to further delimitate the concept of e-learning, the "Observatório Panorama e-learning", an initiative that aims to promote e-learning in Portugal, established four main characteristics, based on previous literature, that characterise an e-learning course. This delimitation is essential to guide the development of a regulation model and improve the practice of e-learning in Portugal (Dias et al., 2014).

The first characteristic states that there should be an almost permanent separation between student and professor throughout the learning process. Though the course might have a face-to-face component, most of the course should be conducted in a distance regime.

The second characteristic postulates that mediatic content, such as video and audio, should be utilised. (Dias et al., 2014). Instructional technologies, such as text, images, and other media or applications, when used to support learning, are called learning objects. Besides having benefits to the learning process, learning objects also present qualities including reusability, generativity, adaptability, and scalability. These qualities benefit the development and distribution of e-learning courses (Wiley, 2002). It is relevant to consider the benefits of using learning objects in the context of ERE, as generated content can be quickly distributed with minimal costs associated.

The third characteristic states that communication should be bidirectional: students should be able to respond and engage in dialogues with teachers and their peers as part of the educational process. Interaction and communication between students and between students and teachers may

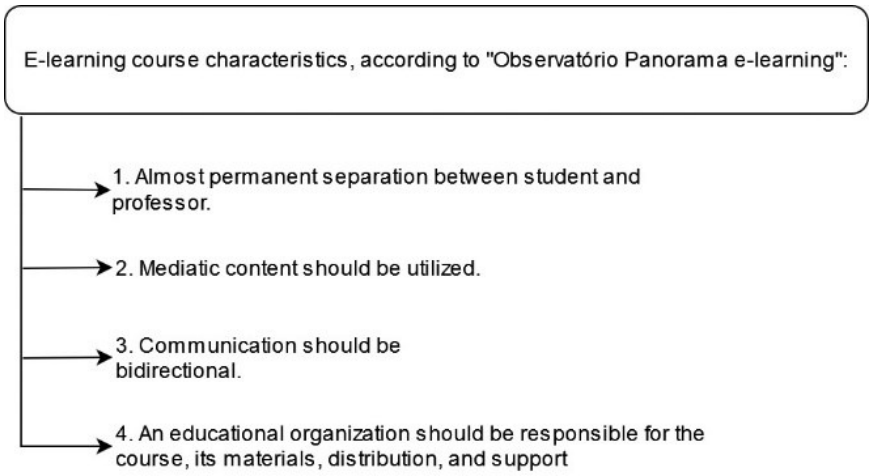
be synchronous or asynchronous. The first one occurs simultaneously, as in a videoconference, for example, and the latter does not happen in real-time and can be exemplified with a forum board discussion.

Finally, the fourth guideline postulates that an educational organisation should be responsible for the course, its materials, distribution, and support for the student. This guideline aims to establish a quality level for e-learning education and improve the perceptions of e-learning by associating it with trustworthy institutions since distance learning may not always be seen in a good light. (Dias et al., 2014; Keller & Cernerud, 2002).

These four guidelines are summarised below, in Figure 1.

Figure 1

E-learning characteristics according to "Observatório Panorama e-learning" (Dias et al., 2014)



Most of the interactions presented in the four guidelines above are made possible due to the advent of Web 2.0. Web 2.0 can be a difficult topic to define, so authors tend to classify it according to four key properties it presents: (1) social software (multiple users can collaborate); (2) micro-content (shorter content produced and distributed); (3) freely available; and (4) sophisticated interfaces that simplify the interaction between users and the tools. Web 2.0 allowed students to access, create, and distribute content as long as they have an internet connection (Bower et al.,

2010; Bower & Torrington, 2020). These tools, when utilised in education, open a broad possibility of interactions that can improve the learning experience. Students can cooperate remotely to develop projects, watch classes according to their schedules, and even ignore geographical barriers to attend classes as long as they are available online (Fry et al., 2008).

Even though ERE can't be considered e-learning, the tools utilised in e-learning are essential to promote an efficient and effective ERE. Videoconferencing provides synchronous interaction between teachers and students, enabling academic activities to continue in a familiar way and providing an opportunity for students to socialise, even if online. Learning objects provide scalable content that can be shared between teacher and student and between teachers, as a way to support each other in a difficult moment.

These tools enabled education to continue in the face of the restrictions imposed by the COVID-19 pandemic, even if compromises were necessary to accommodate to the limited time and resources of ERE (Hodges et al., 2020). Despite the experience of ICT platforms usage being considered positive in some cases, the pandemic had negative repercussions on education (Oliveira et al., 2021). The next section…

1.2 COVID-19 AND IMPACTS ON EDUCATION

Schools and teachers had to adapt to this new context rapidly, and the Portuguese Ministry of Education developed initiatives to promote an emergency educational response. A guide entitled "ROTEIRO - 8 Princípios Orientadores para a Implementação do Ensino a Distância (E@D) nas Escolas" (DGE, 2020) was issued and contained several suggestions and recommendations that would help teachers and schools implement ERE. Besides that, #EstudoEmCasa, a nationwide television programme, was created to overcome the sudden lack of face-to-face classes. #EstudoEmCasa resulted from a partnership between the Portuguese Ministry of Education and the public broadcasting network RTP. It was created with two main goals in mind. The first was to serve as a guideline for teachers to organise online academic activities. The second one was to help students that had difficulty accessing online classes due to a lack of internet connection, computer access, etc., to have a reliable and accessible way of remotely watching classes and keeping up with academic content (Assunção Flores & Gago, 2020; República Portuguesa, 2020).

On August 26, 2020, Deco Proteste, a non-profit organisation that defends consumers' rights, conducted a satisfaction inquiry with parents of students in the first cycle of primary school

regarding education during the state of emergency. Most parents (70% of participants) were unsatisfied with ERE and awarded an overall score of 5.8 out of ten to their satisfaction level of education during the lockdown. The three most used tools were videoconferencing (used by 87% of the students), documents with activities and exercise (76%), and television with #EstudoEmCasa (70%). Even though videoconferencing was the most popular tool, only 21% of the students watched content pre-recorded by the teachers, and 16% watched additional videos that weren't recorded by the teachers. Online platforms, such as Moodle, were utilised by 67% of the students in their learning activities. Access was challenging in some cases. Classes and academic content were accessed by computer (63%), tablet (21%), smartphone (9%), or a combination of all (7%). Half of the students had to share the equipment they were using with family members, and one in ten students borrowed equipment from the school to attend online classes. Students spent an average of 6 hours a week with the teacher and 7 hours watching #EstudoEmCasa, which is a lower workload than the approximately 25 hours a week of face-to-face classes (Almeida, 2020).

Regarding teachers, only 15.3% used #EstudoEmCasa to support teaching activities. The recurrent complaint of educators was regarding student participation. Since students were not obliged to turn on the webcam, most of them "hid" during classes, and participation decreased. Besides this decrease in interaction, teachers, on average, were not able to contact two students per class. This inability to reach students usually was a consequence of a lack of means to access online content by the learners. Additionally, teachers identified as their main difficulties the lack of adequate equipment for students, engaging students in their learning, lack of time, lack of proper training on online teaching, and lack of support from parents (Assunção Flores & Gago, 2020).

The results presented above help us understand how teachers and student engaged with ERE and their impressions. However, other frameworks can be used to analyse these events through different optics. The theory of social representations is a different perspective that may reveal relevant information regarding how people made sense of the ERE, focusing on “common sense” instead of individual impressions.

1.3 SOCIAL REPRESENTATIONS

The social representation theory, first presented by Serge Moscovici in 1961, is a framework to study psychosocial phenomena in modern societies. According to this theory, psychosocial phenomena can only be understood if seen embedded in historical, cultural, and macrosocial

conditions. Social representations can be summarised as “the ensemble of thoughts and feelings being expressed in verbal and overt behaviour of actors which constitutes an object for a social group” (Wagner et al., 1999). Social representations are forms of knowledge socially elaborated and shared, having a practical objective and converging in the construction of a common reality to a social group (Jodelet, 1989).

These groups do not live in isolation, and they can be disrupted by events or other groups, and an example of a disruptive event is the COVID-19 pandemic. The way groups cope with these events, in a symbolic manner, is by the processes of “anchoring” and “objectification”. The first one, consists of naming and attributing characteristics to these events, to allow people to talk about them. The second one, “objectification”, consists of constructing an icon, metaphor or trope which comes to stand for the new phenomenon or idea (Wagner et al., 1999).

The central nucleus theory (Abric, 2003) helps us understand the processes of change in the context of social representations. Social representations possess two main components in its structure: the nucleus and the periphery. The nucleus comprises the vital elements and features of the representation and is less likely to change. The periphery, which surrounds the nucleus, is composed of less important elements and is more likely to change. Changes affect the periphery first, and when the periphery has changed significantly, the nucleus is altered (Abric, 2003).

This theory can be used to identify the representations of ERE of teachers and students. By understanding how these groups made sense of this period, we are able to better comprehend the this modality of education. This understanding will allow us to develop better educational policies and to improve distance learning as whole. Below, we expand on the representations of distance education, ICT use in education, COVID-19, and the use of social networks in identifying social representations.

Previous studies have successfully used the social representations theory to identify the common sense related to distance education. Marchisotti et al. (2017) conducted a study with Brazilian students utilising an online questionnaire that required participants to engage with a free association exercise. Participants were expected to list five words that came to their mind when they read the expression “distance learning” and results were organised by frequency and relevance to participants. This study identified that the most frequent concepts in the social representations of “distance education” consisted of “flexibility”, “facility”, “practicality”, “discipline”, “time”, “low-cost”, “cost”, “opportunity”, “internet”, and “convenience”. Based on these results, the

authors concluded that, despite an overall positive outlook of students regarding distance education, it was necessary to assure three key points to assure its effectiveness: (i) adopt a blended model, (ii) have trained teachers that stimulated interactions, and (iii) adopt adequate learning objects, communication, and technologies

Besides identifying the representations of more broad concepts, such as distance education, it is also possible to analyse more specific aspects of education, such as the different tools utilised. In a recent study regarding the representations of multimedia and virtual reality in communication practices of science centres (Simões et al., 2019), the social representation theory was used to identify that virtual reality was seen as objectifying the concept of interactivity and mainly used to demonstrate immersive capabilities instead of communicating science contents. This tool wasn't being implemented in a manner that its educational potential was being explored to the fullest. These results help us better understand how a social group makes sense of a tool, providing critical information that can aid future initiatives to better implement them in education.

Another relevant aspect of social representations is that different social groups can present different representations regarding the same theme. Martins et al. (2019) conducted a study regarding the social representations of the learning management system Moodle in higher education, and it was identified that teachers' and students' representations differed. While the semantic field of the teachers consisted of "accessibility" (47%), "evolution" (42%), and "distance" (39%), students' fields consisted of "technology" (97%), "evolution" (59%), and "easiness" (37%). Furthermore, social representations among students seemed to be more homogeneous than among teachers. These results may imply conclusions such as due to the familiarity of teachers with the tools, they do not see Moodle as technology, as the students do. Instead, they look beyond the technology and focus on the accessibility and the distance. Students, however, do not present the same familiarity as teachers, and still focus on the technology itself. Understanding these differences, and differences between representations of social groups in general is relevant to better target educational efforts. A recent systematic review was able to identify the social representations associated with the internet (Moreira et al., 2021), and was able to group academic social representations in four different themes: (i) the Internet and quality of life; (ii) the Internet as a moving representation; (iii) the Internet and the digital divide; (iv) the Internet and mobile culture, aiding further studies to better comprehend the constantly evolving system of the Internet.

The social representations of COVID-19 have also been analysed through the lenses of social representations, providing some insight in this recent event that had such a profound impact on peoples' lives. A study conducted in Italy (Fasanelli et al., 2020), investigated to verify the existence of differences between the social representations of COVID-19 between two different groups of students with different areas of study: social sciences and humanities and life sciences. The technique of hierarchical evocation was utilised to collect representations, and it was possible to identify that the two groups presented different representations, indicating that social group and background influence how people make sense of events. Students from the first group (social sciences and humanities) presented a more emotional evaluation of the situation, more strongly associated with negative feelings, while the second group (life sciences) focused on descriptive aspects of the situation. This type of information may be relevant to develop better aimed initiatives towards education stakeholders.

Social representations can also be identified through mediatic products, and not only direct surveys with participants. Twenty two online media articles were collected and analysed to identify the representations of COVID-19 among South Africans (Sitto & Lubinga, 2020). Results indicate that privileges in the South African society have increased racial tensions and revealed that dangerous myths regarding the virus contributed to the rapid increase of confirmed positive cases in South Africa, at the time of the study.

The studies mentioned above utilised word association through surveys and analysis of mediatic content to collect social representations. However, it is also possible to utilise social networks to retrieve this information in a much larger scale. The social network Twitter, specifically, has been utilised to analyse discourses about immigration in Italy (de Rosa et al., 2021). Tweets, which are brief messages users create and share in the platform, both national (for the Italian researchers) and international referring to migration were manually collected from the platform and analysed in SPAD. The authors identified a dichotomous discourse, leading to polarised social representations of 'immigrants–migrants'. Furthermore, Twitter was identified as a powerful propaganda tool for both sides, indicating the reach of the social network, and it´s relevance in the context of social representations.

Representation in social networks were also investigated by Sarrica et al. (2018) in a study that examined the use of Twitter and Facebook in two earthquakes that hit Italy: L'Aquila (2009) and Emilia (2012). Results indicated that social networks, initially, were used to provide

information and material coping, then social sharing of emotions and joint remembering, and finally contributed to a claiming voice and control. These results suggest that the use of social media favoured different representational functions, which progressively contributed to community empowerment. Social representations can be used to make sense of events through the optics of a determined social group. Moreover, social networks are large-scale sources of representations, that may help us reach a greater number of individuals, and, therefore, a larger group, that can provide results that more accurately represent a larger population.

1.4 CONCLUSION

Due to the COVID-19 pandemic, schools, universities, and colleges, had to switch their instructional delivery method from face-to-face to ERE. These emergency measures were necessary for academic activities to continue, but their implementation was criticised and compared to traditional distance learning. Even if the concepts of digital divide and digital literacy already, with the COVID-19 ERE they became more obvious. It is necessary to address these topics, as they have much larger implication in education and society.

Access to relevant equipment and high-speed internet connection isn't universal in Portuguese households (PORDATA, 2021). Consequently, a nationwide television-based distance learning solution was adopted to make sure that a more significant part of the children was able to learn in the context of the lockdown. During the lockdown period, e-learning tools became an essential solution to mitigate physical distancing and allow students to continue with their studies, a small amount of normality in a moment where everything was uncertain.

Furthermore, the educational system must prepare for similar situations in the future, and the growing scope of new evidence represents a fundamental key to improve education. Media and technological literacy must become part of the daily lives of both professors and students. ICT offers a great set of tools that could be used to improve education if teachers and students are introduced to them. Nevertheless, the standardisation of emergency education as was implemented, could potentially perpetuate inequalities. Thus, it is essential to address inequalities in education, aiming to make e-learning the democratising tool it can be at its full potential.

2. SCOPING REVIEW

This scoping review aims to understand what is known about ERE, and how COVID-19 influenced academic production through the analysis of published papers addressing the topic. Due to the emergent nature of this field of research, a scoping review was adopted instead of a systematic review. This choice is in line with the objectives of this study, which were to map the available evidence and identify the main findings, the limitations and methodological tendencies (Daudt et al., 2013).

2.1 METHODS

The methodology adopted was first stablished by Arksey and O'Malley (2005), and later expanded by Levac et al. (2010) and Daudt et al. (2013), and its six stages consist of:

a. *Identifying the research question:* defining a broad enough research question that provides enough breadth to guide the rest of the study.
b. *Identifying relevant studies:* Planning out the search process (where to search, terms to use, etc.) following criteria based on the research question.
c. *Study selection:* Studies will go through a manual screening that analysis abstract and, later, the full text to verify if inclusion and exclusion criteria are met.
d. *Charting the data:* extract information from the selected studies and develop our database.
e. *Collating, summarising, and reporting the results:* As the name suggests, this stage consists of the presentation of results. In this study, results will be presented in the next topic (2.2 Results) instead of the current one (2.1 Methods).
f. *Consultation exercise:* Results are presented to stakeholders in order to gather additional insights and references. Due to time constraints, this step will not be adopted in this study.

A. Identifying the research question

The research questions that guided the study were:

- What are the main findings of studies that addressed the covid-19 emergency remote education aimed at middle and high school?

- What methodological tendencies exist in current literature regarding the COVID-19 emergency remote education aimed at middle and high school?

- What are the limitations identified by authors in current literature regarding the COVID-19 emergency remote education aimed at middle and high school?

B. Identifying relevant studies

Through the research questions previous stablished it was possible to determinate the eligibility criteria that guided the development of the search process. These criteria are listed below:

1 – Studies must address the COVID-19 ERE that took place during 2020.

Since the focus of this study is to understand academic production regarding the 2020 ERE, it is essential that studies address this topic.

2 – Studies must focus on or include middle and/or secondary school.

This scoping review is part of a greater study that focuses on middle and high school, and, therefore, eligible articles must also have this focus. Due to the great variation in grade division and classifications around the world, it was stablished that, for this scoping review, middle and secondary school should encompass school years between 6^{th} and 13^{th} grade and, approximately, the ages 11 through 18.

3 – Articles should be in English, Portuguese, Spanish, or French.

Due to resource limitations, no translation was possible for this project, and, for that reason, articles had to be in languages familiar to the researchers.

4 – Studies should be articles in journals indexed in Scopus or Web of Knowledge.

Literature, for this study, will be considered published, peer-reviewed articles.

5 – Studies should be published in 2020 or 2021

The ERE is a recent event, and articles selected must be published after the event took place.

Following the development of the criteria, the search plan was stablished. This study opted for an iterative process, where the searches were tested and improved, until the largest number of relevant articles was obtained. Furthermore, two different Boolean search queries were developed, always aiming to improve the article database.

These two different searches were compared in order to choose the search query that would yield more relevant results. The first one, utilised an exclusive technique, and the second one, an inclusive technique. In the exclusive technique, all results for “emergency remote education”, “emergency remote teaching”, and “emergency remote learning” were obtained. Then, terms that

weren't relevant to this review, such as "undergraduate", "college", "elementary", etc., were used as an exclusion criterion. Finally, these results were limited by date of publication (2020 and 2021), and type (article). The electronic Boolean search can be seeing in Table 1, below.

Table 1

First Boolean search

Search section	Search terms
Part 1	TITLE-ABS-KEY ("emergency remote education" OR "emergency remote learning" OR "emergency remote teaching")
Part 2	AND NOT TITLE-ABS-KEY ("higher education" OR university or college OR *graduate OR "medical students")
Part 3	AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020)) AND (LIMIT-TO (DOCTYPE , "ar"))

The second search technique utilised an inclusive approach and started with the use of the same broad terms: "emergency remote education" OR "emergency remote learning" OR "emergency remote teaching". However, instead of excluding articles that weren't relevant to this study, relevant terms were utilised to narrow down results, as we can see in Table 2. In a third and final step, results were limited by date of publication (2020 and 2021), and type (article), just like in the first method.

Table 2

Second Boolean search

Search section	Search terms
Part 1	TITLE-ABS-KEY ("emergency remote education" OR "emergency remote learning" OR "emergency remote teaching")
Part 2	AND TITLE-ABS-KEY ("k-6" OR "k-7" OR "k-8" OR "k-9" OR "k-10" OR "k-11" OR "k-12" OR middle OR secondary OR school OR "grade 6" OR "grade 7" OR "grade 8" OR "grade 9" OR "grade 10" OR "grade 11" OR "grade 12" OR "grade 13" OR "6th grade" OR "7th grade" OR "8th grade" OR "9th grade" OR "10th grade" OR "11th grade" OR "12th grade" OR "13th grade")
Part 3	AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (PUBYEAR , 2021) OR LIMIT-TO (PUBYEAR , 2020))

Since the second technique returned more relevant articles, it was selected as the Boolean search utilised in this scoping review. The relevant studies that were present in the first method, but not in the second, were manually added later on the process. Web of Science and Scopus were selected as the databases used in this study, because both present high quality global content, and advanced search engines.

C. Study selection

The initial search was conducted on November 11th, 2021, in both Web of Science and Scopus. Web of Science yielded 153 results[1], while the same search in Scopus yielded 109 results. After these results were combined and, after duplicates were excluded, 178 articles remained.

[1] The search reported in the literature review presented significantly more results because it did not utilize any filters and wasn't limited to title, abstract, and keywords, as is the case here.

Even after the effort of developing the most effective Boolean search, results still presented some articles that were not relevant for this project. Therefore, an additional selection process where studies abstracts were analysed was necessary. From 178 articles, 63 met the eligibility criteria and were selected for the next stage of the scoping review, as is shown in Figure 2, below. Finally, four articles were manually included in the review process that weren't present in the initial searches.

D. Charting the data

Following the selection of studies, articles went through an in depth analyses and relevant information was organised into an excel table. After a closer inspection of all articles, and despite all 67 passing the abstract inspection, some studies did not meet the inclusion criteria and were excluded. This brought the total of articles to 60 (listed and numbered in Appendix 1), which was the final number of studies analysed in this scoping review. In the excel table, information was organised and codified into themes according to frequency in main findings of articles in order to answer the research questions stated above.

During this scoping review, a few difficulties regarding the search of articles were regarded throughout the process. These difficulties were organised and described below, as guidance for future researchers to make their articles more easily accessible, more appealing and more recurrent in future searches.

1 - Inconsistency in the use of keywords: Throughout step 3.2 (defining the Boolean search terms), a great variation in keywords that related to the same topic made it more efficient to utilise TITLE + ABSTRACT + KEYWORDS, instead of relying only on keywords. Keywords relating to COVID-19 would range from "COVID-19", "SARS-COV-2", "COVID-19 PANDEMIC", "CORONAVIRUS DISEASE 2019", and "CORONAVIRUS".

2 – Abstract and title in different language from the rest of the article: Some articles presented title and abstract in English. However, the complete text was in a different language, which made the article not relevant for this study.

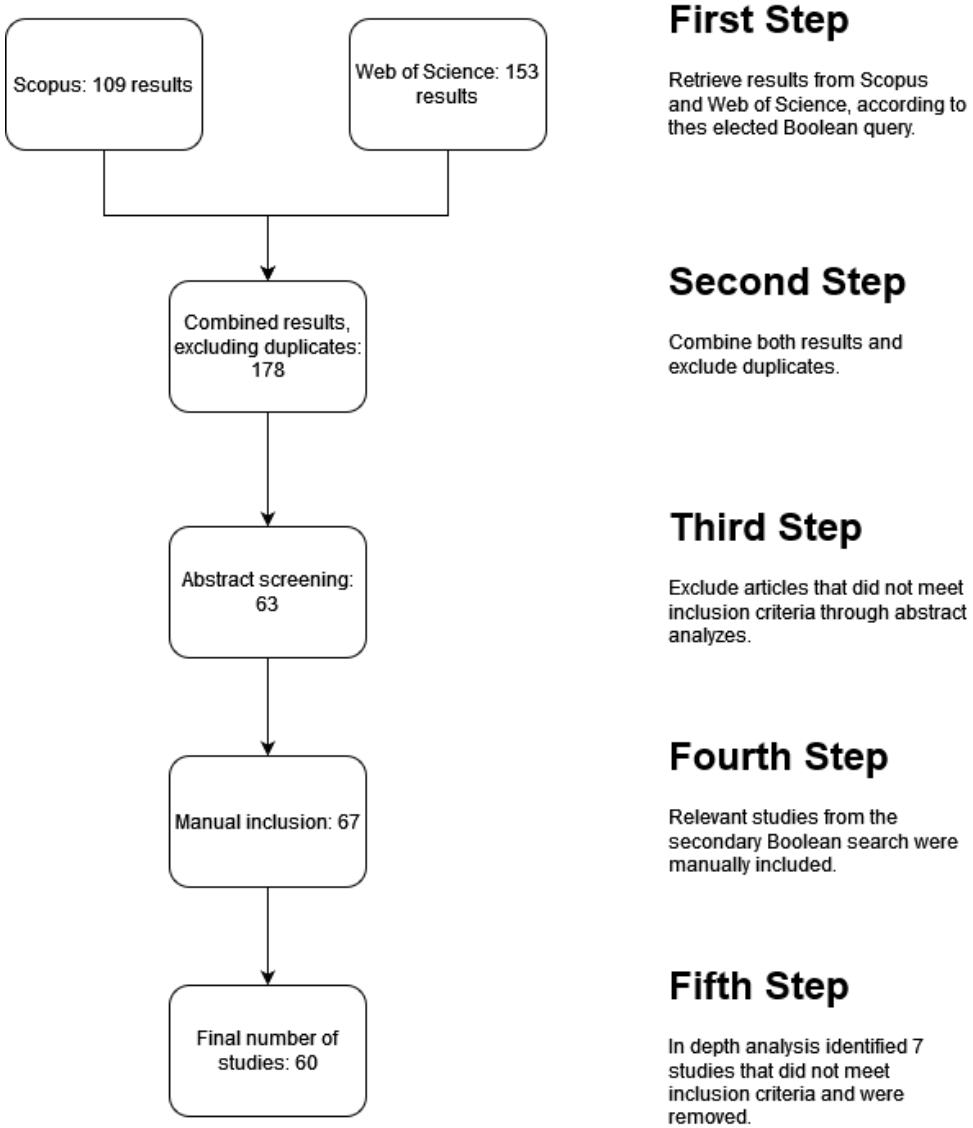
3 - Search result does not lead to article: Some articles, despite having results in the search engines, were unavailable through Scopus and Web of Science, and had to be obtained through different sources.

4 - Inconsistency of title in different search engines: Some articles had their titles and abstract written in a different manner in different search engines. Though most of the times it was the punctuation and spacing that differed, in more extreme cases, the wording was also different.

5 – Translation inconsistencies: In some cases, issues with the translation made it difficult to find the original article if it wasn't available in English via the search engine. Since it was necessary to locate articles in their native language, and the meaning of the title was different, some time was necessary to locate the full text.

Figure 2

Scoping review steps

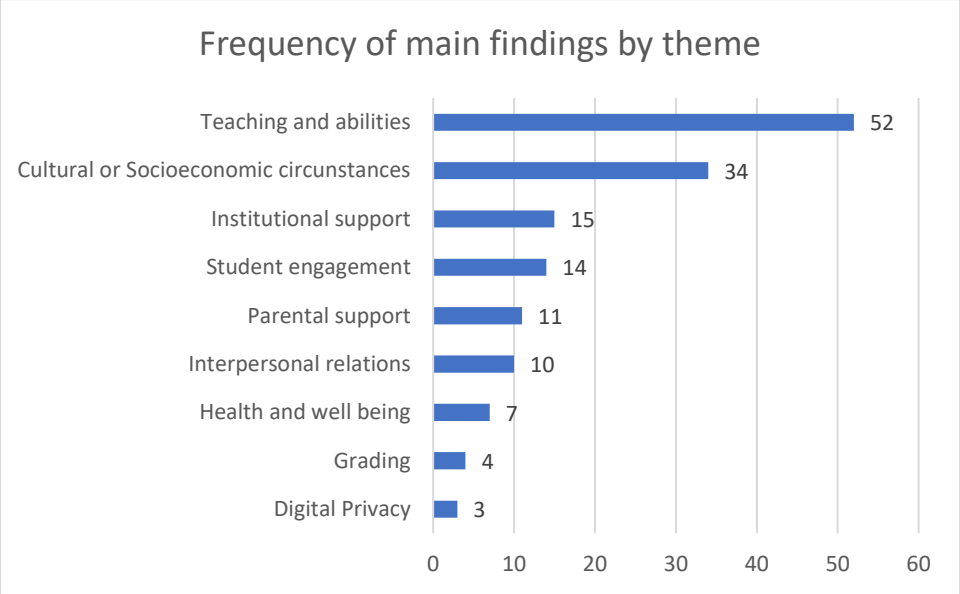


2.2 RESULTS

1. What are the main findings of studies that addressed the covid-19 emergency remote education aimed at middle and high school?

Figure 3

Frequency of main findings by theme



The main findings of each study were analysed and coded into nine recurring themes: (i) teaching and abilities, (ii) cultural or socioeconomic circumstances, (iii) institutional support, (iv) student engagement, (v) parental support, (vi) interpersonal relations, (vii) health and wellbeing, (viii) grading, and (xi) digital privacy[2].

The most frequent theme in studies was (i) teaching and abilities. This theme was present in the main findings of 52 studies, and absent only in eight studies (2, 3, 20, 21, 27, 28, 38, and 58). Findings in this category presented the importance of ICT skills in ERE, and how previous relevant knowledge played a fundamental role into a less troublesome transition into ERE. The lack of ICT skills proved to increase teacher workload, since teachers had to learn how to adapt their content to ERE and how to conduct online classes before being able to implement them. While

[2] The frequency of themes in studies can be seen in Figure 3. It is important to stress that one study may present more than one main finding and, therefore, be present in more than one theme.

most studies stated that a lack of relevant skills implied in an increase of teacher workload, nine studies stated that teachers that already possessed ICT skills had a less troublesome transition to ERE (5, 7, 13, 23, 35, 39, 40, 44, and 50)

Besides identifying the importance of these skills, 21 studies recommended the training of teachers in ICT skills (1, 4, 5, 6, 7, 11, 15, 17, 18, 19, 37, 39, 40, 44, 48, 51, 49, 50, 52, 54, and 55). In a broader manner, these studies expressed how important it is to train and prepare teachers for the future educational contexts where these skills may be relevant. ICT skills directly impacted the quality of education ERE by providing alternative interactions with students and more pedagogical possibilities through the use of learning objects and online platforms, and not limiting ERE to synchronous online classes.

Some teachers identified as a positive outcome of ERE that they were able to learn new skills (1, 13, 14, 18, 19, 51, 47, 52, 56, and 57). Despite this optimistic finding, one study reported that teachers working with different levels of education possessed different levels of ICT skills. Namely, educators that taught in elementary school possessed a lower level of ICT skills (46). Regarding the pace of ERE, two studies identified that educational content was administered at a lower speed (32 and 40), when compared to traditional education.

Finally, several studies identified that the adaptations implemented for ERE should be considered when traditional education resumes (14, 16, 17, 25, 30, 31, 34, 35, 37, 40, 43, 47, 50, 51, 52, 54, and 55). These studies believe that schools should try to keep up with the technological advances, as the technologies used during the ERE could benefit education by providing tools that could promote collaborative, student centred pedagogies.

The impact of cultural or socioeconomic circumstances on ERE (theme ii) was reported by 34 studies (1, 2, 4, 5, 6, 7, 8, 11, 12, 14, 15, 16, 17, 23, 24, 29, 31, 32, 36, 38, 39, 40, 42, 44, 46, 47, 48, 51, 25, 50, 55, 57, 58, and 60). These studies claim that the quality of ERE was greatly influenced by socioeconomic factors, as students and teachers who did not have access to relevant equipment or reliable internet connection reported a worst experience than those who did. The studies that presented this theme in their main findings either had participants in public schools or in public and private schools.

Some studies mention school, governmental, and private initiatives to bridge the digital divide between students, supplying equipment and internet access. Participants from these studies were in the United States, Italy, Spain, Bahrain, and Russia (2, 5, 7, 12, 14, 15, 38, 46, 48, and 60).

This uneven distribution of access also reflected on the software selected to be used utilised during the ERE. Messaging apps that weren't initially conceived to be used in education became a more reliable way of reaching students (4, 8, 14, 16, 23, 24, 29, 36, 39, 40, 42, 47, 51, and 57), and in some more extreme cases, replacing Zoom and Google Meets as an online synchronous classroom (51). In the latter, equipment was only half of the issue, as data plans limited the information that could reach students. These restrictions were so challenging that photographs of textbook pages couldn't be sent to students.

Public and private schools also showed some discrepancies, in some countries (4 and 16). It was possible to identify that, while public schools in Brazil struggled to maintain contact with students, having a much lower attendance, particular school kept up with content in a manner closer to the presential classes offered before the ERE, even if offering less emotional and social support to students (16).

Equity initiatives were recommended by 14 studies (1, 2, 4, 11, 15, 23, 31, 46, 47, 51, 52, 55, 57, and 58), claiming that these initiatives were important not only to prepare teachers and students for similar situations, but to help them be fully integrated in a world that relies on these interactions.

The third theme, institutional support, was identified in 21 studies (1, 2, 5, 7, 8, 15, 16, 19, 22, 23, 26, 32, 42, 43, 48, 49, 53, 55, 57, 58, and 59) and reported how support from school, government, and relevant institutions are essential to guarantee a less distressing transition from face-to-face to ERE. Institutional support may consist of offering equipment, training or simply guidance for education professional, creating a support network and a less isolated experience, in which educational actions are relatively coordinated ensuring a somewhat similar experience between different classes in the same institution.

Eleven studies (1, 2, 5, 8, 16, 42, 43, 49, 57, 58, 59) recommended administrative support and communication initiatives from institutions, as they are fundamental to improve the ERE for teachers and students by decreasing the sense of isolation. Besides that, ERE quality benefits greatly from having strategies developed by responsible institutions. Therefore, the above-mentioned studies recommended that, in the future, schools and governments must provide clear and achievable guidelines, while also communicating the process with the stakeholders.

Building on favourable pre-exiting conditions has proved to help prompt a quick and effective response (5). However, despite strong infrastructure, issues with school readiness,

including the maintenance of academic rigour and social and emotional wellbeing, may still be present (7). Institutional support was relevant despite of the participant location and should be considered (19 and 23).

Student engagement (theme iv) was highlighted in 14 findings (1, 4, 6, 12, 14, 17, 18, 27, 43, 45, 49, 54, 56, and 58). Overall, studies identified that teachers had more difficulty engaging students during ERE than during regular education. Lack of student participation in ERE (e.g. no interaction in synchronous classes, webcams turned off, failing to turn in assignments, etc.) was identified as one of the biggest challenges teachers faced in the pandemic.

This difficulty could possibly be linked to teachers trying to replicate their face-to-face teaching strategies in online lessons, because their pre-conceptions regarding distance education influenced the way they conducted their online lessons (6). Parental involvement and teacher support are associated with higher levels of student affective engagement (49). Remote teaching was considered as unsuitable for young children and students with special needs (27)

The theme v, parental support, was also recurrent in findings. Eleven studies (1, 8, 17, 18, 27, 38, 41, 45, 47, 49, and 56) addressed them, and stressed that parent involvement is essential during ERE to improve results, by helping students with academic content and with maintaining their schedules. Only two studies (5 and 7) recommended the inclusion of parents and students in the decision-making process of ERE, stating that it would be beneficial to the process since, according to these studies, ERE was a time filled with insecurities and incorporating families in this process could make them feel less isolated.

One study pointed out that ERE placed a heavy burden on parents, as they had to dedicate more time to their children's education (27). Another study also suggested that parents should be trained to better support their children in ERE (8). In the same manner that parental support can improve the ERE, parents that questioned ERE and available resources could hinder it (17).

The sixth theme, interpersonal relations, was present in ten studies (4, 12, 14, 19, 27, 42, 45, 52, 54, and 56). These studies stated the importance of creating and maintaining communication between teachers and between teachers and students during ERE. This theme also addressed the difficulties faced when shifting form face-to-face to remote classes regarding this perspective. Communication between teachers proved to be beneficial since they were able to share experiences, teach and learn relevant skills, share platforms and learning objects, and provide support for each

other. Furthermore, studies claim that the relationship between teachers and students can be a major driver of the motivation to learn.

One study (4) reported that some teachers increased number of moments of contact with students during ERE, even if this contact was asynchronous. While all reported the importance of teachers stablishing a relationship with students to mitigate the sense of isolation from ERE, some (27 and 45) also stressed the importance of the role of guardians in this aspect. It was also stated that social media communication can be used by teachers to increase socialisation, teaching and learning (42).

The following theme, (vii) health and wellbeing, was mentioned in eight studies (2, 7, 19, 26, 38, 41, 56, and 59). Generally, studies reported that a focus on the wellbeing and health of the stakeholders implicated in a better ERE experience. Mental health is an important topic when discussing ERE and should be taken into consideration when addressing similar situations in the future. Providing learners with an opportunity for socialisation and other initiatives to improve mental health, such as counselling, talking, or adapting the curriculum not to overload learners, can be important to assure a less traumatic ERE experience. Socialisation and health measures such as these were recommended by four studies (2, 7, 19, and 59).

One study reported that there was no significant difference found between ERE and in-person learning for risk of anxiety, depression, or OCD for students (38), while other that teachers reported relatively extreme levels of stress during ERE (59). From the total of seven studies that addressed this topic, four had participants in the United States of America.

Theme viii, grading, was present in four studies (4, 12, 13, and 56), and reported the challenges teachers faced to grade students and utilise tests in an online environment. Since courses relied on presential written tests, ERE proved to be a hinderance in the evaluation process, as students couldn't be monitored in their own houses. Grading was identified as a strong concern by teachers in a study located in Sweden (12), as usually students were graded through national tests. Large-scale standardised tests have become, according to the author, important tools for creating accountability and comparison – nationally and internationally. However, they had to find other ways of obtaining grading material when these evaluation methods were postponed.

The last theme (ix), digital privacy, was only present in the main findings of three studies (17, 52, and 58). Participants reported concerns with their privacy, which turned out to be a great worry in the countries of participants (Afghanistan, Libya, and Palestine). Two issues were raised

by these studies: gender differences in privacy and sharing devices or internet access. Parental concerns, norms, and traditions became relevant factors in student participation, especially in the case of female students, as they were many times prohibited to share pictures, videos, or audios of themselves due to a belief that their personal image should remain private. Furthermore, parents were concerned that by sharing their personal equipment with their children, their personal information would be accessible, and personal conversations and social media posts could be read by the students.

Besides the findings presented above, two studies developed techno pedagogical frameworks to be applied in similar situations in the future: the Emergency remote teaching environment (20) the ALO (*análisis, localización y organización*) (21). One study (28) had as its main result the development of the HBL Teacher Readiness Scale, that can be used to identify the level as well as the stage of teacher readiness to change from face-to-face to ERE and to use as feedback to guide school leaders when giving much-needed support for implementing home-based learning.

2.2. What methodological tendencies exist in current literature regarding the covid-19 emergency remote education aimed at middle and high school?

Figure 4
Methodology of studies

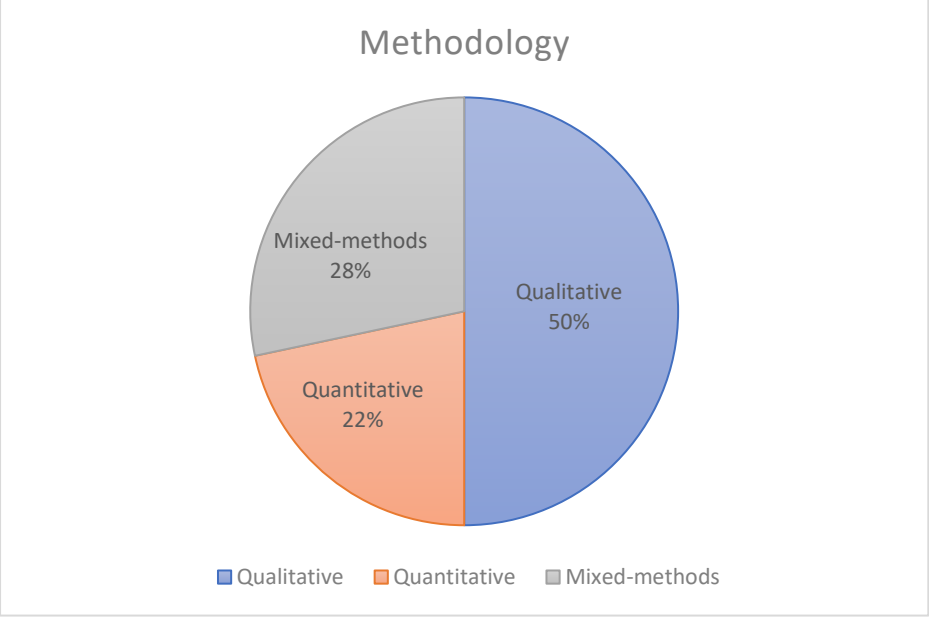
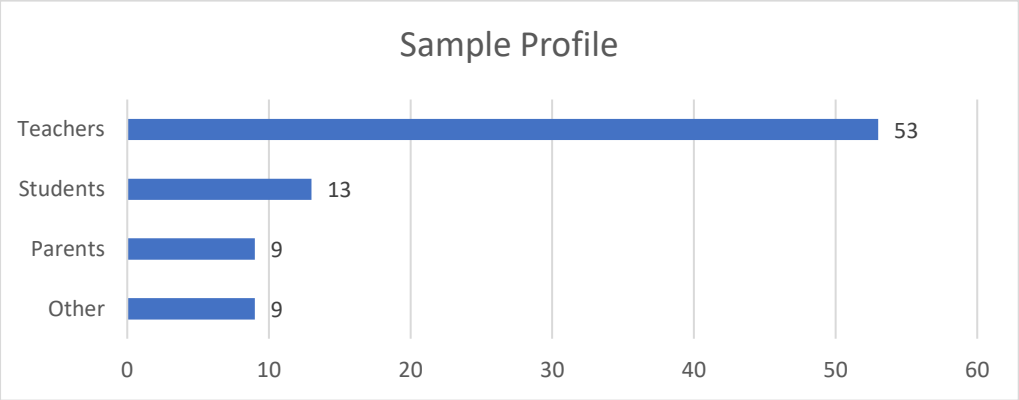


Figure 5

Frequency of participant group in study sample



Studies favoured the qualitative approach (Figure 4) and relied heavily on teachers as participants (Figure 5). Teachers were participants in 88.3% of studies, students in 21.6%, parents in 15% and other professionals related to education in 15%.[3]

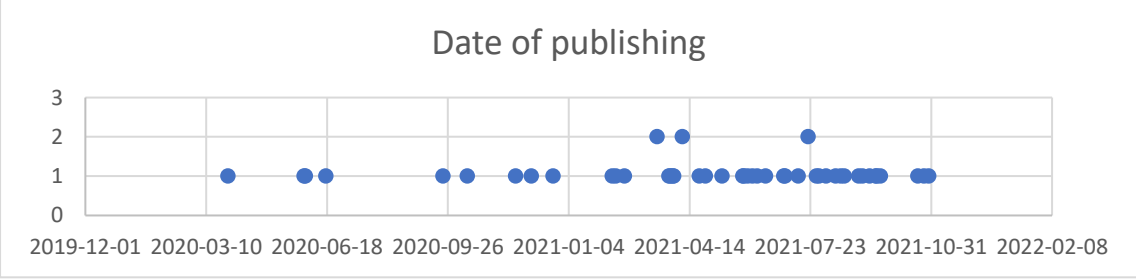
Regarding the samples of participating teachers, the *n* of participants ranged from 2 to 7841 (*Mdn*=94). When analysing only the qualitative studies, *n*=2 and *n*=305 were the smallest and largest sample size respectively (*Mdn*=18).

Regarding the student samples, *n*=5 and *n*=5300 were the smallest and largest sample respectively (*Mdn=59*). When analysing only the qualitative studies, *n*=5 and *n*=88 were the smallest and biggest sample respectively (*Mdn=19*).

The great variation of sample, and with a *standard deviation* larger than the *median*, we must recur to the *interquartile range* to better understand the variation. Overall, qualitative studies had smaller samples in both cases.

Figure 6

Frequency of publication by date



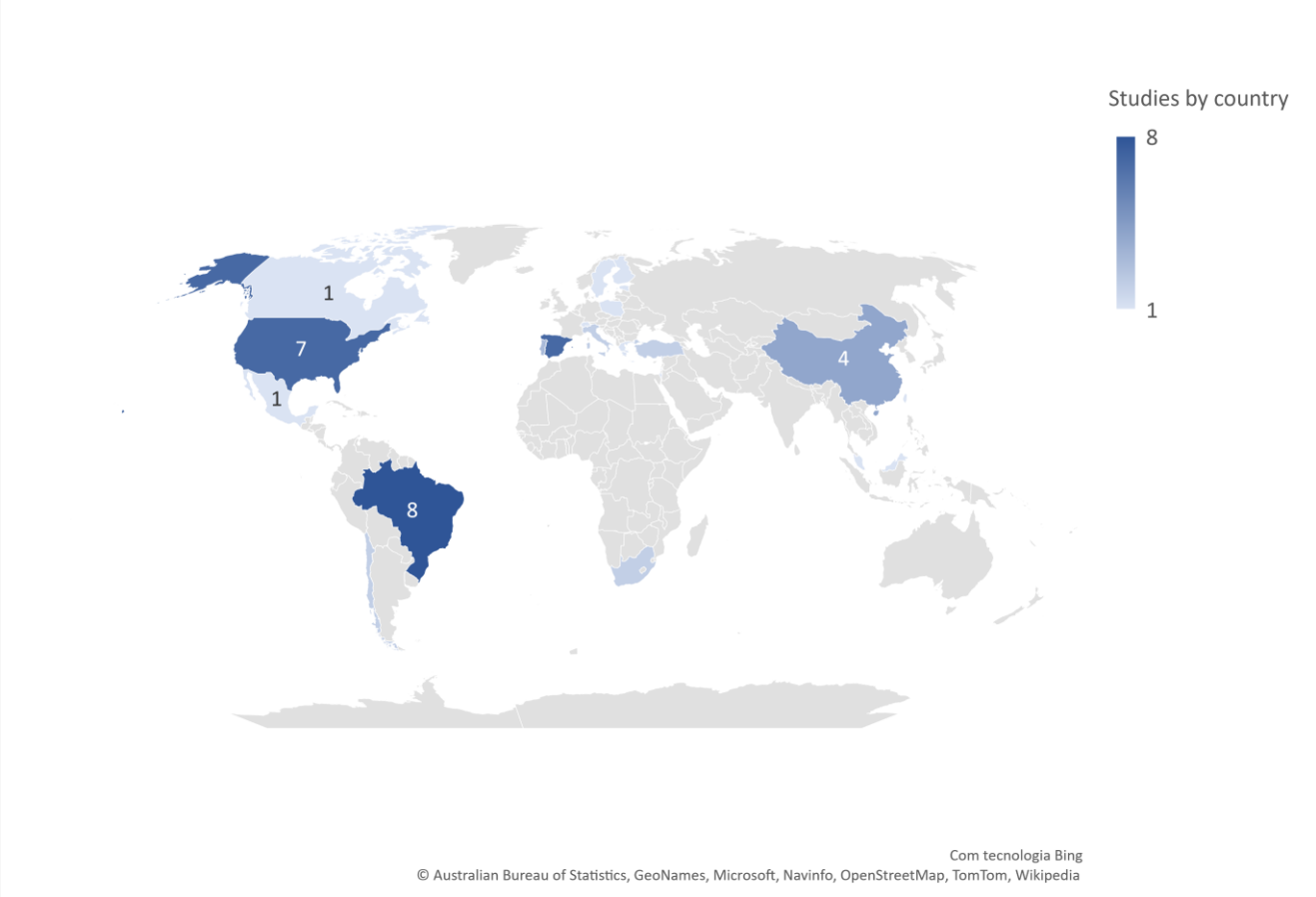
[3] It is important to stress that studies could present more than one group of participants.

Figure 6 represents the date articles were published. As we can see, most studies were published in 2021 (80%), with few being published still in 2020 (20%). Since the articles were collected in the end of 2021, there weren't any articles dating to 2022 in this analysis.

Regarding the language, 80% of the articles were written in English, 17% in Portuguese, and 3% in Spanish. The presence of Portuguese and Spanish can be explained by the frequency of studies by country, as we can see below in Figure 07.

Figure 7

Publication of studies with participants located in one country

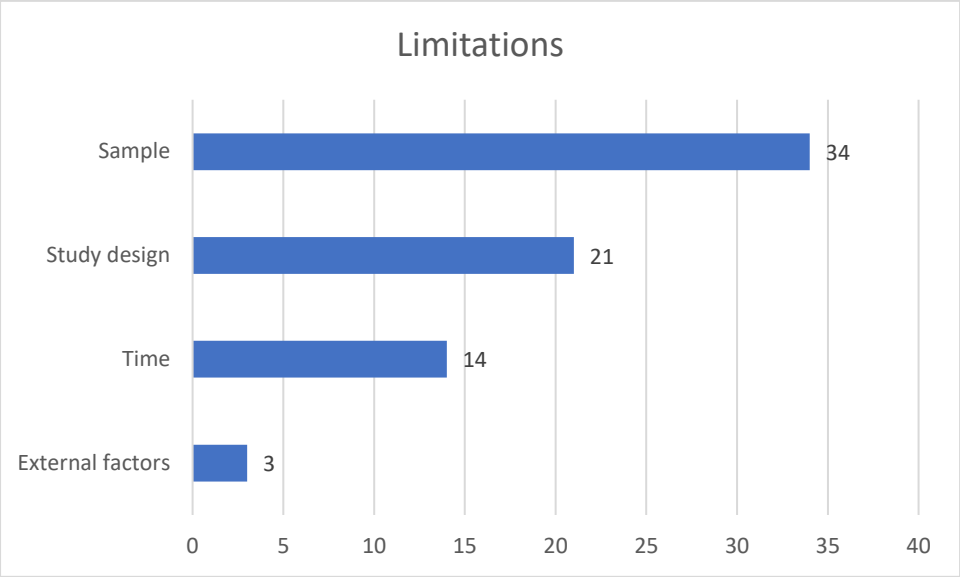


Brazil, Spain, and the United Sates were the top contributors publishing 36.6% of total articles. There were also, seven multicounty studies (14, 19, 50, 52, 54, 58, and 60).

3.3. What are the limitations identified by authors in current literature regarding the covid-19 emergency remote education aimed at middle and high school?

Figure 8

Frequency of limitations by theme



The most common theme in the limitations presented by authors was related to the sample size, variety, and sampling method (1, 3, 5, 8, 9, 10, 13, 17, 18, 19, 20, 27, 28, 30, 31, 32, 33, 37, 38, 39, 40, 42, 43, 44, 45, 47, 48, 49, 50, 51, 54, 57, 59, and 60). The most common sampling method was snowball sampling, and the most common sample was convenience sample (9, 10, 18, 27, 28, 30, 32, 33, 39, 40, 42, 43, 47, 50, 51, 54, and 57). Authors stated that samples weren't sufficient to be generalisable due to size or variety. However, the recurrent themes in findings and recommendations for practice may question these statements. Nevertheless, future studies should try to utilise different sampling procedures and more generalisable samples.

Study design was considered a limitation in 21 studies (2, 5, 8, 14, 15, 17, 19, 25, 30, 33, 36, 39, 40, 43, 45, 48, 49, 50, 55, 59, and 60). Qualitative studies recommended a follow up study utilising the quantitative approach to verify the information obtained, as quantitative studies could be biased (8, 15, 33, and 43). One study stated that the quantitative methodology "cannot yield the nuance or contextualised detail in the way qualitative research might" (59). Finally, the case study design's generalisation was questioned by two articles (5 and 14). One study conveyed that the

self-report methodology is a limitation and future studies should be supplemented with observation of classrooms (25).

Time was a limitation for 14 studies (2, 8, 9, 18, 19, 20, 25, 32, 40, 47, 49, 54, 55, and 59), and this limitation related to the short time frame researchers had to publish content and still be applicable to undergoing pandemic. Still on this matter, three studies recommended that future studies should consider a longitudinal approach (9, 25, and 54). External factors such as political issues and stress due to the pandemic were considered limitations by three authors (10, 38, and 48).

2.3 DISCUSSION

The objective of the study described in chapter two was to identify the main findings, methodologies, and limitations of current studies regarding ERE. Articles published in journals were collected from Scopus and Web of Science and, after going through an initial abstract screening, and later a full analysis of the retrieved articles, sixty studies were selected and analysed.

First, it was possible to identify that the articles analysed heavily favoured teachers as participants, as they were present in 88.3% of studies. Students, on the other hand, were only present in 21.6% of studies, which may have led to a participation bias. This bias may have influenced the frequency of main findings in the scoping review and justify the quantity of studies that presented the theme *Teaching and abilities*. This participation bias could be justified by the great number of studies that identified "Time" as a limitation in their studies. With the intention of contributing to the understanding of ERE as fast as possible, studies may have found themselves utilizing the more handily available participants: their peers.

Regarding the main findings of studies, it was identified nine recurrent themes in the articles analysed: digital privacy, grading, health and wellbeing, interpersonal relations, parental support, student engagement, institutional support, cultural or socioeconomic circumstances, and teaching and abilities. Most of the findings of the studies analysed have already been discussed before the pandemic (Ghavifekr et al., 2016; Moral-García et al., 2020; Muñoz & Guskey, 2015; Opić, 2016; Pérez & Rodríguez, 2011; Stahl & Karger, 2016; Trowler, 2010; Weist et al., 2012; Williams et al., 2000), indicating that the issues reported by participants always existed, even if in a different scale.

In contrast, the equity theme presented relevant inputs that should be addressed in this discussion. The digital divide is not something new (Jenkins, 2009), and it existed before the COVID-19 pandemic (Ritzhaupt & Hohlfeld, 2022), however, ERE exposed and widened this

divide, creating two kinds of experiences: one that almost kept up with face-to-face classes for those with relevant equipment and reliable internet connection, and another of major academic losses for those without access to relevant equipment and connection (de Almeida et al., 2021). There were measures that tried to mitigate these disparities, and countries that presented larger initiatives to address the digital divide, providing students with access to online classes and academic content, were all highly classified in the Human Development Index Scale (HDIS) according to the United Nations Development Programme (Nations, 2020), being placed at the 17th (United States), 25th (Spain), 29th (Italy), 42nd (Bahrain), and 52nd (Russia) position out of 189 measured countries.

However, countries which did not present larger scale initiatives such as the ones mentioned above, but smaller efforts that were enabled by local communities or individuals (Khlaif, Salha, Affouneh, et al., 2021; Padilla Rodríguez et al., 2021) scored lower in the HDIS. Among these studies, any mention of students receiving computers or tablets were rare. Studies that presented these initiatives had participants from Afghanistan (169th in the HDIS), Libya (105th in the HDIS), Palestine (115th in the HDIS), and Mexico (74th in the HDIS). Despite Mexico scoring higher in the HDI scale, the study was conduct in a lower socioeconomic rural area, which dealt with severe digital divide during the ERE. This information may lead us to believe that initiatives to bridge the digital divide were least present in the countries that needed them the most.

In cases where access was problematic, and responsible institutions did not offer adequate support, teachers had to improvise solutions to make sure that ERE would be possible, such as printing and handing out academic content to students, or even teaching through WhatsApp (Padilla Rodríguez et al., 2021). Even though the use of social media and messaging apps in education is not new (Rosenberg & Asterhan, 2018; Zachos et al., 2018), the role these platforms occupied was different when compared to before the pandemic. While before they were primarily used as information channels, during the ERE they were being used as teaching environments, despite its limitations when compared with other educational solutions such as Zoom or Google Classroom.

Portugal also faced challenges regarding access, and initiatives such as *Estudo em casa* were attempts to increase the reach of ERE and reduce the number of students without access. Reports regarding access and digital literacy in Portugal varied greatly through time, indicating an inconsistency in educational measures aimed at providing equipment and training. For instance, the Country Profile of the European SchoolNet report in 2012 identified that students in Portuguese

schools enjoyed an above average access to equipment and internet when compared to other European countries. Also, it was stated that teachers had relatively high levels of ICT training. However, more up-to-date information provided by the Organisation for Economic Co-operation and Development (Development, 2019) depicts a different scenario, placing Portugal below the OECD average in percentage of teachers who have received training in formal education for teaching with ICT, felt well or very well prepared to use ICT for teaching, and received training in recent professional development. More current information reveals that in 2020, 84.1% of Portuguese households possessed a computer with access to broadband internet (PORDATA, 2021), which was relevant during the ERE, and implies that 15,9% of the population could not be fully integrated in online activities during the lockdown. These number are in line with a recent study (Moreira, 2021) that identified 85.1% of students had access to a computer at home, and most relied on smartphones (93.1%).

Nevertheless, access to equipment and reliable connection were not a synonym of a successful implementation of ERE, as in some cases, the online platforms and software were not being used to its full potential. Lack of knowledge about ERE may have led teachers to try and replicate face-to-face teaching strategies in online lessons (Baran & Baran, 2021). Previous relevant literature that could potentially improve the ERE experience, such as an ecological framework aimed at bridging school and home contexts by involving parents and students in digital media-based assignments were ignored (Paiva et al., 2017), and no grave changes in curriculum that could characterize an emergency context or an exception period were observed. What was observed were attempts at preserving the pedagogical approach of face-to-face education in ERE, perhaps in an attempt to retain some sense of normality in the trailing times faced. Bartolic et al. (2022) identified that technology both enabled an immediate respond, but limited responses due to time constraints. Therefore, ERE was developed focusing on technology content, instead of focusing, or at least also considering in equal measure, the academic content.

Nevertheless, this scoping review highlights the fact that the educational system was surprised by the COVID-19 pandemic and had adapt into an ERE with limited time and resources. The studies analysed focused on the experience of the teachers, and despite previous relevant evidence on education (including e-learning, emergency and distance education), our results indicate that face-to-face techniques were utilized in online classes, which was perceived as unsatisfactory by students and teacher, and that the digital divide became more evident during the

ERE. In this context, identifying the social representations of different social groups regarding this education modality is important to better comprehend the events that took place and propose educational policies that would lead to a more effective ERE in the future.

3. SOCIAL REPRESENTATIONS IN TWITTER

This chapter presents a study that aims to identify the social representations of ERE in circulation through analyses of messages posted in the social network Twitter between 2019 and 2021. The first part of this chapter presents the research questions, the second part the methods, the third part the results, and the fourth part the discussion of the results.

3.1 RESEARCH QUESTION

The research question that guided this study was:

What are the social representations of the Portuguese ERE in circulation in the social network Twitter?

3.2 METHODS

Context

Twitter is a social network, and it was chosen as a platform for the study due to the fact that the majority of messages posted are public, which makes their collection through automatic processes simplified and the results obtained more transversal than other social networks such as Facebook. Also, Twitter is considered a public dissemination platform, and the presence of politicians, journalists, and political activists attests to this statement (Smyrnaios & Ratinaud, 2014).

Procedures

The researchers collected tweets, which are posts on the social media Twitter containing up to 280 characters, associated with the word *ensino* (teaching) shared between 01/01/2019 and 31/12/2022, due to the fact that this period comprehends moments before, during, and after ERE. Initial tests presented a great number of tweets from other Portuguese speaking countries, identified by differences in the Portuguese language and local references, so it was necessary to limit the search to posts in Portuguese and localized in Portugal. The word *ensino* was chosen because in Portuguese it is associated with formal education, as the word education (*educação*) could be

associated with formal and informal education and increase the amount of Tweets that were not relevant for this study.

The tool utilized to collect the tweets was a Python (Foundation, 2021) program developed by the authors (Appendix 2) which utilized the Tweepy library (Roesslein, 2022). The output of this program was a JSON file, which was treated (Appendix 3) and converted (Appendix 4) by two other Python programs developed by the authors. The treatment consisted of removing hyperlinks and emoticons, as they either weren't recognized by the analysis software or interfered in the analysis. The conversion consisted into transforming the JSON into a TXT which is compatible with the statistical analysis software. Also, during the conversion, relevant information (*e.g.* date, Twitter metrics, etc) were automatically inserted into the TXT in a manner that it could be recognized in the data analysis. The aim of this process was to automate the collection, treatment, and conversion of the corpus in order to minimize human interference and allow for large amounts of data to be analysed.

After an initial analysis, preliminary results indicated that there a few sources of tweets, that published the same patterns of advertisement repeatedly, were interfering in the results of the analysis and should be removed. These tweets were excluded by utilizing a filter that identified unique words in these messages and ignoring them. After excluding these sources, the total number of tweets that remained was 3245.

Corpus

The corpus obtained was divided into seven different time periods (Table 3) in order to enable the comparison between stages of the pandemic and to identify the evolution of the social representations. This division followed important marks of the pandemic (WHO, 2022) and the official Portuguese parliament declarations and reports regarding the implementation and extension of both states of emergency (Parlamento Português, 2020).

Table 3

Corpus division

Corpus	*Number of Tweets*	*Starting date*	*Ending date*
Complete corpus	3245	01/01/2019	31/12/2021
The year before Covid-19 (2019)	1088	01/01/2019	31/12/2019
First contact with Covid-19	306	01/01/2020	18/03/2020
First state of emergency	291	19/03/2020	02/05/2020
Between states of emergency	624	03/05/2020	08/11/2020
Second state of emergency	482	09/11/2020	30/04/2021
Returning to normality	442	01/05/2021	31/12/2021

Complete corpus – All the tweets collected are present in this subcorpus that aims to identify the most relevant social representations in circulation in Twitter between 2019 and 2021

The year before Covid-19 (2019) – Period used as a reference to identify the social representations in circulation before COVID-19 was introduced.

First contact with Covid-19 - Period that comprehends the initial discussions until the first state of emergency.

First state of emergency - Period when the first lockdown happened, and the Portuguese population was forced to remain isolated at home. People were only allowed to leave their houses if they were an essential worker or to acquire basic necessity items. This is the first moment when ERE occurred (Reis, 2020; Tomé, 2020b).

Between states of emergency - Period when restrictions were partially lifted, and a state of calamity was instated, replacing the state of emergency. Some schools and universities opted for hybrid solutions where others opted to continue with remote education (Tomé, 2020a).

Second state of emergency: According to politicians, the high number of COVID-19 cases required that another state of emergency was instated, and restrictions were once again imposed (Botelho, 2020). Education relied once again on Emergency Remote Education.

Returning to normality – Period following the second state of emergency that comprehends the moment when restrictions were lifted, and traditional education was gradually instituted (Agência Lusa 2021).

Data analysis

This final corpus was analysed with Descending Hierarchical analysis and specificities and correspondence factor analysis in Iramuteq (Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires) (Marchand & Ratinaud, 2012).

Specificities and correspondence factor analysis

This analysis was utilized with the intention of associating texts with variables, which in this case were the different time periods. This allows us to visually explore data and compare the evolution of the discussion in Twitter (Camargo & Justo, 2013).

Descending Hierarchical analysis (DHA)

The DHA clusters Tweets into classes according to their vocabularies and distributes them according to the frequency of reduced forms. This analysis provides another way of exploring the data and identify social representations in a determined period (Camargo & Justo, 2013). The only adjustment made to the predefined parameters of the analysis were to the number of terminal classes in phase 1, in order to obtain a percentage of texts classified higher than 75%, as this value is considered the minimum to assure a reliable analysis (Camargo & Justo, 2013). The values utilized in each subcorpora are displayed in Table 4.

Table 4

DHA analysis parameters

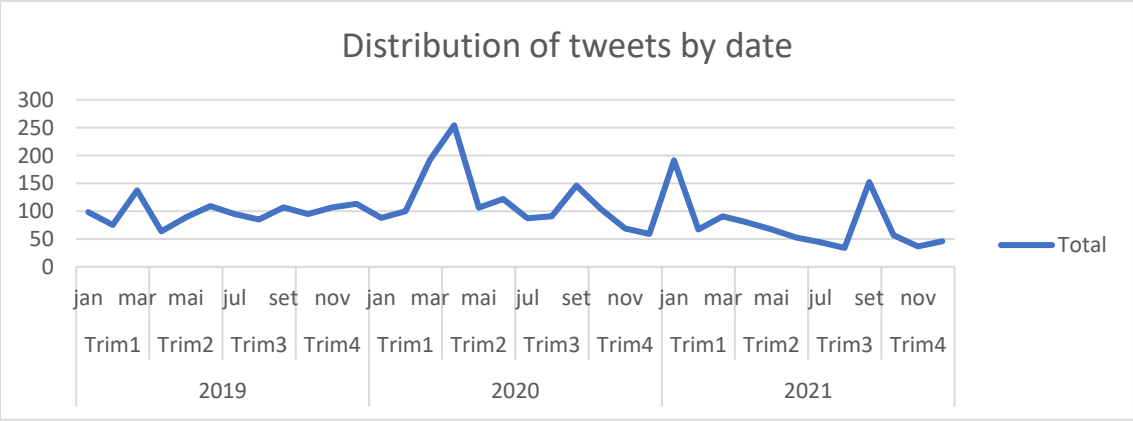
Corpus	*Number of Tweets*	*Number of terminal classes in phase one of the DHA*
Complete corpus	3245	14
The year before Covid-19 (2019)	1088	11
First contact with Covid-19	306	10
First state of emergency	291	10
Between states of emergency	624	10
Second state of emergency	482	9
Returning to normality	442	10

3.3 RESULTS

Analysing the frequency of tweets throughout the complete corpus, it is possible to identify an increase in messages during four different moments. The two highest peaks displayed in Figure 9 correspond to the two states of emergency. The increase in messages between the months of March and May in 2020 are associated with the first state of emergency, and the increase in tweets between December 2020 and February 2021 are associated with the second state of emergency.

Figure 9

Distribution of tweets by date



Complete corpus

DHA

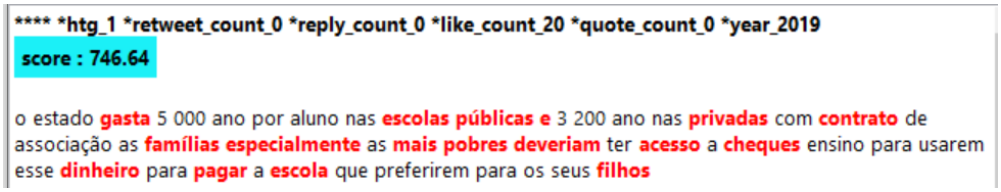
This analysis organises tweets into clusters according to their vocabularies and distributes them according to reduced form frequencies, identifying the most important discussions present in *Complete corpus* (Camargo & Justo, 2013). In Figure 14, we can identify four different classes revealed by the analysis, the percentage of the complete corpus they represent, and their most frequent relevant words. The relation between clusters is displayed in the dendrogram in Figure 14, and it is possible to identify that Classes 1 and 2 present more similarities between each other than with the rest of the clusters. Nevertheless, the discourse in class 4 is more distant than the remainder of tweets analysed.

The first class ("classe 1", in red) has as its central theme "Public and Private education" and represents 21.8% of the tweets in this subcorpus. The high frequency of words such as "privado" (private, in the context of private colleges and universities) "público" (public, in the context of public colleges and universities), "pagar" (pay), and "propina" (tuition) indicate that this is the focus of this discussion. Furthermore, a close inspection of each individual tweet in this group confirms that this is indeed the central theme of these messages. This process of identifying relevant words isolated, and then in the context of the tweets of the class was repeated for each analysis in this study. Figure 10 displays one of the most relevant tweets, according to the analysis, that represents this theme. It can be translated[4] as: "The state spends 5.000 (euros) a year per student in public schools, and 3.200 a year per student in private schools with association contracts. Families, especially the ones with low income, should have access to financial education aid to be able to pay for the school they choose for their children". An example of tweet meeting the criteria of relevance according to the analysis and depicting discussions, will be presents for each analysis in each theme.

[4] A interpretative translation was conducted with the tweets in this chapter to facilitate comprehension.

Figure 10

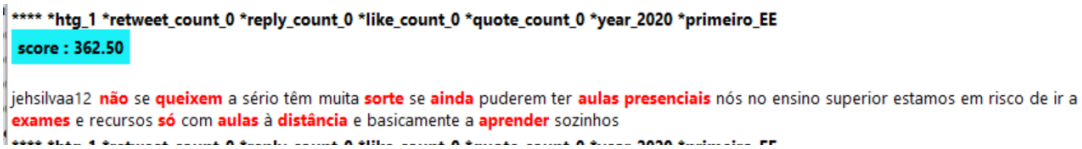
Typical tweet of Class 1 of the DHA of Complete corpus



Class 2 (“classe 2”, in green, 43.2%) discusses ERE as a whole, and it is possible to identify words such as “exame” (test), “distância” (distance), “aula” (class), and “método” (method). The words present in this class correspond to the representations of the whole period, and not a specific moment. Figure 11 displays the typical tweet in this class: “Do not complain. You are very lucky if you can still have face-to-face classes. We, higher education students, are facing the risk of taking tests relying only on distance classes. Basically, learning by ourselves”.

Figure 11

Typical tweet of Class 2 of the DHA of Complete corpus



Class 3 (“classe 3”, in blue, 19.2%) focuses on nostalgia, and presents a playful tone, when compared to the others. The words “médio” (from “ensino médio”, or high school) and “fundamental” (“ensino fundamental”, elementary and middle school) and are used alongside with “saudade” (missing years that have passed, nostalgia), and the words that consist only of “k”s, represent laughter. Figure 12 displays the typical tweet of this class: “Remembering moments from my high school. Oh god, how I miss it”.

Figure 12

Typical tweet of Class 3 of the DHA of Complete corpus

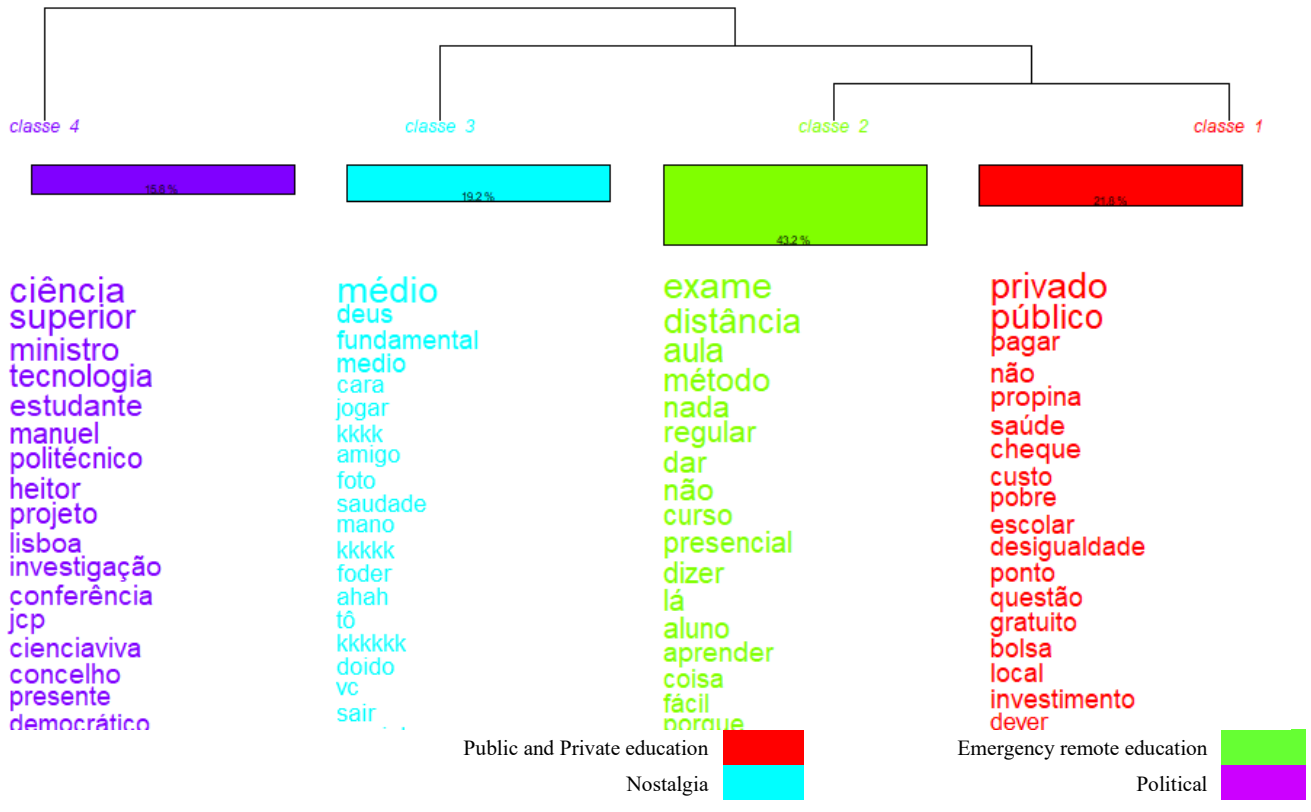
Class 4 (“classe 4”, in purple, 15.8%) is composed of tweets that present educational measures of the government, and overall political discussions. A typical tweet can be seen in Figure 13, and reads: “Altran Portugal receives in Porto the general director of the European Commission, Khalil Rouhana, and the minister of Science and Technology and Higher education, Manuel Heitor. The objective was to present projects in the automotive area that the group develops in Portugal”.

Figure 13

Typical tweet of Class 4 of the DHA of Complete corpus

Figure 14

Dendrogram of the DHA of Complete corpus



Note: Labels added by the author

Specificities and correspondence factor analysis

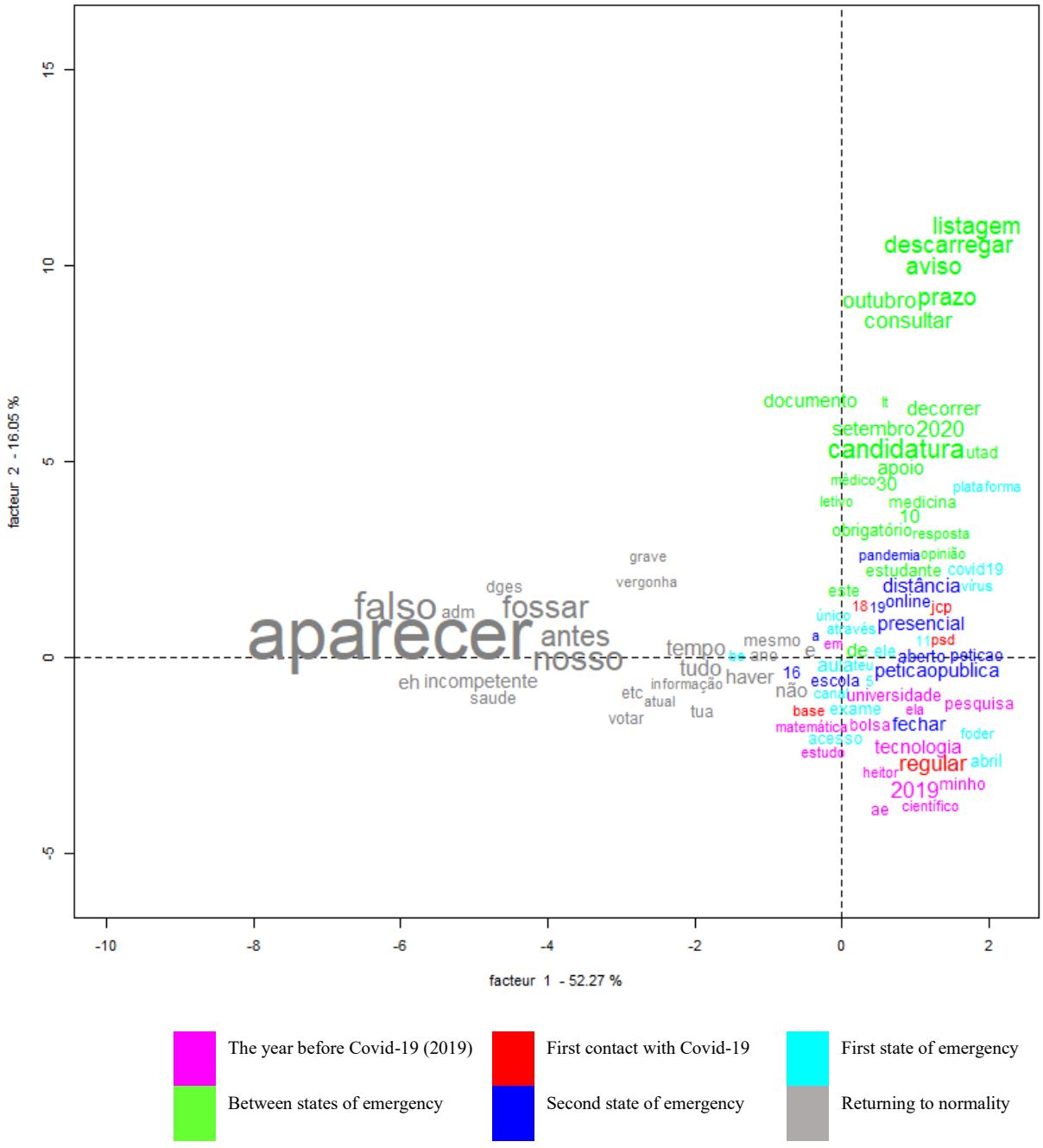
Figure 15 represents the specificities and correspondence factor analysis of the complete corpus. In this analysis, it is possible to associate text with illustrative variables, which in this study are the different time periods mentioned above (Camargo & Justo, 2013).

The discourses present in *The year before Covid-19* (in pink), *First contact with Covid-19 (red), First state of emergency* (light blue), and *Second state of emergency* (dark blue) are more closely displayed in the graph, indicating more similarities between them than with the rest. However, each period possesses a unique central theme. For *The year before Covid-19*, it is possible to identify a more politically inclined discourse, due to the presence of words such as Heitor (name of the minister of Science and Technology), technology (due to the name of the ministry of Science and Technology), scholarship, and university. In *First contact with Covid-19* the discussion was focused on the differences between regular and professional education, as the words regular (education) and *JCP* (Portuguese Communist Youth) can be identified. *First state of emergency* presented as its central theme uncertainties in ERE, and it is possible to identify that through the words classes, platform, exam, and access. Finally, *Second state of emergency* presents a discussion oriented towards criticism of the government and governmental measurers, as the words distance, online, public petition can be identified.

The period *Between states of emergency* (green), is more distant and focuses on access to higher education, presenting words such as deadline, documents, and apply. The final cluster, *Returning to normality* (grey), is more critical and is composed of negative words that criticise governmental measures (*e.g.* incompetent, grave, and shame).

Figure 15

Specificities and correspondence factor analysis of Complete corpus



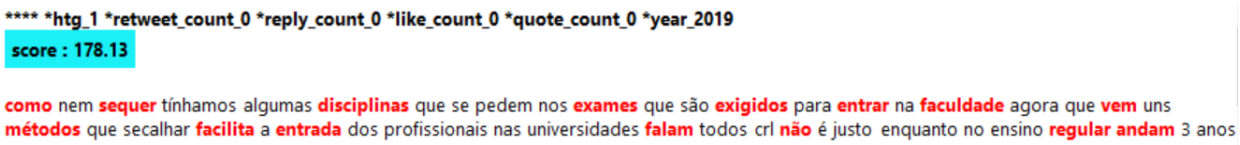
Note: Labels added by the author

The year before Covid-19

This period consists of tweets collected in 2019, before COVID-19 was actively being discussed in Portugal and presents similarities with *Complete corpus,* as it is also possible to identify four different classes (Figure 20). The first class (red, 43.6%) presents a discussion comparing regular education and professional education. The typical tweet of this class can be seen in Figure 16, and reads: “We did not even have (in professional education) some of the disciplines required in the test to get into college. Now, that some processes that may facilitate the entry of professional education students in universities, they say it is not fair, while in regular education they study these disciplines for three years”.

Figure 16

Typical tweet of Class 1 of the DHA of The year before Covid-19



The second class’s discussion (green, 13.8%) is focused on nostalgia, and in this cluster, it is possible to identify a more playful tone and a variation of the Portuguese language and local references that could be associated with Brazilian users, despite limiting the retrieval of Tweets by results where the country code associated with “PT” (Portugal). The second and first classes are the most closely related in this period. A tweet that represents this class can be seen in Figure 17, and translates to: “This makes me miss high school. I only studied crazy parasites, how I miss them”.

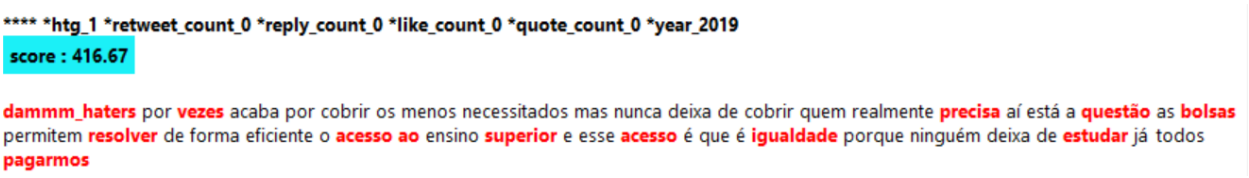
Figure 17

Typical tweet of Class 2 of the DHA of The year before Covid-19

The third class (light blue, 32.4%) presents discussions regarding access to higher education. Figure 18 displays a typical tweet in this class: “Sometimes it helps those less in need, but it always helps those who really need it. This is the main point about scholarships, they allow to resolve in an efficient way issues regarding access to higher education. This is the egalitarian access because no one is left behind and everyone pays for it”.

Figure 18

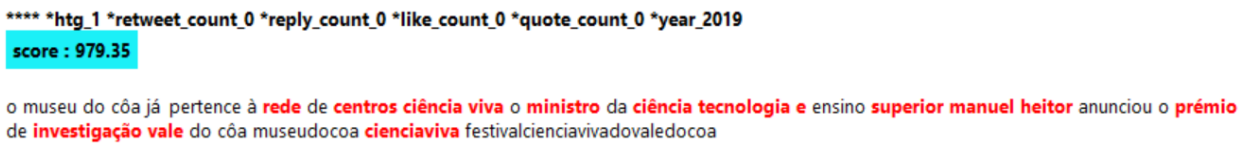
Typical tweet of Class 3 of the DHA of The year before Covid-19



Finally, the fourth class (purple, 10.3%) addresses a political discussion, which presents promotional information regarding governmental measures and overall political conversations. Figure 19 displays a tweet that is both relevant in the analysis and representative of the central theme and reads: “The museum of CÔA already belongs to the network of Living Science Centres. Cheers! The minister of Science and Technology and Higher education, Manuel Heitor, announced the Award of Research of the CÔA Valley”.

Figure 19

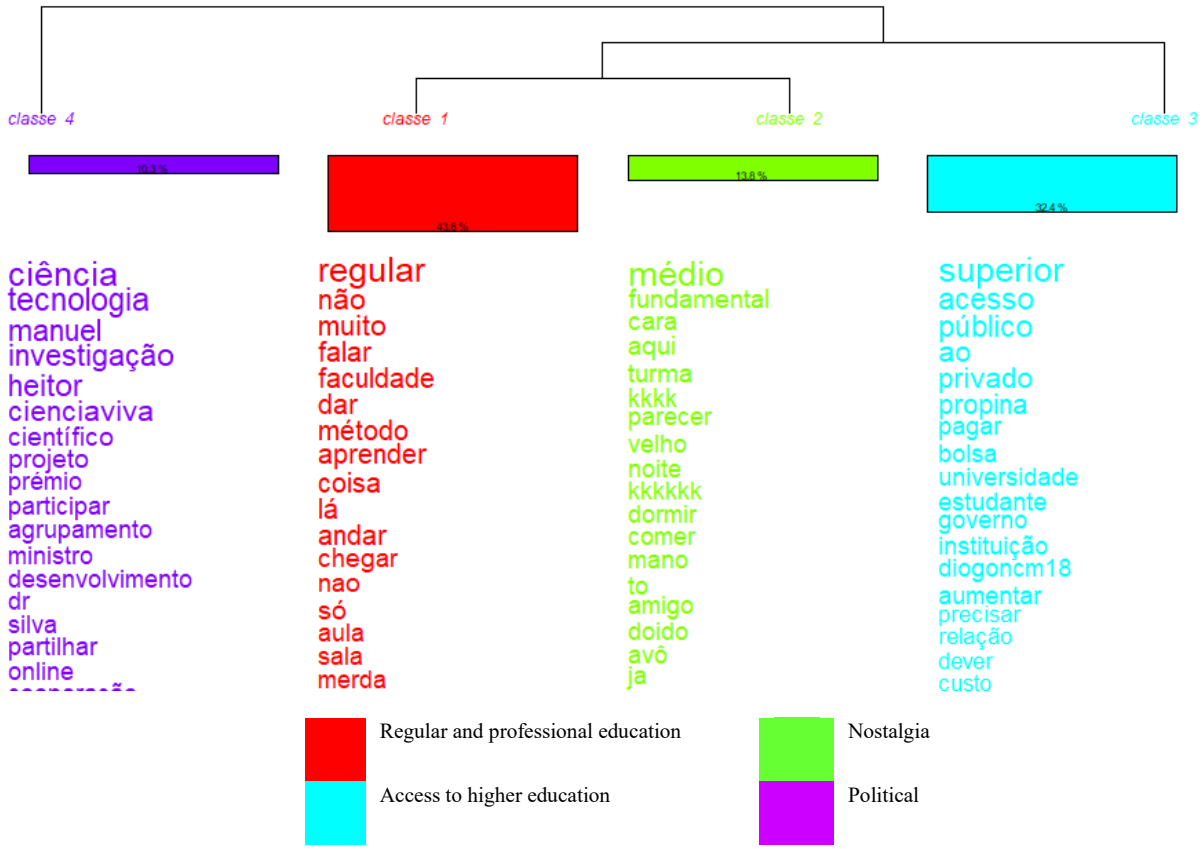
Typical tweet of Class 4 of the DHA of The year before Covid-19



This study will only present the factorial correspondence analysis of the DHA for the two states of emergency, as they revealed relevant information to the analysis, therefore, it will not be addressed in this period.

Figure 20

Dendrogram of the DHA of The year before COVID-19



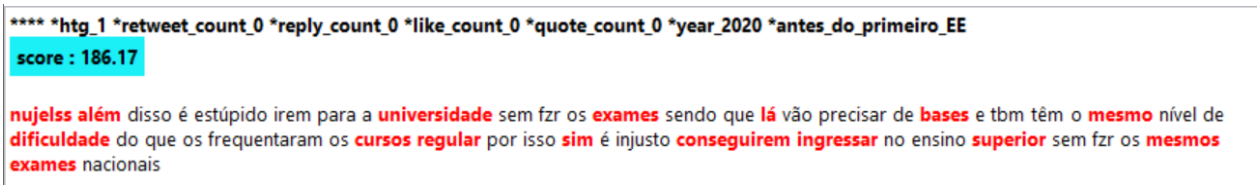
Note: Labels added by the author

First contact with Covid-19

Class 1 presents tweets that discuss differences in access to higher education between students of traditional and professional education, as it is possible to identify in the tweet displayed in Figure 21: “Besides, it is stupid for them to go to university without taking exams, since they are going to need the knowledge (acquired in regular education). Also, they will have the same level of difficulty as those that frequented regular education courses. So yes, it is unfair that they (professional education students) can be approved to enter higher education without taking the same national exams”.

Figure 21

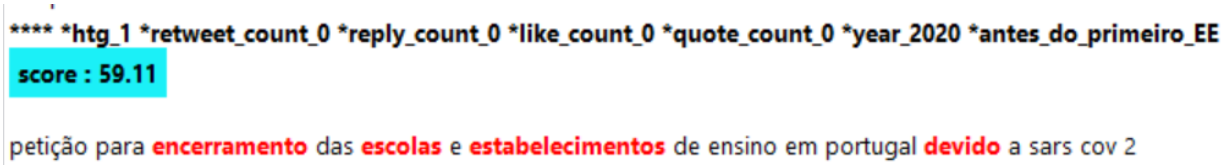
Typical tweet of Class 1 of the DHA of First contact with Covid-19



Class 2 addresses the discussions regarding the closure of schools due to COVID-19, as users were mostly supportive of closures and afraid of the pandemic. Figure 22 presents a typical tweet in this cluster: "(Sign this) Petition to close schools and teaching establishments in Portugal due to the Sars-Cov-2 (virus)".

Figure 22

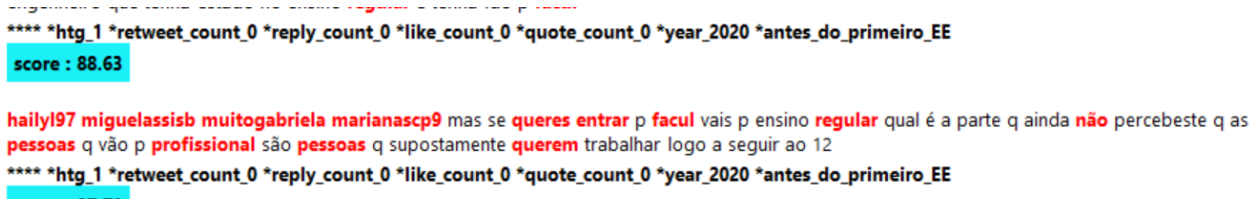
Typical tweet of Class 2 of the DHA of First contact with Covid-19



Class 3 is closely related to Class 1 and focuses on the comparison between traditional and professional education. Though there are some mentions of access to higher education, the discussion focuses on the different capacities developed in each modality of education and their applications, as it is possible to identify in Figure 23: "But if you want to enter a college, go to regular education. Which part of "people that go to professional education are the ones that supposedly want to work at 12(th grade)" did you not get?"

Figure 23

Typical tweet of Class 3 of the DHA of First contact with Covid-19



Finally, class 4 is focused on overall access to higher education and is more similar to class 2. In this class, access revolves around the costs associated with Higher Education, such as tuitions, as is presented in Figure 24: “Yes people, we want everyone in a free higher education, but this is not going to happen instantly. It is going to be a long process, very long. So yes, 200 euros less of tuition is something that I celebrate.”

Figure 24

Typical tweet of Class 4 of the DHA of First contact with Covid-19

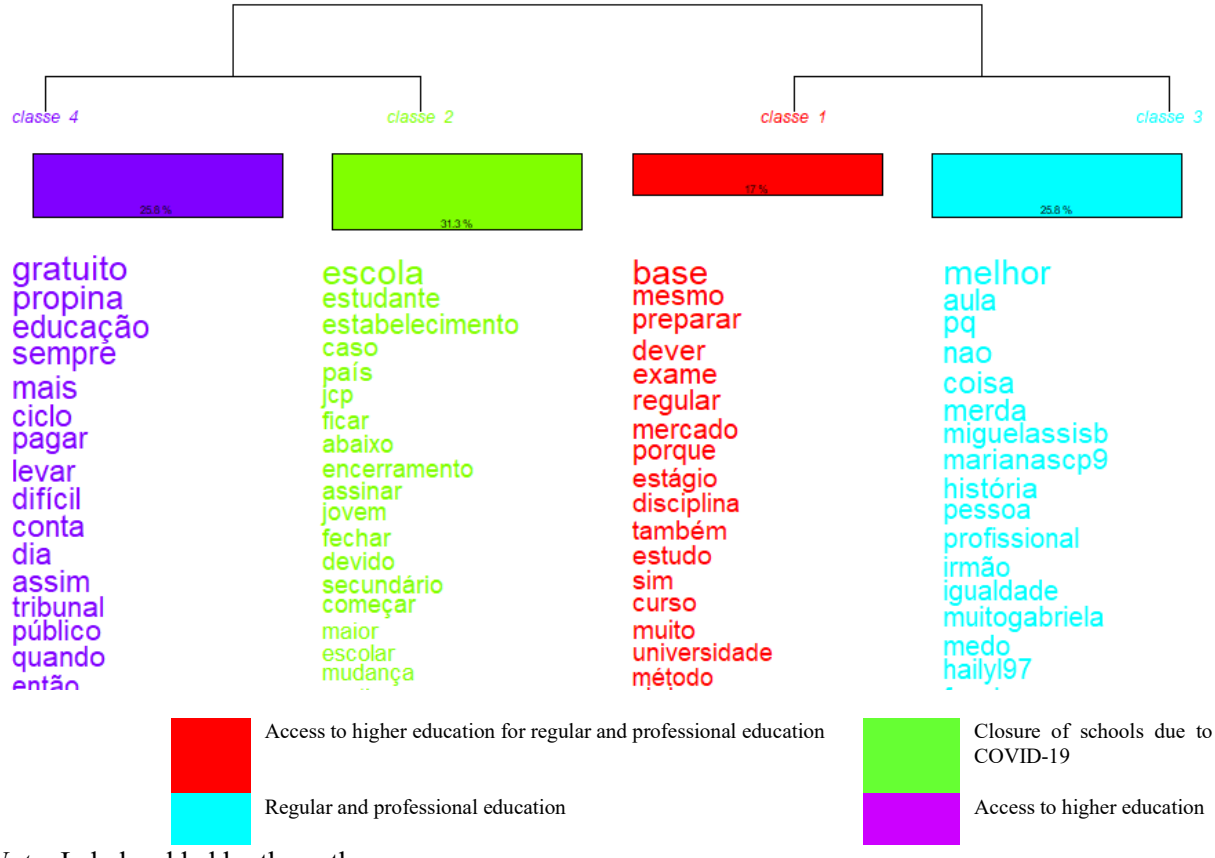
sim pessoal queremos todos um ensino superior **gratuito** mas isso não vai acontecer da noite para o **dia** vai ser um processo longo **e** ponham longo nisso ent sim 200 euros a **menos** de **propinas** é algo que eu celebro

****** *htg_1 *retweet_count_0 *reply_count_0 *like_count_0 *quote_count_0 *year_2020 *antes_do_primeiro_EE**

score : 52.18

Figure 25

Dendrogram of the DHA of First contact with COVID-19



Note: Labels added by the author

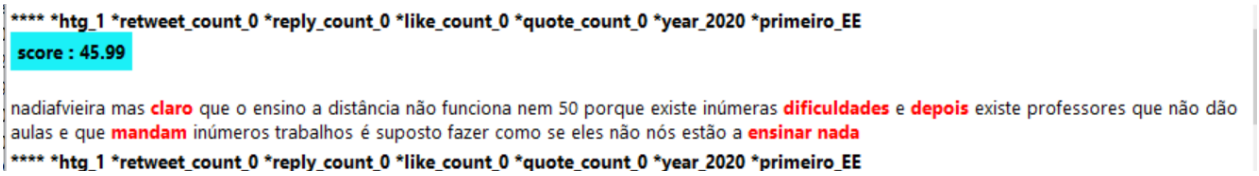
First state of emergency

During the first state of emergency, the corpus is grouped into three classes instead of the usual four, suggesting that the discussion narrowed into fewer topics. Recurring topics have given place to discussions regarding ERE: two out of the three clusters debate ERE. Classes 2, in green, and 3, in blue, discuss different aspects of this modality of education, and, as it is possible to identify in Figure 29, they are the most closely related of the three.

Class 2 (31.6%) is mostly composed of criticisms aimed at ERE and how it was implemented, as it is possible to identify in Figure 26: "Of course distance education does not work even 50% (when compared to face-to-face education). Because there are countless challenges. Also, there are teachers that do not teach and give us lots of homework to turn in. It is like they are not teaching us at all". Despite an overall pessimistic approach, it is possible to identify tweets that recognise the efforts of the people involved with ERE.

Figure 26

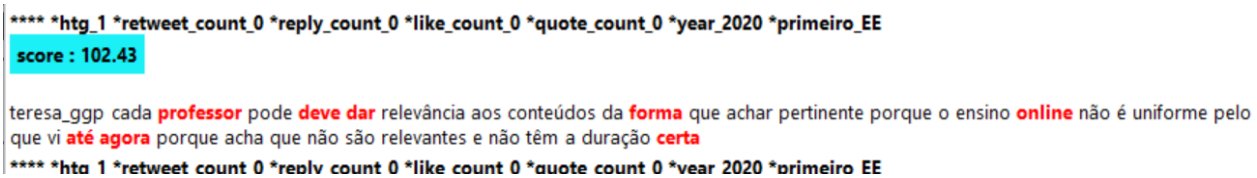
Typical tweet of Class 2 of the DHA of First state of emergency



Class 3 (33.2%) focuses on tweets discussing the measures of ERE. In this class, adaptation of content, evaluation, and support are discussed. Even if some of the messages are permeated by criticism, tweets in this cluster tend to use less aggressive language, to criticise in a more constructive manner, and to recognise the efforts of teacher and educational professionals more frequently when compared to Class 2, as it is possible to identify in Figure 27: "Each teacher can give the relevance of (academic) content as they may see fit, because, according to what I have seen until now, online education is not uniform. Why do you think they are not relevant and do not have a stipulated duration?".

Figure 27

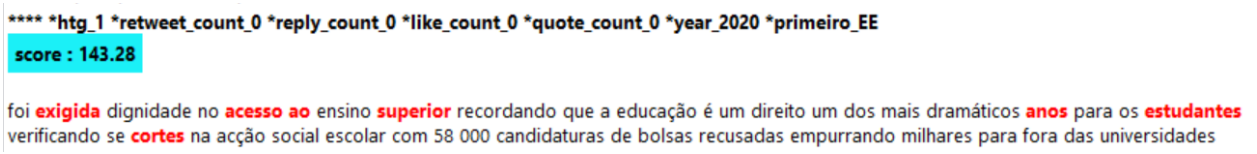
Typical tweet of Class 3 of the DHA of First state of emergency



Finally, Class 1 (red, 33.2%) addresses access to higher education. This topic was present in different periods analysed, indicating its relevance to the users, and is displayed in the typical tweet of this class in Figure 28: "Dignity in the access to higher education was required. Remember that education is a right. (It was) One of the most dramatic years for students. Verifying if there were cuts in educational social actions, with 58000 scholarships being turned down, pushing thousands out of universities".

Figure 28

Typical tweet of Class 1 of the DHA of First state of emergency

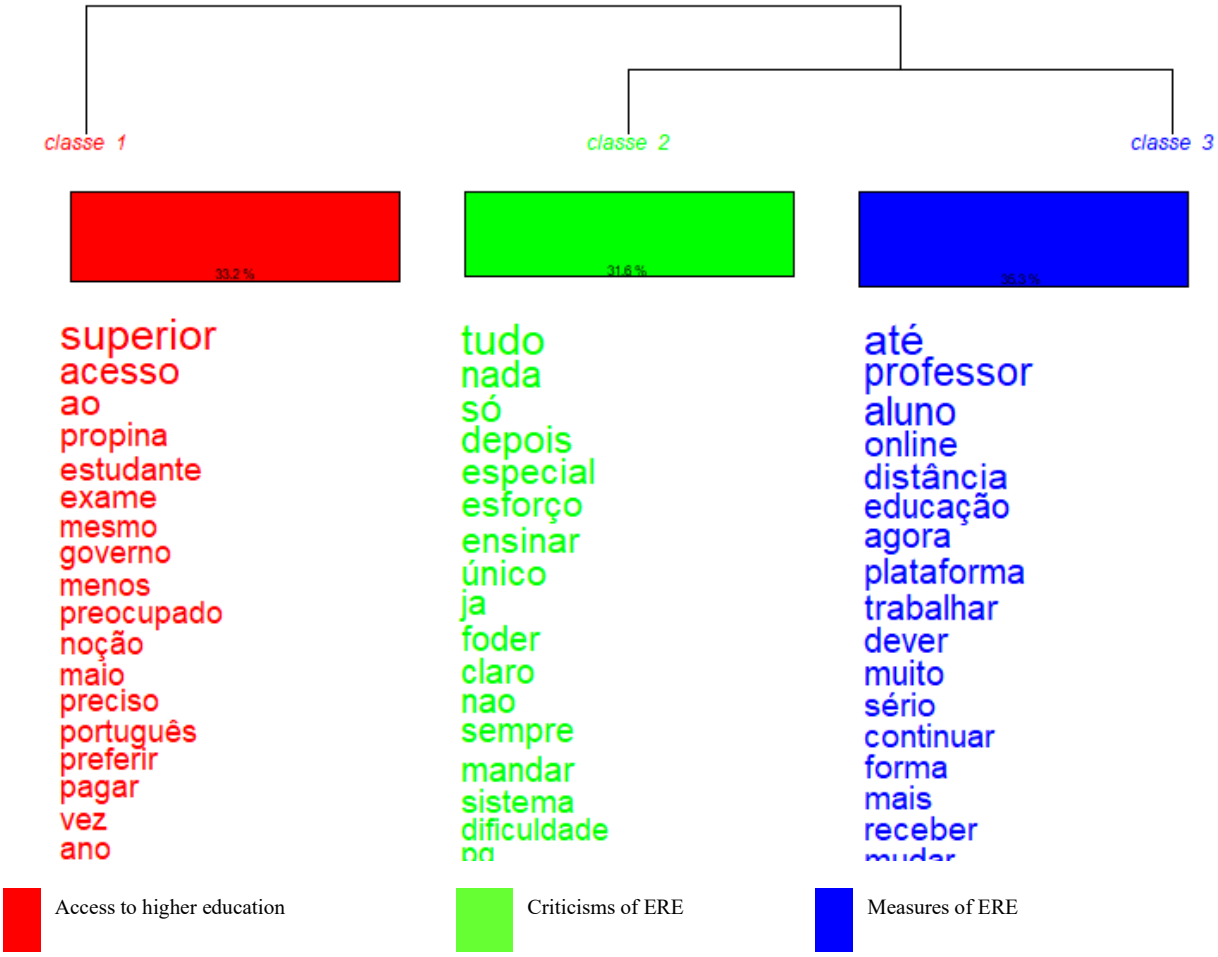


In the Factorial Correspondence Analysis of the DHA (Figure 30) it is possible to identify tensions between the different clusters (Camargo & Justo, 2013). The X axis presents a tension between present (classes 2 and 3) and future (class 1), as the class situated farthest in the X axis is focused on entering university and uncertainties regarding the future. On the left, the discussion is centred on ERE, which is an event that is recent to the users. Therefore, it is possible to infer that tweets on the left tend to worry about the present, and tweets in the right are focused on the future.

The Y axis, on the other hand, is organized by the tone of the discussion, with more solution-oriented discussions being presented in the lower half of the cartesian plan, with classes 1 and 3, and a more unsatisfied discourse composed of more aggressive messages in class 2.

Figure 29

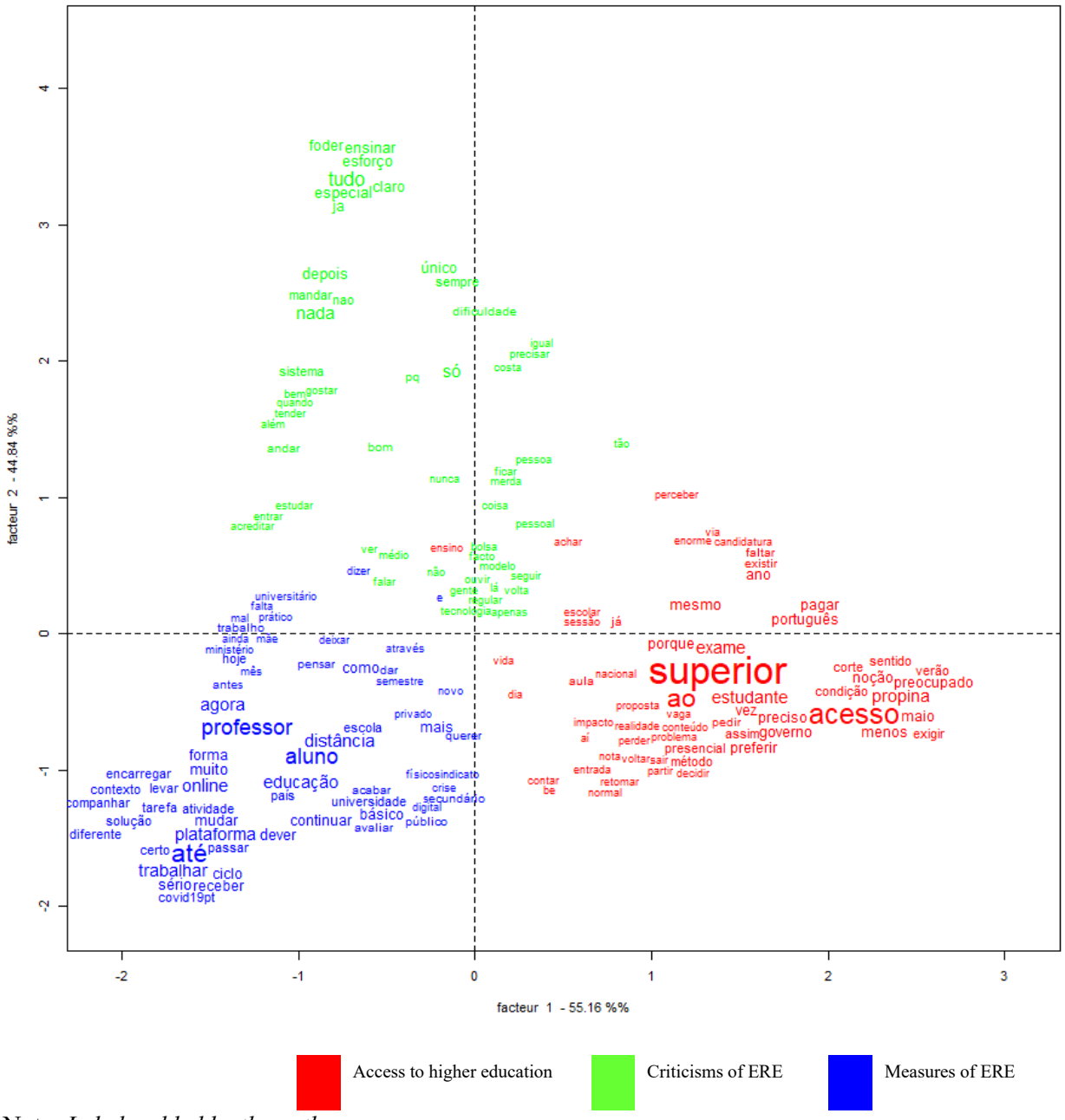
Dendrogram of the DHA of First state of emergency



Note: *Labels added by the author*

Figure 30

FCA of First state of emergency



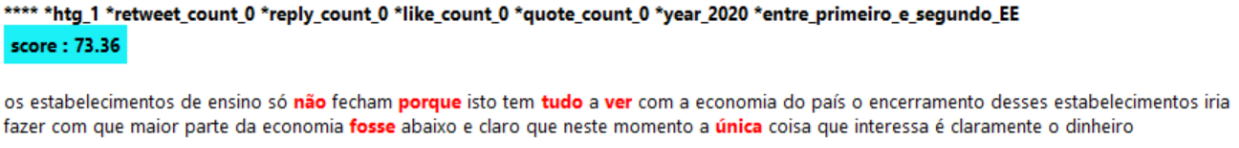
Note: *Labels added by the author*

Between states of emergency

The CHD of *Between states of emergency* (Figure 36) was divided into five different classes, expressing the diversity of discussions present in this time period. The first class (class 1, in red, 21.5%) consists, mainly, of criticisms to the Portuguese education system. Figure 31 reads: "The education establishments remain open because of the economy of the country. The closure of these establishments would mean that the biggest part of economy presented losses and, of course, this moment the only thing that matters is, clearly, money".

Figure 31

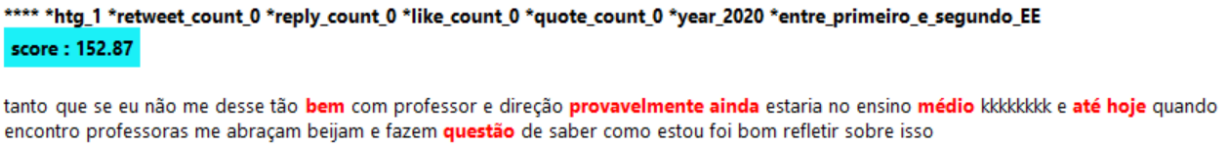
Typical tweet of Class 1 of the DHA of Between states of emergency



Class 2 (grey, 14.7%) is focused on nostalgia, and once again, presents a majority of users that presents differences in the Portuguese language and local references, indicating Brazilian users. The typical tweet, present in Figure 32, states: "So much that if I did not get along with teachers and the direction, I would probably still be in high school. (Laughs) And even today, when I meet teachers, they hug and kiss me. They make sure to ask how I am. It is good to reflect about this".

Figure 32

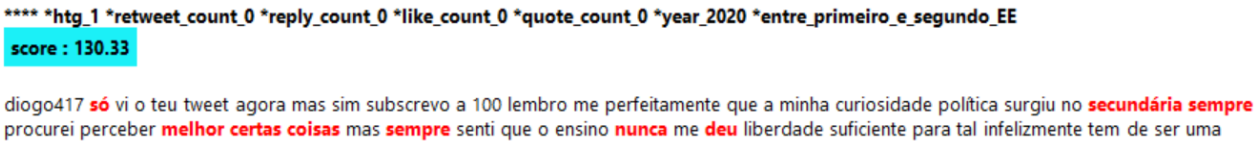
Typical tweet of Class 2 of the DHA of Between states of emergency



Class 3 (green, 21.9%) addresses the impacts education can have on a person, both positive (*e.g.,* enter university and acquire knowledge) and negative (e.g., traumas) aspects are presented here, as it is possible to identify in Figure 33: "I only now saw your tweet, but yes, I agree to it 100%. I remember perfectly that my political curiosity emerged in high school. I always tried to better understand some things, but always felt that the education never gave me enough liberty to do so. Unfortunately, it must be…".

Figure 33

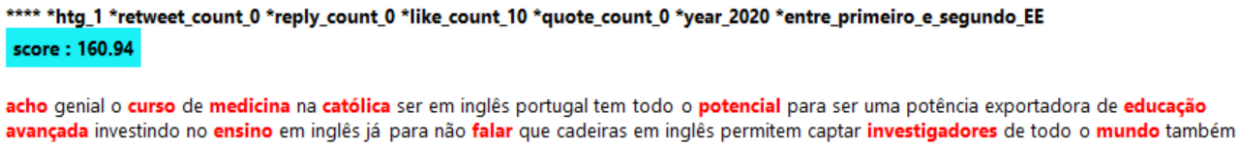
Typical tweet of Class 3 of the DHA of Between states of emergency



Class 4 (blue, 16.4%) offers a more general discussion regarding higher education, addressing the overall quality of education and projects and initiatives regarding the subject, such as the one presented in Figure 34: "I think it is genial that the medicine course of the Catholic (University) is in English. Portugal has the potential to become one of the greatest advanced education exporters by investing in education in English. Not to mention that English disciplines attract researchers from all over the world as well".

Figure 34

Typical tweet of Class 4 of the DHA of Between states of emergency



Finally, class 5 (purple, 25.5%) is composed of political tweets promoting activities of two specific groups *(Juventude Comunista Portuguesa* and *Partido Comunista Português)* aimed at higher education. Figure 35 reads: "Faculty of Arts of the University of Lisbon, the JCP is present

all over the country listening to students of higher education about their difficulties and the challenges that this epidemic caused in you lives, both in a pedagogical level as well as in a socio-economic level".

Figure 35

Typical tweet of Class 5 of the DHA of Between states of emergency

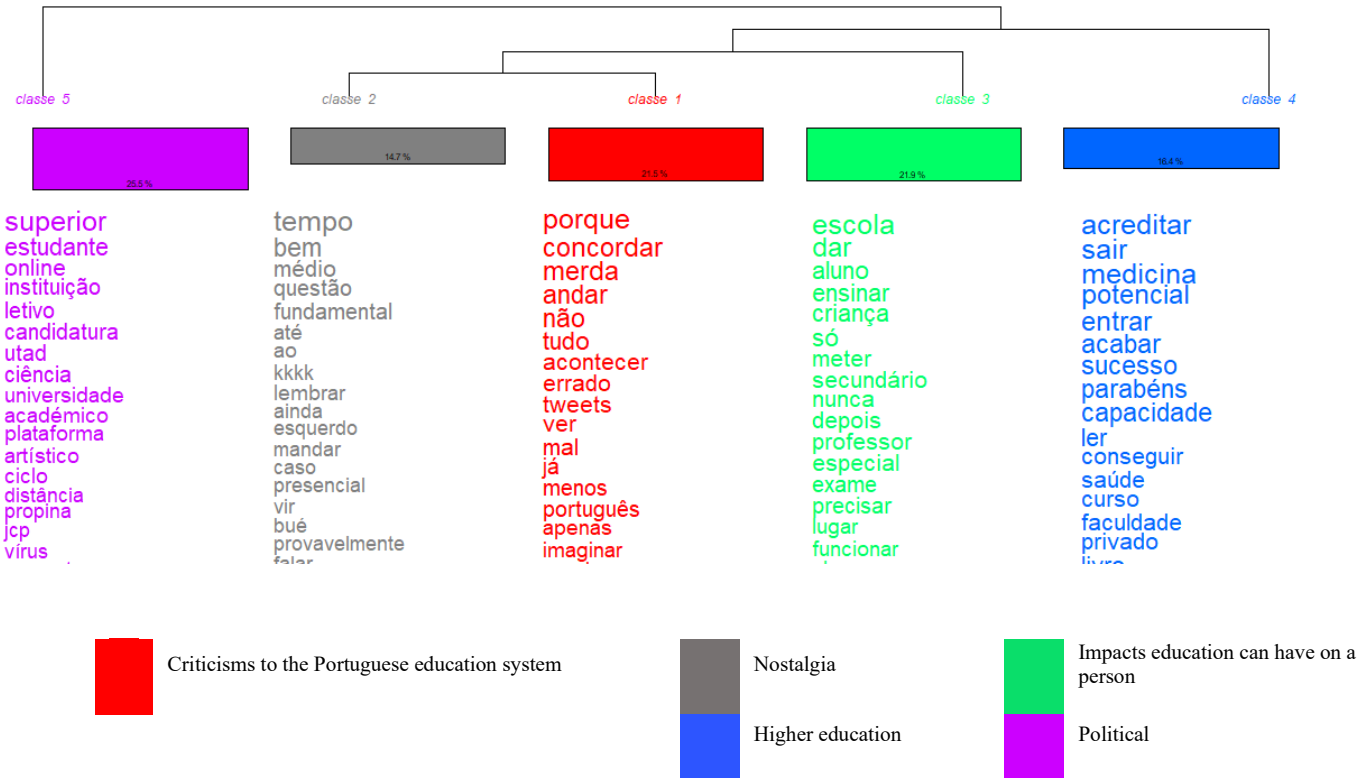
****** *htg_1 *retweet_count_0 *reply_count_0 *like_count_0 *quote_count_0 *year_2020 *entre_primeiro_e_segundo_EE**

score : 242.69

faculdade belas artes da **universidade** de **lisboa** a **jcp** está **presente** por todo o país ouvindo os **estudantes** do ensino **superior** sobre as suas **dificuldades** e os **entraves** que este **surto** **provocou** nas suas vidas tanto a nível **pedagógico** como a nível **socioeconómico** covid19pt

Figure 36

Dendrogram of the DHA of the period "Between states of emergency"



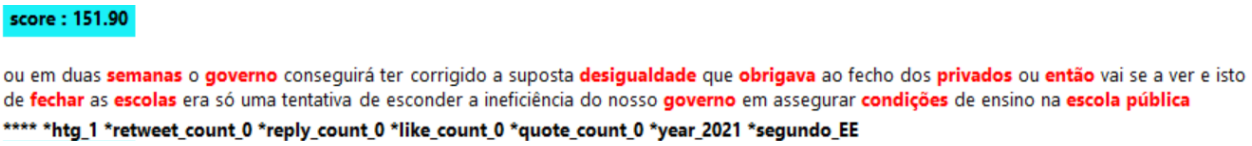
Note: *Labels added by the author*

Second state of emergency

During the second state of emergency, it is possible to identify four different clusters (Figure 41) in the DHA. The first class (red, 30.3%), discusses the measures adopted by the government during this state of emergency. Moreover, the tweets in this class debate which schools should close, remain open and when these changes should occur. The tweet in Figure 37 can be translated to: "Either the government corrects the suposed inequality which required the closure of private schools, or this was only an attempt to hide the inefficacy of providing (minimal) conditions in our public schools."

Figure 37

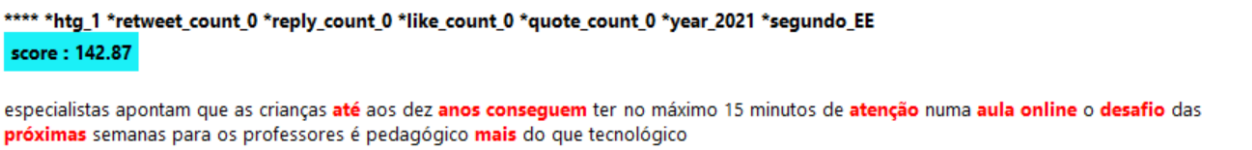
Typical tweet of Class 1 of the DHA of Second state of emergency



Class 2 (green, 12.7%) discusses the challenges of ERE. This cluster presents tweets that debate the difficulties faced and the importance of ERE in the context of the COVID-19 pandemic. Concepts such as equity and health are discussed in this cluster, as users are concerned with access to online classes in ERE and fear the spread of COVID-19 if schools remain open. Furthermore, there are also tweets addressed directly to Portuguese political figures, demanding better infrastructure. The typical tweet in Figure 38 states: "Specialists point out that children up to ten years old can have, at maximum, 15 minutes of attention in an online class. The challenge of the next weeks for the teachers is more pedagogical then technological".

Figure 38

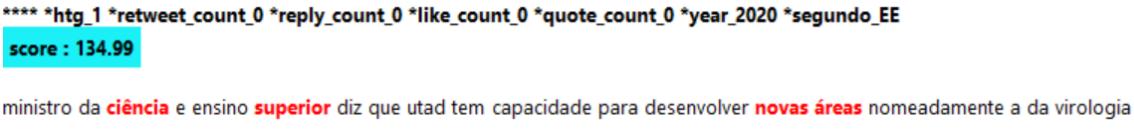
Typical tweet of Class 2 of the DHA of Second state of emergency



Class 3 (light blue, 25.6%) is focused on general discussions regarding higher education, such as political projects, criticisms of Portuguese higher education, and disputes between students of different courses. The typical tweet of this class can be identified in Figure 39 and reads: "Minister of Sciences and Higher education says that UTAD has the capacity to develop new areas. Namely, the virology area".

Figure 39

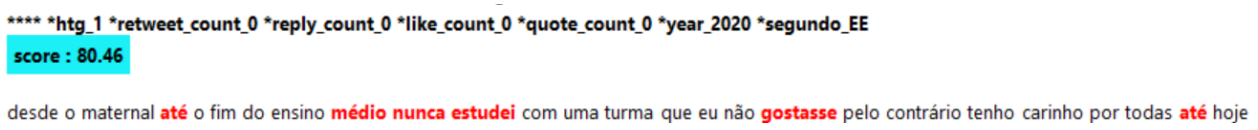
Typical tweet of Class 3 of the DHA of Second state of emergency



Finally, class 4 (purple, 31.4%) presents as its central theme nostalgia. As was the case with previous similar classes, there is a playful tone in the messages and there is a large participation of Brazilian users in this cluster. Figure 40 reads: "Since the kindergarten until the end of high school I never studied with a class I did not like. On the contrary, I have affection for everyone until today".

Figure 40

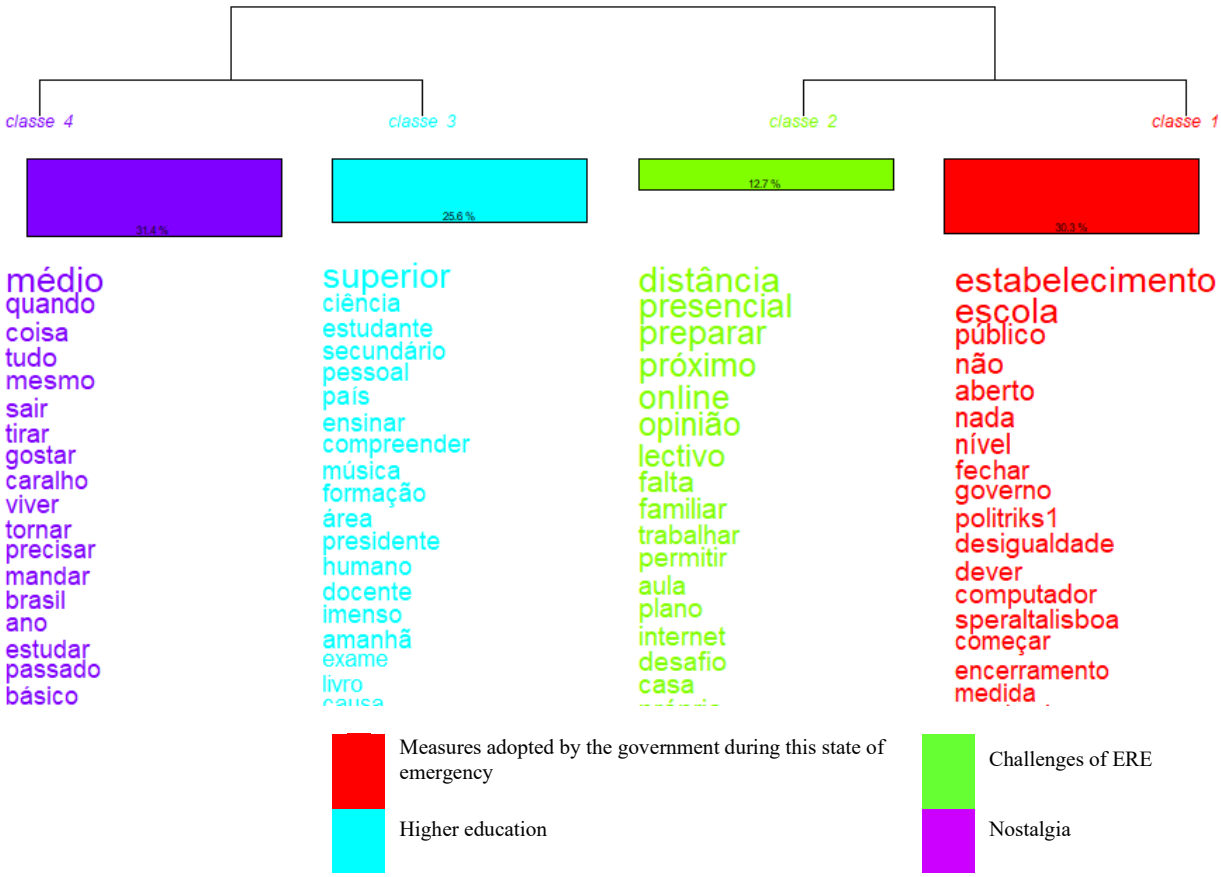
Typical tweet of Class 4 of the DHA of Second state of emergency



In the Factorial Correspondence Analysis of the DHA (Figure 42) it is possible to identify a thematic tension between axes. The X axis distributes the discussion between traditional education and ERE. On the left quadrants we have classes 3 and 4, that focus on higher education and nostalgia, while the right quadrants present topics related to ERE. The Y axis distributes tweets according to time, as the tweets in the lower quadrants discuss the future, tweets on the top discuss the past, and tweets in the middle are focused on the present.

Figure 41

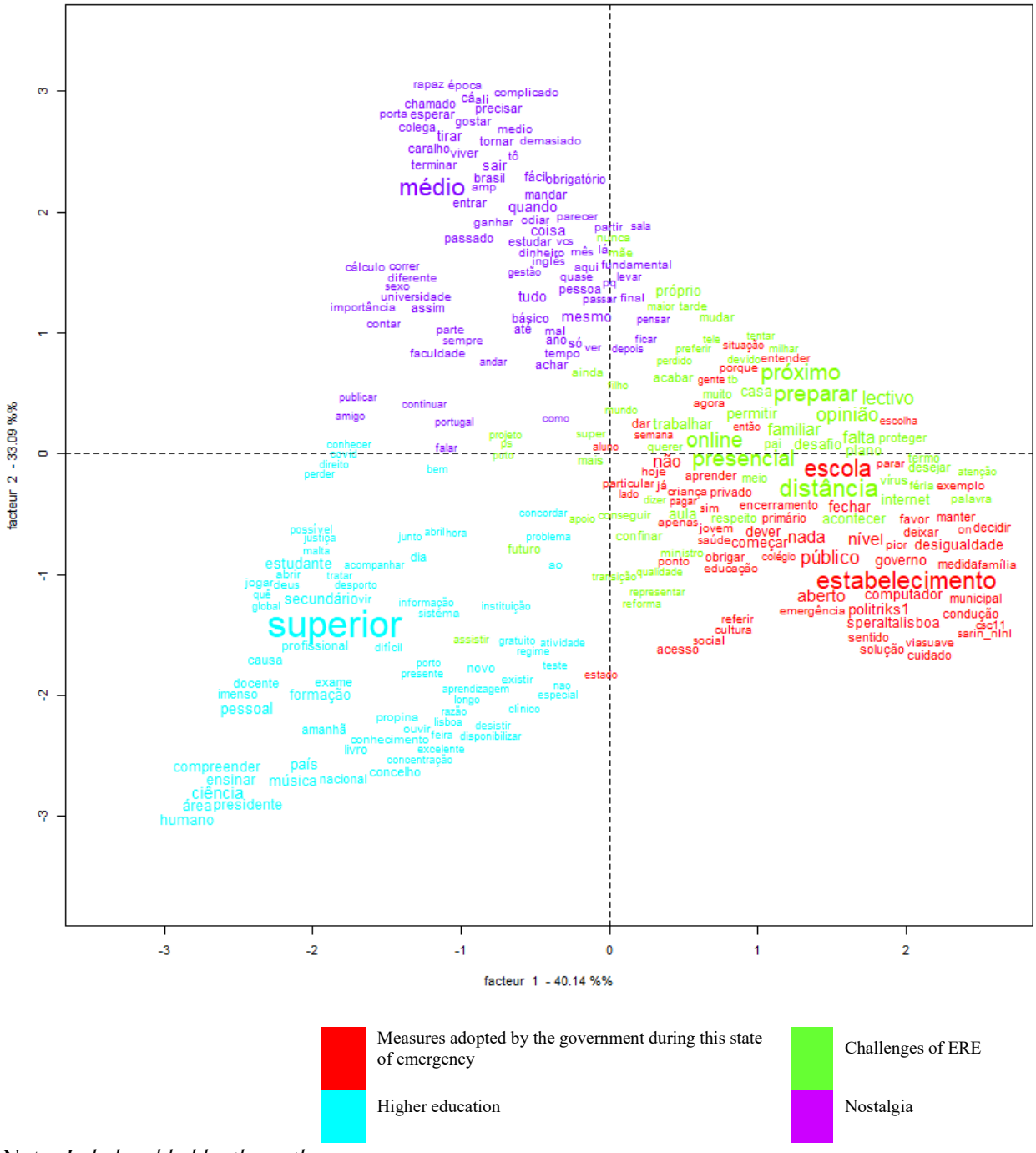
Dendrogram of the DHA of the period "Second state of emergency"



Note: *Labels added by the author*

Figure 42

FCA of the period "Second state of emergency"



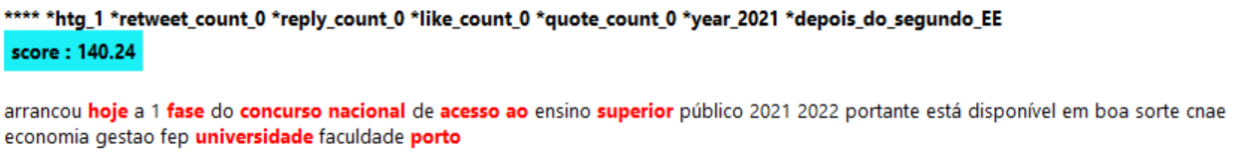
Note: *Labels added by the author*

Returning to normality

The final period, which is situated after the second state of emergency, presents five different classes, suggesting a broader discussion. Class 1 (red, 29.1%) focuses on access to higher education. Moreover, this period coincided with the admission exams to universities, which influenced the percentual of this class, when compared to other classes and to the same discussion in previous periods. The tweeter in Figure 43 can be translated to: "Begins today the first phase of the national exam to access higher education in 2021/2022. Support documents are available in cursos.fep.up.pt/licenciaturas/. Good luck!".

Figure 43

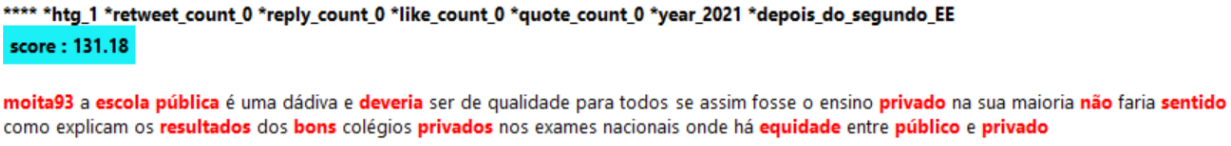
Typical tweet of Class 1 of the DHA of Returning to normality



Class 2 (grey, 19.9%) discusses differences between public and private education[5], and the typical tweet can be found in Figure 44: "The public school is a gift that should provide quality (education) for all. If public education was like this, private education would not make sense. How do you explain the results of good private schools in the national exams where there is equity between public and private?".

Figure 44

Typical tweet of Class 2 of the DHA of Returning to normality

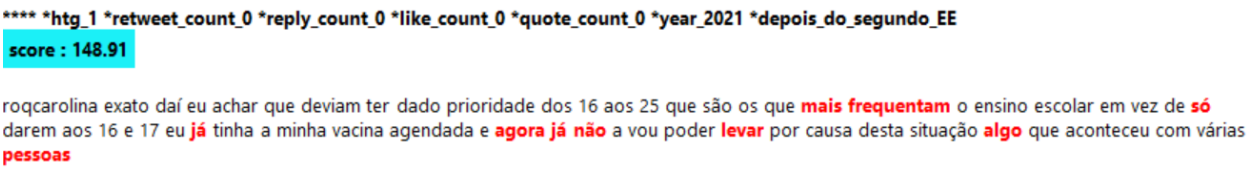


[5] In Portugal, public schools are funded by the government and free of cost to students. Private schools, contrarily, are autonomous and require the payment of tuitions by students.

Class 3 (green, 15.9%) focuses on educational political measures, and is more closely related to Class 2. In Figure 45 it is possible to read the following message: “Exactly, this is why I believe that they should have given priority (to vaccinate people aged) between 16 and 25 years, since those are the ones that most frequently attend classes, instead of only giving priority to 16 and 17-year-olds. I already had my vaccination scheduled, and now I will not be able to take it because of this situation that happened to several people”.

Figure 45

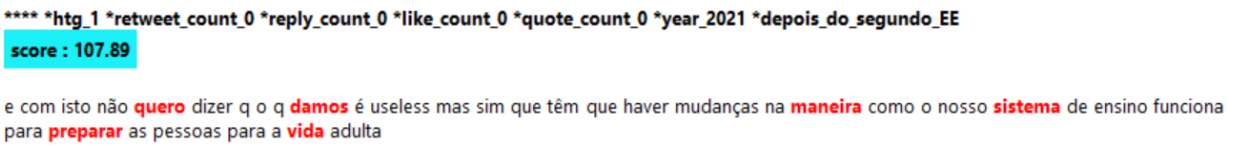
Typical tweet of Class 3 of the DHA of Returning to normality



Class 4 (blue, 13.7%) presents a broad discussion about different aspects of the Portuguese education system, such as impacts of education, engagement of teachers in higher education, and ideologies in education. Figure 46 represents a typical tweet of the class: “…and with this I do not mean that what we teach is useless, but that there should be changes in the way our education system works to prepare people for adult life”.

Figure 46

Typical tweet of Class 4 of the DHA of Returning to normality



Class 5 (purple, 21.4%) discusses previous experiences in high school. However, in this class it is not possible to identify a majority of Brazilian users. Figure 47 reads: “I am here remembering my high school, when I made a French notebook so spectacular that everyone asked to photocopy it. The notebook went home with everyone. Each person would take it home one day and bring it back the next, so someone else could take it”.

Figure 47

Typical tweet of Class 5 of the DHA of Returning to normality

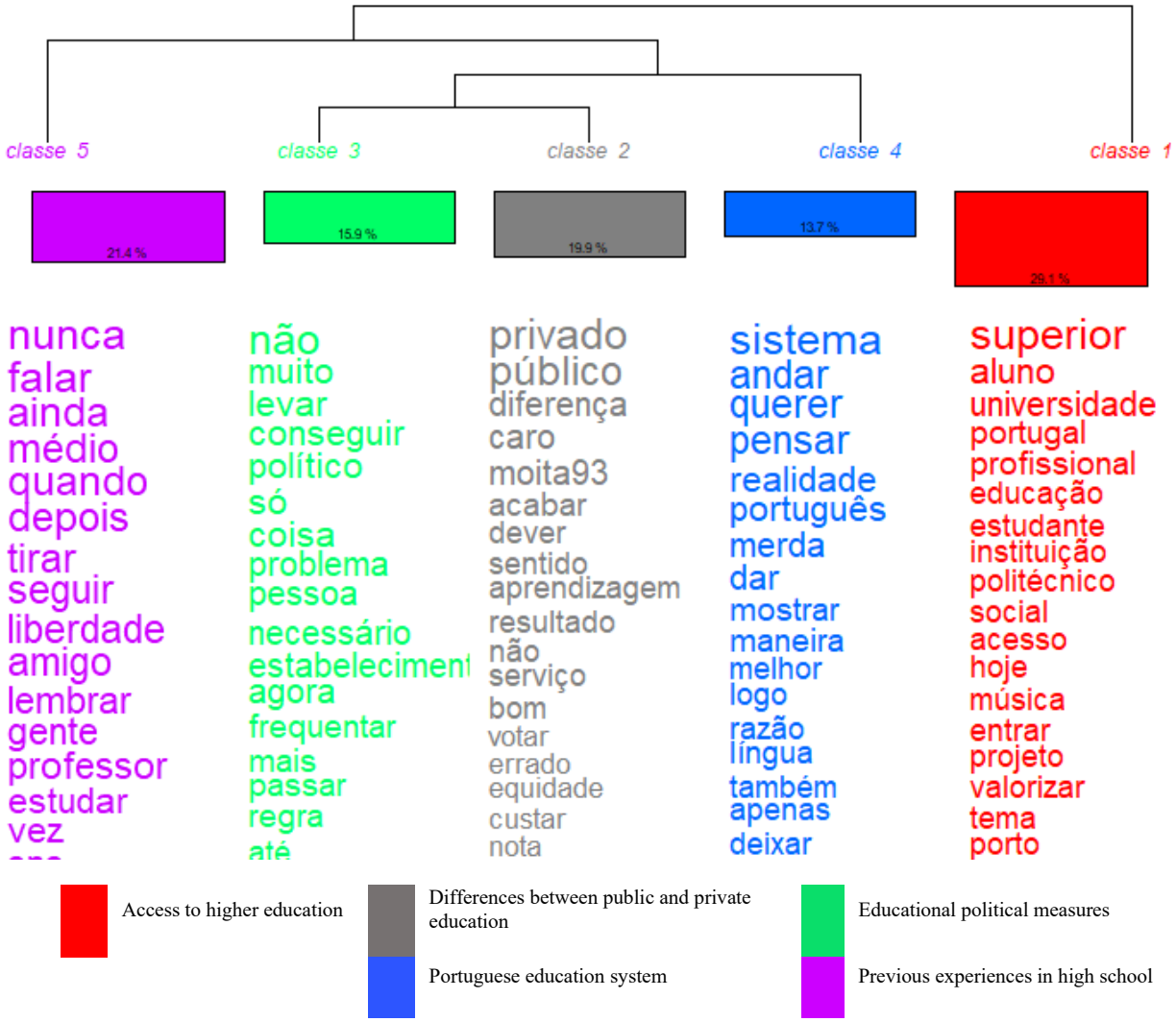
****** *htg_1 *retweet_count_0 *reply_count_0 *like_count_0 *quote_count_0 *year_2021 *depois_do_segundo_EE**

score : 79.71

lembrando aqui do meu ensino **médio quando** eu fiz um caderno de francês espetacular **daí** todo **mundo** pediu pra **tirar** xerox e o caderno foi passando de mão em mão a pessoa levava pra **casa** num dia e trazia no dia seguinte para o próximo até **aí** td bem

Figure 48

Dendrogram of the DHA of the period "Returning to normality"



Note: *Labels added by the author*

3.4 DISCUSSION

Aiming to assess the social representations of ERE and better understand how education during the pandemic was perceived, posts from the social network Twitter containing the term *Ensino*, which is associated with formal education in the Portuguese language, shared by users between 2019 and 2021 were collected, organized, and analysed.

This study presents a different approach to identify social representations in circulation in social media, as previous works relied on manual collection of messages and manual preparation of the corpus (de Rosa et al., 2021; Smyrnaios & Ratinaud, 2014), which may increase time and human resources necessary. This study focused on an automated approach that aimed to enable researchers to process large amounts of information with minimal time and effort, allowing resources to be focused on the analysis and the interpretation of the results. The code for the three Python software developed for this dissertation can be found in the Appendix section as Appendix 2, Appendix 3, and Appendix 4. However, it is important to point out that this process did not replace characters that the statistical software may not recognize, as it is recommended in one of the official manuals (Camargo & Justo, 2013). Future studies should identify if these changes may have an impact on the statistical outputs of Iramuteq and Dtm-Vic.

During the pandemic, social networks provided support to education in different manners. Educational institutions, for example, used social networks to communicate relevant information and create groups to support the community (Michela et al., 2022). In some cases, Twitter was used as a space where teachers could reach out and seek advice (Beardsley et al., 2021). The tweets collected in this study, showed that in Portugal Twitter was used mainly to discuss matters related to ERE, education in general, and inform users regarding the scheduling of educational measures such as *Estudo em casa*. The two states of emergency were marked by differences in the tone of discussions: the first lockdown, and consequently the first ERE, presented messages filled with insecurities about the future. The terms competing for the nucleus of the social representation of this discussion are professor, student, online, distance, education, and platform. There are no terms or concepts related to the severity of the context, such as emergency and exception, indicating that ERE was perceived as conventional distance education. Furthermore, ERE relied on knowledge teachers already had regarding distance learning and e-learning or to what they could learn in a short period of time, limiting the tools and platforms utilized in ERE (Baran & Baran, 2021;

Campos & Pereira, 2020; Henriques et al., 2021; Seabra et al., 2021). Social representations identified in later periods analysed corroborate with this statement.

The second state of emergency presented a more informed discussion, where Twitter users addressed the challenges of ERE and the measures adopted by the government during that period. Besides the change of tone in the discussion, these tweet clusters presented a similarity with the cluster present in the first state of emergency: the lack of terms associated with the severity of the situation. One of the clusters, had as its main terms distance and online, which were used in the context of distance education and online education. Once again, ERE was perceived as conventional distance education.

Through the information identified in the results of the Twitter analysis it is possible to identify and anchoring process associating ERE with distance education (Abric, 2003). Due to the fact that the COVID-19 pandemic evolved rapidly and required that ERE was implemented with limited time and resources (Hodges et al., 2020), it was necessary to anchor ERE to distance education, so this new concept could be integrated into previous knowledge, allowing users to better comprehend and discuss the topic (Vala & Monteiro, 2013).

During the analysis of the first state of emergency, it was not possible to identify mentions of access being discussed, however, this became a relevant topic during the second state of emergency. This may be related to the fact that people who utilize Twitter need to have access to the internet, and, therefore, are less likely to present challenges in accessing online content, such as classes. Later, this discussion was presented by media, and became a part of the social representations in circulation (Assunção Flores & Gago, 2020; Kotowicz; Seabra et al., 2021).

In conclusion, this study assessed the social representations of ERE in circulation at Twitter in distinct stages of the pandemic and identified that these representations lacked terms that characterized the modality of education experienced during the pandemic, such as emergency or exception. It was possible to identify a process of anchoring to conventional distance education, which may have influenced the unsatisfaction with the process and the measures adopted. In this context, it is important the development of further studies focusing on the social representations of the students, as the ones collected in this study are from a larger social group consisting of users of the social network. The findings in this study are important to support the development and propose educational policies that would lead to a more effective ERE in the future.

4. SOCIAL REPRESENTATIONS IN THE CLASSROOM

This chapter presents the survey conducted with students from a public high school in the North of Portugal. This study aims to identify the social representations of ERE, knowledge regarding internet use and overall perceptions of the education system and the ERE that took place during pandemic among high school students. The first part of this chapter presents the research question, the second part the methods, and the third part the results. The discussion of findings will be conducted in Chapter 5, along with the discussions of chapters 2 and 3.

4.1 RESEARCH QUESTIONS

The research questions that guided the study are listed below:

1. Has emergency remote education influenced classes when they returned to the presential modality in the selected school?
2. What are the social representations of emergency remote education of 10th grade students from a Portuguese public school?

4.2 METHODS

Context

This study was conducted in a Portuguese public high school located in Porto region, and two 10th grade classes were surveyed. Both classes consisted of professional courses which prepare students to work as technicians in different areas. One of the classes was aimed at preparing student to act as physical education technicians, and the other one as computer technicians.

Participants

A total of 40 students answered the survey. Table 5 describes the sociodemographic characteristics of the participants. The majority of students were male (82.5%), aged 15 years old (40.0%), and had a Portuguese nationality (97.5%). The distribution of the students in the courses of physical education and computer technician was the same (50.0% each group).

Table 5

Sociodemographic Characteristics of Participants

	n	*%*
Sample	*40*	*100*
Gender		
Female	7	17.5
Male	33	82.5
Age		
Less than 15	0	0.0
15	16	40.0
16	15	37.5
More than 16	9	22.5
Nationality		
Portuguese	39	97.5
Other	1	2.5
Course		
Physical education	20	50.0%
Computer technician	20	50.0%

Measures

The instrument utilised in this study (Appendix 05) was a questionnaire that consisted of four different parts. Part 1 contained sociodemographic questions, such as gender, age, nationality, and course (physical education technician or computer technician), part 2 included ranked association questions, part 3 utilised the Web-Use Skill Measure Index (Hargittai & Hsieh, 2012; Hargittai et al., 2019), and part 4, utilised two different scales developed by Moreira (2021), the Beliefs on Education Scale and an adapted version of the Perceived Internet School Usage, and an open-end question asking students what they would change in education based on their experience with ERE.

Ranked association questions

This part consisted of ranked association questions, where each student was given three different stimuli: “distance education”, “education”, and “*Estudo em casa*”. The last stimuli consisted of the governmental educational initiative that was broadcasted in the Portuguese television. Students

were expected to indicate at least five different words that came to their minds when they read each stimulus and, after writing down five words for each stimulus, were prompted to rank these words in order of importance for them. However, a significant number of students had difficulty understanding the ranking system, which made it necessary to change the analysis from an importance ranking to an evocation order ranking, despite ranking system providing more consistence results (Wachelke, 2008).

The Web-Use Skill Measure Index

Developed by Hargittai and Hsieh (2012), and validated and adapted to the Portuguese context by Moreira (2021), this scale consists of six different concepts divided into three levels of understanding: high-level of understanding (i.e., advanced search, favourites, and PDF), medium level of understanding (i.e., spyware and wiki), and low-level understanding (i.e., phishing). Each item is measured through a five-point scale, ranging from 1 (no understanding) to 5 (full understanding), and intends to identify the level of knowledge regarding internet use. High-level of understating relates to concepts more broadly known by users, while low-level of understanding relate to concepts understood by fewer people.

Beliefs on Education Scale

Developed and validated by Moreira (2021), this scale measures beliefs on the educational system through nine affirmatives and was evaluated through a Likert scale ranging from 1 (I strongly disagree) to 5 (I strongly agree).

Perceived Internet School Usage

This scale was developed from Moreira (2021) and utilised a Likert scale to measure perceived internet use in school. Thirteen items were measure by two different Likert scales: a concordance scale, where students rated items in a scale form 1 (never) to 5 (always), and a second scale that measured the influence from the pandemic, where students were supposed to rate each affirmative from 1 (no influence from the pandemic) to 5 (heavily influenced by the pandemic).

Procedures

Questionnaires were distributed in the beginning of an intervention aimed at discussing Phishing and internet safety with high school students. Previously to the intervention, students received a consent form that was supposed to be signed by parents and presented in the day of the intervention. Students answered the questionnaire before watching the lecture, in order to avoid biasing answers. There was no time limit to the responses.

Data analysis

Numerical data was imported and analysed using SPSS (Statistical Package for the Social Sciences, version 27) (IBM, 2021). Analyses included variable frequencies and descriptive statistics (number and proportions for categorical variables and mean and standard deviation for continuous variables). The open-end answers from the final question were coded into themes and arranged by frequency of mention.

Ranked association questions were organised into an excel spreadsheet in the same manner as they were written by the students. This unmodified lexical corpus was explored and information such as number of occurrences, distinct words, and the number of unique words was analysed. After these initial analyses, entries were lemmatised, synonyms or antonyms and similar expressions were reduced to overall final themes. This final corpus was analysed with prototypical and similarity analyses in Iramuteq (Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires) (Marchand & Ratinaud, 2012), and textual correspondence analyses in Dtm-Vic a free software developed by Lebart Ludovic. Due to the fact that a large number of students did not fill the rank appropriately, the order of evocation was utilized in this analysis.

Prototypical analysis:

Prototypical analysis was conduct by utilising Iramuteq 0.7, running over R (4.0.3) with the intention of exploring the social representations of each stimuli (Wachelke & Wolter, 2011). This analysis combines frequency (high /low), and mean importance (high /low) and generates a 2x2 matrix (Moreira, 2021). Due to the small sample size of participants (N =40), the arbitrary cut off for frequency and mean importance was 2.

Similarity analysis:

Similarity analysis is based on Graph theory (Marchand & Ratinaud, 2012) and presents a complementary way of exploring the social representations. Similarity analysis was conducted with Iramuteq 0.7, running over R (4.0.3), with the parameters: cooccurrence, fruchterman reingol, statique, maximum tree, text over vertices, score on the edges, edge curved, communities and halo. The cut off for frequency was 2, also due to the small sample size.

Textual correspondence analyses:

Correspondence analysis was conduct in Dtm-Vic, a free software developed by Lebart (n.d.). All themes with frequency equal or higher to two and contribution higher than two are shown in the figures. Themes are positioned in a Cartesian space, along with variables, without affecting the generation of the semantic field (Moreira, 2021). The position of the variables is given by a value-test, and we will present and discuss illustrative values which value-test is higher than 2, as this means that there is a 95% chance that the position in the Cartesian field isn't by chance (Lebart et al., 1995; Moreira, 2021).

4.3 RESULTS

4.3.1 Has emergency remote education influenced classes when they returned to the presential modality in the selected schools?

Overall, the students' self-perceived knowledge regarding the internet indicated an average level of understanding (M = 3.06, SD = 0.648). The highest average scores were associated with PDF (M = 4.10, SD = 0.821), followed by favourites (M = 3.38, SD = 1.248), and lowest associated with phishing (M= 2.28, SD= 1.234) and spyware (M= 2.33, SD= 1.108), which are concepts related to internet safety (Table 6).

Table 6

Web-Use Skill Measure Index

	M	*SD*
Wiki	3,08	1,124
Favourites	3,38	1,248
Spyware	2,33	1,108
PDF	4,10	0,821
Advanced search	3,21	1,143
Phishing	2,28	1,234
Total	3,06	0,648

Regarding the Beliefs on Education Scale, items indicates that students' opinions regarding the Portuguese school system and internet use tend to be slightly positive, although very close to a neutral stance (M=3.0). In Table 7 a lower median score in the total line indicated a positive perception (*M*= 2.71, *SD*= 1.140).

Most positive perceptions were identified in the questions regarding the use of internet in the education, with students strongly disagreeing that "internet is making daily life in school more difficult." (M= 2,50, SD=1,377) and "internet is harmful to life in school." (M= 2.37, SD= 1.275), and strongly agreeing that "internet is improving the learning-teaching processes" (M=3.78, SD= 1.050). However, students were more neutral responding that "school is going through a profound crisis of values" (M=3.05, SD= 1.011) and "school doesn't keep up with society's pace" (M=3.23, SD: 1.310), which may be reflecting an immaturity of students to analyse the role of school and education in the society.

The open-ended answers to the question "Based on your personal experience with distance learning during the pandemic, how could face-to-face education be improved?" were coded into themes and organised by frequency, as depicted in

Figure 49. Most of the answers requested for less expositive classes (N=16) and more interactive initiatives (such as quizzes). More use of technology in class (computer, internet, and cell phones) was the second most frequent theme, being present in 12 out of the 39 valid answers. The third most frequent suggestion was to use more learning objects in classes (such as PDFs instead of physical books). Reduce classes duration and change rhythm of contend administration came in fourth place, and in fifth we have three different themes that appeared once in answers:

increase dialogue between teachers and students, increase hygiene measures in school, and supply lockers to students.

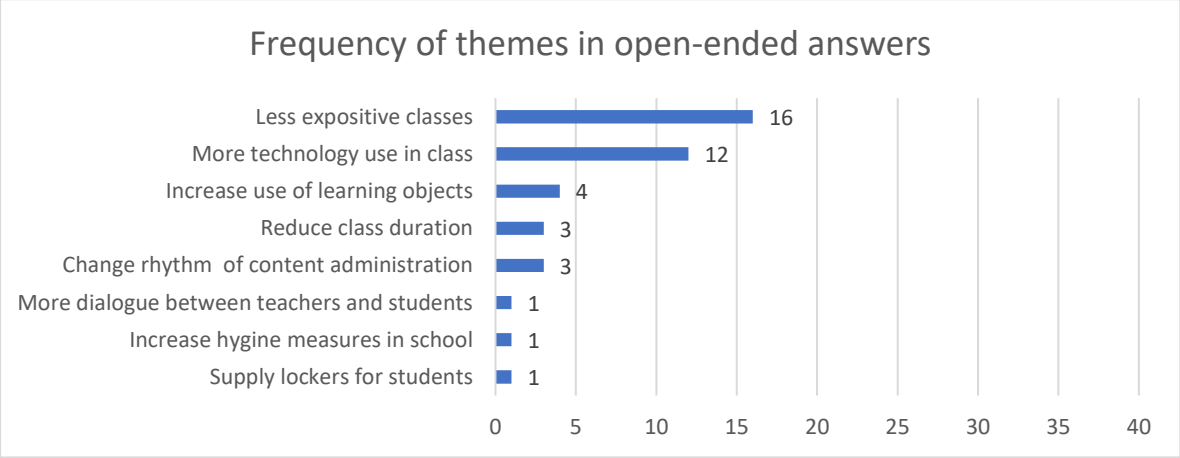
Table 7

Beliefs on Education Scale

Item	*M*	*SD*
School is going through a profound crisis of values.	3,05	1,011
School is losing its importance in society.	2,73	1,154
School doesn't keep up with society's pace.	3,23	1,310
School is meeting society's needs.	2,95	1,154
School is accomplishing its mission in society.	3,33	1,047
Internet is making daily life in school more difficult.	2,50	1,377
Internet is improving the quality of personal relations in school.	3,40	1,236
Internet is improving the learning-teaching processes.	3,78	1,050
Internet is harmful to life in school.	2,37	1,275
Total	2,71	1,140

Figure 49

Frequency of themes in open-ended answers



With the objective of identifying the impact the pandemic had on face-to-face education, the *Perceived Internet School Usage Scale* was utilised to identify internet use in classes and the perceived influence the pandemic had on this process. Regarding the perceived internet school

usage students seem to identify that it is frequently used in education, and that some of this can be attributed to a pedagogical change influenced by the pandemic. The highest scores of internet use are associated with completing homework and in class assignments, both individually and in groups. Internet use between classes also presented a higher score, when compared to the rest.

Table 8
Perceived Internet School Usage

Items	Concordance			Influence of the pandemic		
	n	*M*	*SD*	*n*	*M*	*SD*
… teachers use internet in the classroom to transmit content they have to teach.	40	3,85	0,893	38	3,37	1,344
… teachers use internet in the classroom to debate content with the students.	40	3,38	0,952	39	3,05	1,297
… I use the internet in class to develop individual projects.	39	4,05	0,857	40	3,35	1,331
… I use the internet in class to develop group projects.	39	4,21	0,801	40	3,23	1,349
… I use the internet outside the class to develop individual projects.	39	3,56	1,273	40	2,75	1,335
… I use the internet outside class to develop group projects.	39	3,90	1,071	40	2,90	1,336
… I use the internet between classes.	40	4,28	1,062	38	2,74	1,655
… I use my cell phone to access the internet in class.	40	3,68	1,228	38	3,16	1,620
… I use a computer to access the internet in class.	40	3,75	1,235	38	3,16	1,480
… it is allowed to use the internet during classes.	40	3,63	1,234	38	3,13	1,398
… teachers recommend the use of the internet for students to study the contents.	39	3,54	1,120	40	3,33	1,309
… teachers recommend the use of the internet at home to develop homework.	40	3,43	1,083	39	3,41	1,352
… there is homework that requires the use of the internet.	40	3,85	1,189	39	3,64	1,203
Total		3,77	0,914		3,18	0,890

4.3.2 What are the social representations of emergency remote education of 10th grade students from a Portuguese public school?

DISTANCE EDUCATION

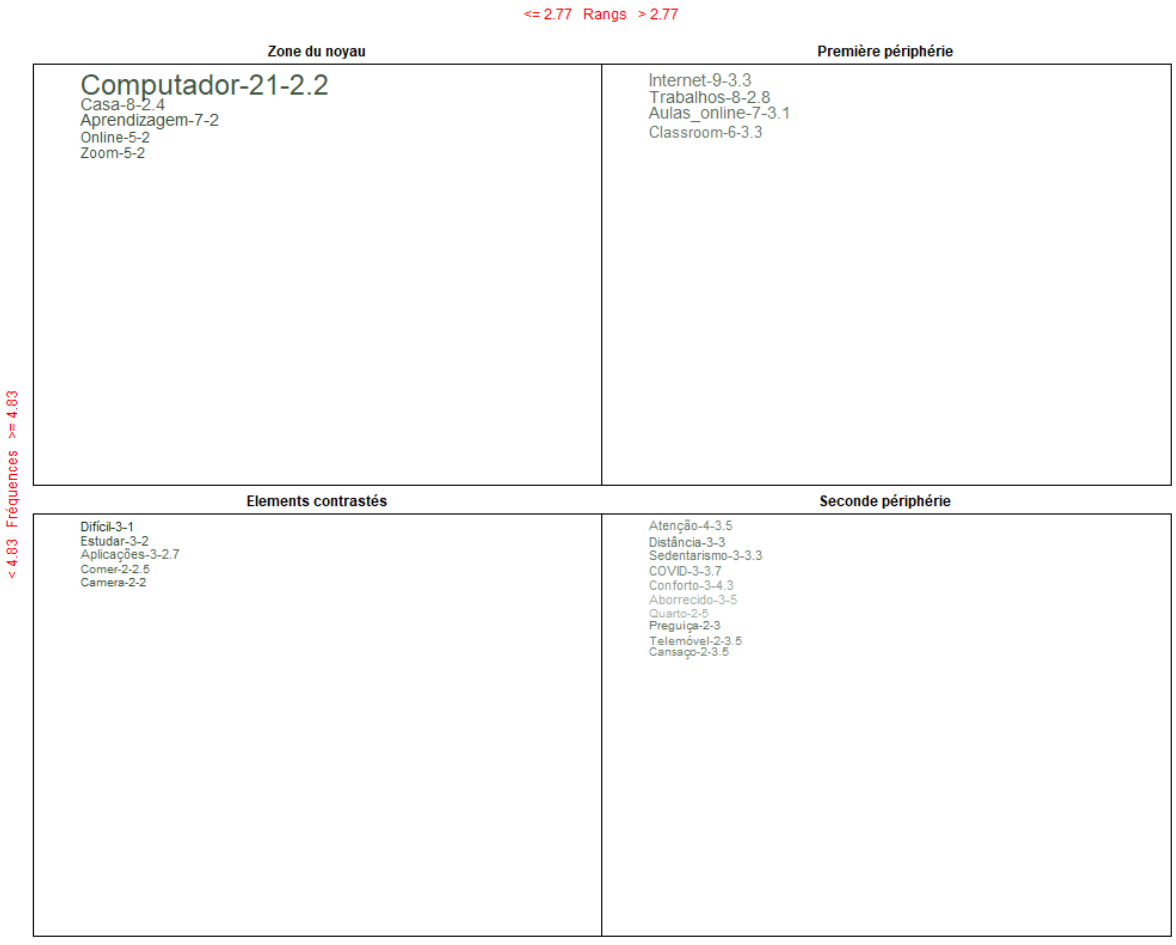
The prototypical analysis conducted with the stimulus “distance education” is displayed in Figure 50. The terms competing for the nucleus of the representations are presented in the upper left quadrant, and consist of the words computer (*computador*), home (*casa*), learning (*aprendizagem*),

online and Zoom. The latter is one of the platforms utilised to conduct synchronous online classes. The upper right quadrant presents the words that structure the first periphery of the representation: internet, schoolwork (*trabalhos*), online classes (*aulas online*), and Classroom. Once again, the latter is another platform that was utilised during ERE (Google Classroom). In this analysis, the nucleus and the first periphery are very similar in content, and it is not possible to differentiate or classify them.

The contrasting elements, in the lower left corner, may present a competing central nucleus, and is comprised of difficult (*difícil*), study (*estudar*), applications ("*aplicações*"), eat ("*comer*"), and camera. The second periphery, in the lower right corner, presents mostly negative feeling associated with ERE: attention, distance, sedentarism, COVID-19, comfort, boring, bedroom, laziness, cell phone, and tiredness.

Figure 50

Prototypical analysis conducted with the stimulus "distance education"

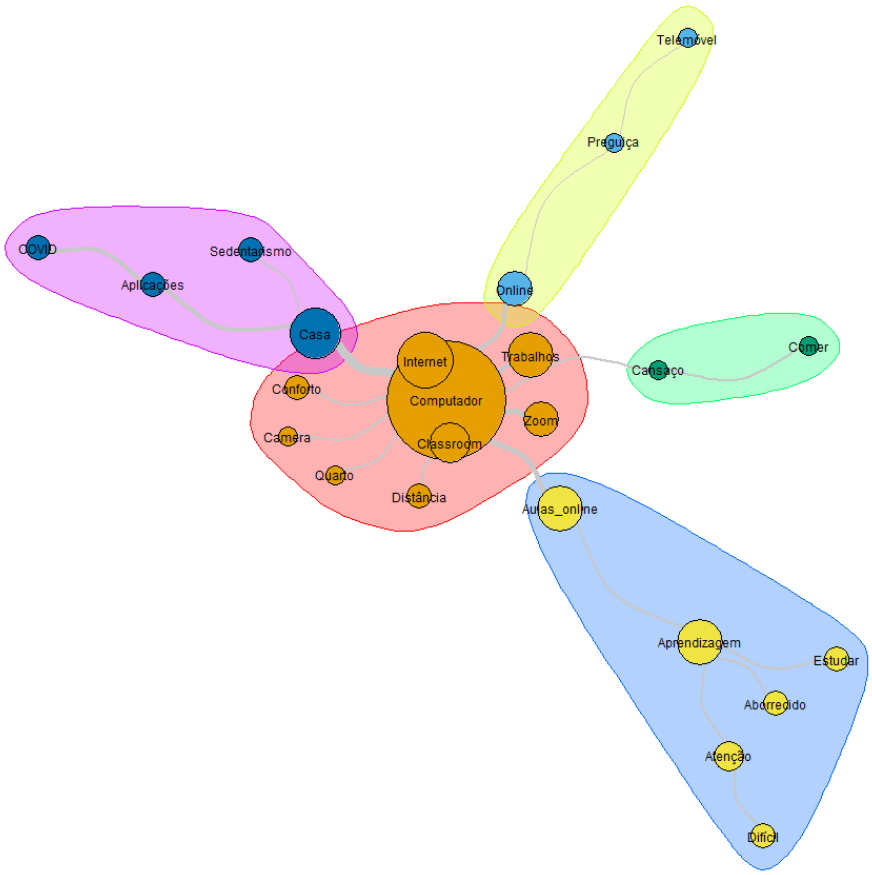


The similarity analysis (Figure 51) identifies a central group that revolves around the word "computer". This seems to be the most relevant term, and all other groups connect to it. This central island represents the equipment, platforms and places related to the ERE.

Four more connected islands are present. The pink island, related to the confinement due to the lockdown, represented by words such as home, COVID, and sedentarism. The blue island relates to the pedagogy and challenges of online classes. The green island relates to more physiological needs (tiredness and eat), and the yellow island revolves around the word online, closely related with cell phone and laziness, implying a lack of stimulation.

Figure 51

Similarity analysis conducted with the stimulus "distance education"



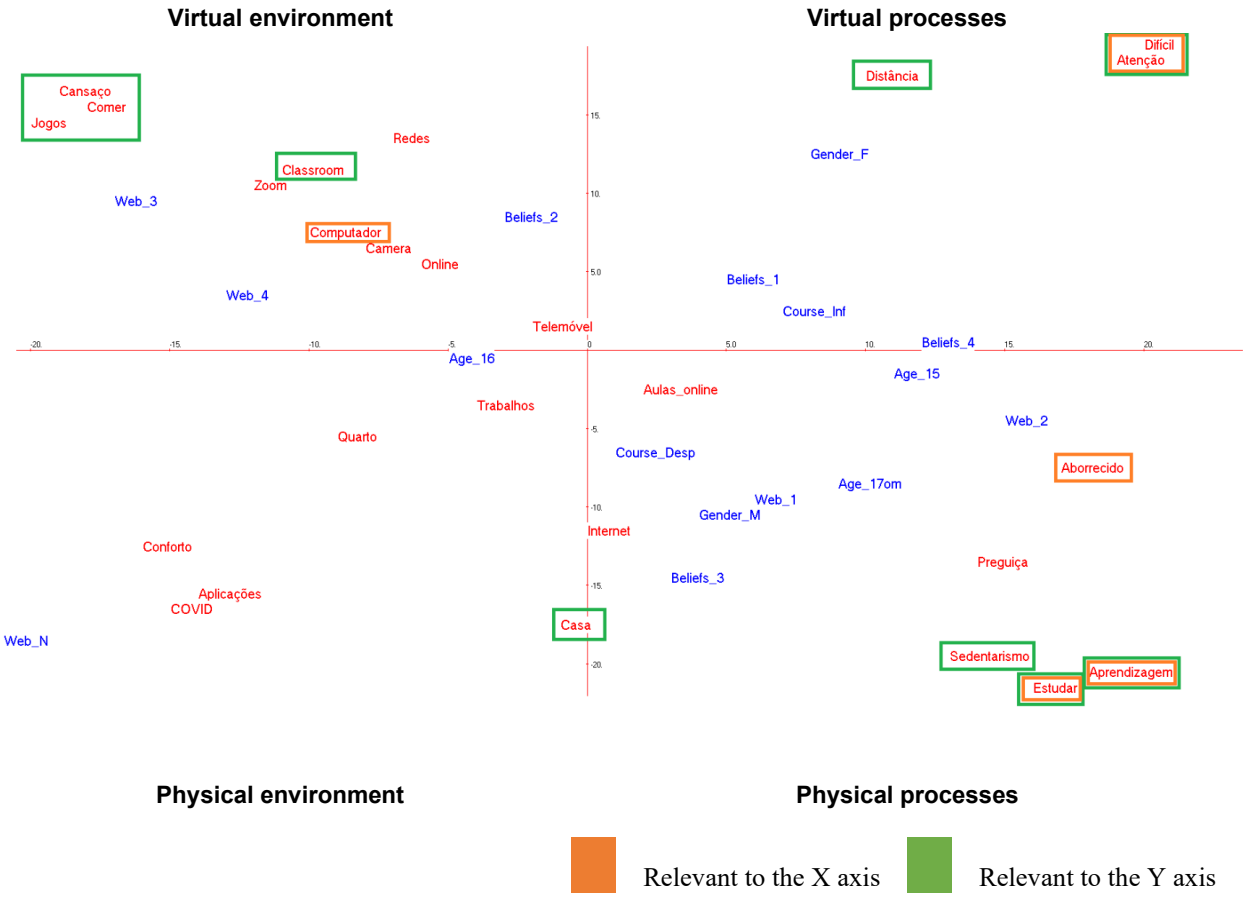
In the correspondence analysis (Figure 52), the information is distributed along a Cartesian plan. The themes are presented in red, while the variables are presented in blue. The *Beliefs on Education Scale* is organised into quartiles: Beliefs_1 represents quartile 1, Beliefs_2 represents quartile 2, and so on. The *Web-Use Skill Measure Index* follows the same patter as the *Beliefs on Education Scale*, and is symbolised by *Web_1*, *Web_2*, *Web_3*, and *Web_4.* The course variable is also displayed below, as Course_Inf (computer technician) and Course_Desp (physical education technician). Gender is represented by Gender_M (male) and Gender_F (female). Finally, age is divided into Age_15 (15 years old), Age_16 (16 years old), and Age_17om (17 years or more).

The correspondence analysis of the stimulus Distance education utilized factors 1 and 2 of the output of Dtm-Vic. In this analysis, these factors presented relevant and well distributed results, which were very similar to the information identified in the cartesian containing factors 2 and 3. Therefore, for the stimulus distance education, the correspondence analysis of factors 1 and 2 was utilized. It is possible to identify that in the X axis, the tension is between the theme computer and the themes difficult, attention, boring, learning, and study. The relation between these words suggests a tension between the environment of ERE and the processes associated with ERE. The tension in the Y axis is developed by the relation between the words difficult, attention, distance, Classroom, tiredness, eat, and games, which oppose home, study, learn, and sedentarism. This axis presents a relation between the virtual and physical. When we associate these two axes it is possible to classify the quadrants as Virtual environment, Virtual processes, Physical environment, and Physical processes.

After analysing the disposition of variables in this Cartesian plan, it is possible to conclude that *gender*, and *courses* present relevance in its distribution. Students that self-reported as male in the questionnaire are associated with representations positioned in the Virtual environment, while students that self-reported as female, presented representations associated with the Physical processes' quadrant. Computer technician students are situated in the Virtual processes' quadrant, while Physical education were located in the Physical environment quadrant.

Figure 52

Correspondence analysis conducted with the stimulus "distance education"



Note. Labels of the axes and quadrants added by the authors to the DTM-Vic output. Only statistically significant data reported. Tensions in the X axis are Environment and Processes. Tensions in the Y axis are Virtual and Physical.

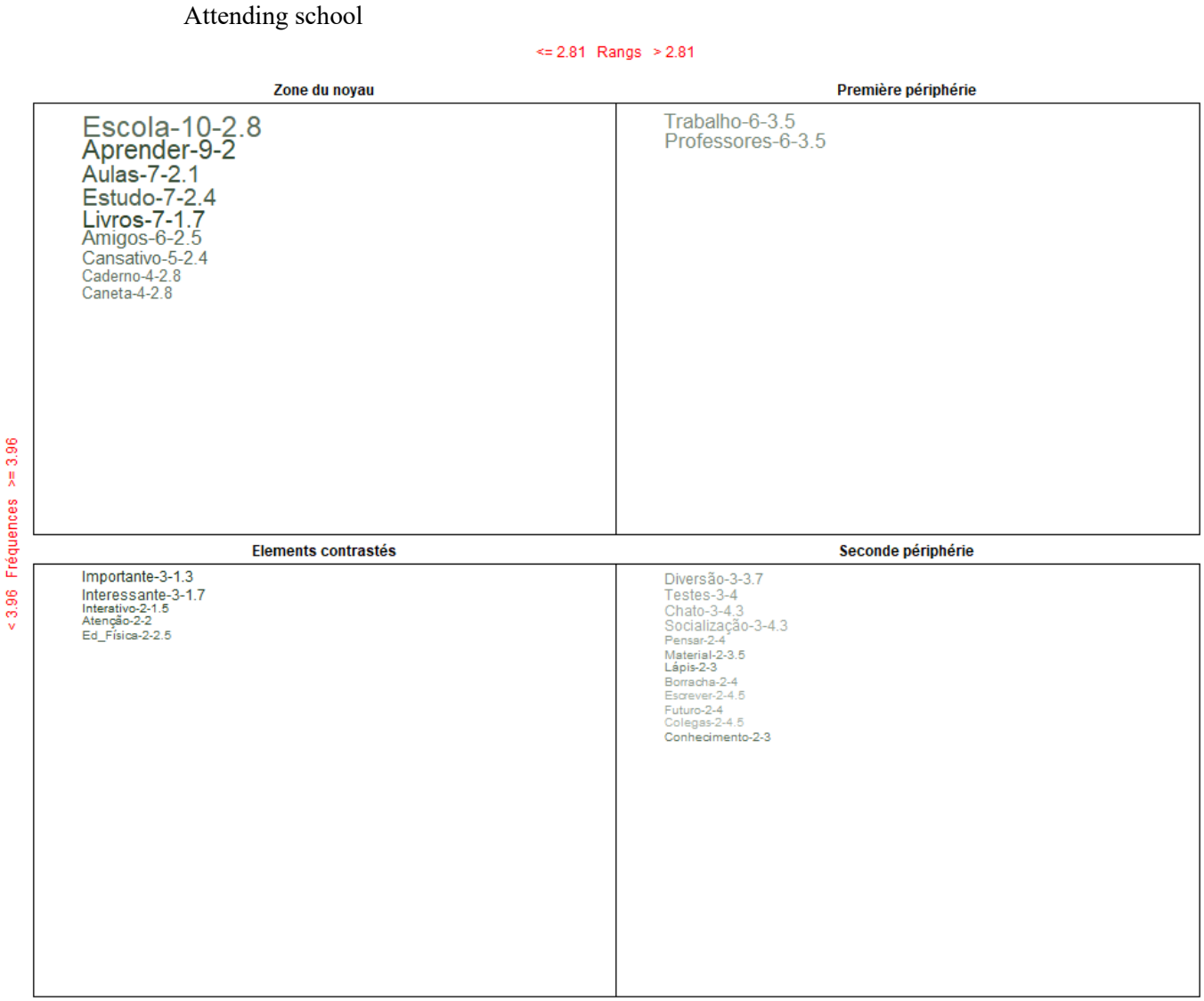
EDUCATION

The prototypical analysis (Figure 53) of the stimulus education revealed that the themes present in the central nucleus are associated with physically attending school. The most frequent word in this group is school, and it is the most relevant along with notebook, and pen. This quadrant was labelled "Attending school".

The first periphery presents only two words: schoolwork and teachers, and no clear theme was identified. The contrasting elements consist of "Benefits of face-to-face education", as this group consist of words such as important, interesting, interactive, attention, and physical education. The second periphery does note present a clear theme in this analysis.

Figure 53

Prototypical analysis conducted with the stimulus "education"



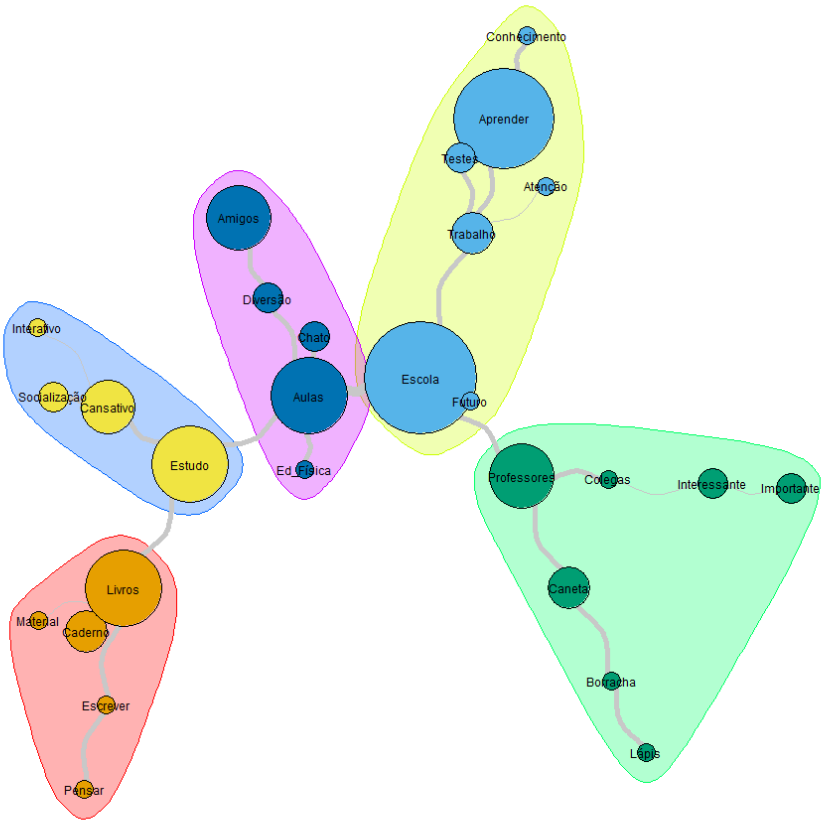
Benefits of face-to-face education

In the similarity analysis (Figure 54), it is possible to identify five different groups. The word school is the most frequent and shares the yellow group with other words such as learning, tests, knowledge, attention, and work. The yellow group is connected through the word school to the green group through the word teachers, and to the pink group through the word classes. The yellow group focuses on school and its relevance.

The green group focuses on the figure of the teacher. Pen, erasure, pencil, classmates, interesting, and important are connected to the word professor, creating a group that represents people and tools. The group in pink is connected through the word classes and is associated with others such as boring, fun, friends, and physical education. This group represents the positive and negative side of classes. The group in blue focuses on the words study and tiredness. Despite also presenting the words socialisation and interactive, they are less frequent than the others. Therefore, the focus of this group is study efforts. Finally, the red group focuses on the word book, followed by notebook, material, write, and think, indicating a theme associated with knowledge.

Figure 54

Similarity analysis conducted with the stimulus "education"

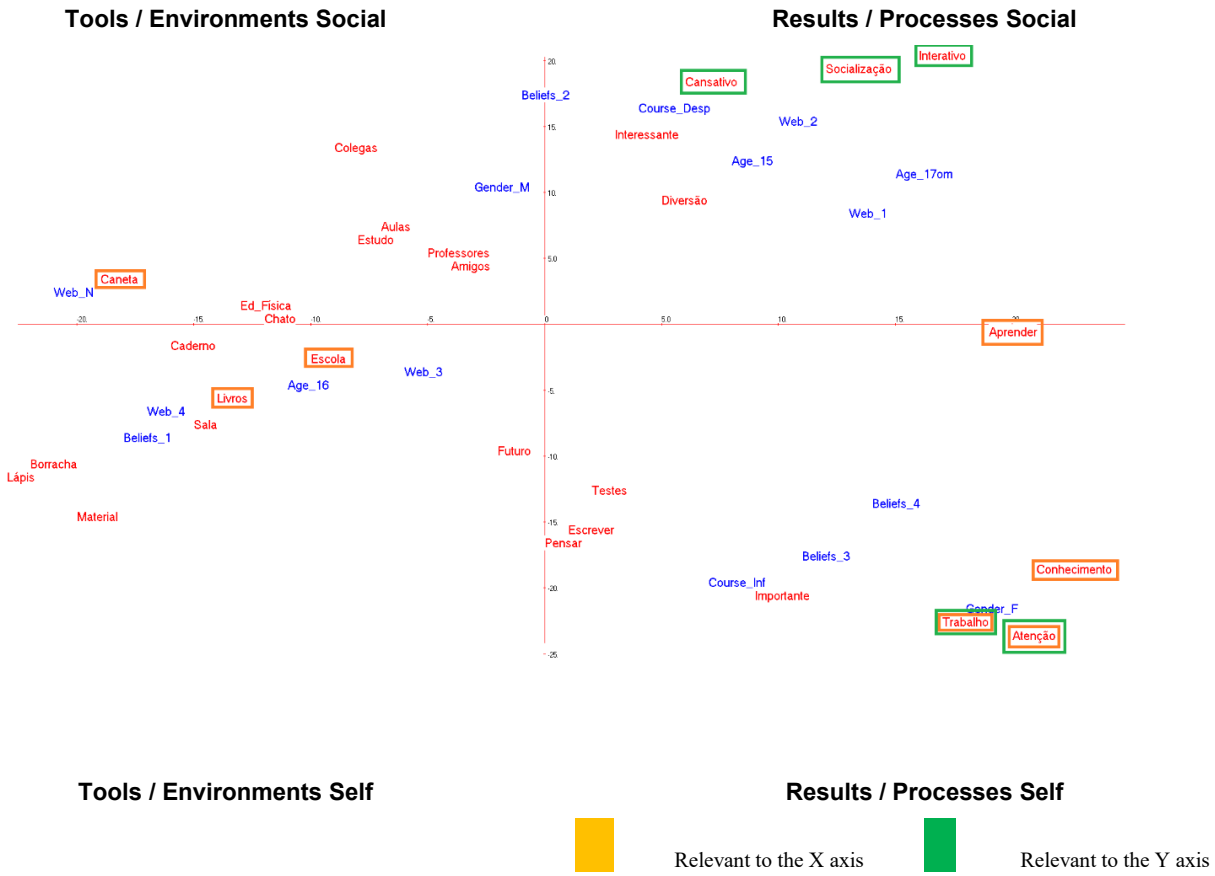


The Cartesian plan of the correspondence analysis of the stimulus Education (Figure 55) was created with the 2nd and 3rd factors of the analysis generated in Dtm-Vic, as the first factor did

not present enough relevant terms to make it possible to identify its theme. The X axis of the Cartesian plan presents a tension that goes form the tools and environments of education (pen, book, school) on the left, to the results and processes of education (learn, knowledge, attention, work), on the right. The Y axis presents a tension between the self, by being composed of the relevant words work and attention in the lower quadrants, and social, as it is possible to identify the words socialization, interactive, and tyring. The variable distributions that presented relevance were *gender* and *course*. The female group is positioned in the Results / Processes Self quadrant, while the male group is situated in the Tools / Environments Social quadrant. The computer technician class is positioned in the Results / Processes Self quadrant, and the physical education technician class is located in the Results / Processes Social quadrant.

Figure 55

Correspondence analysis conducted with the stimulus "education"



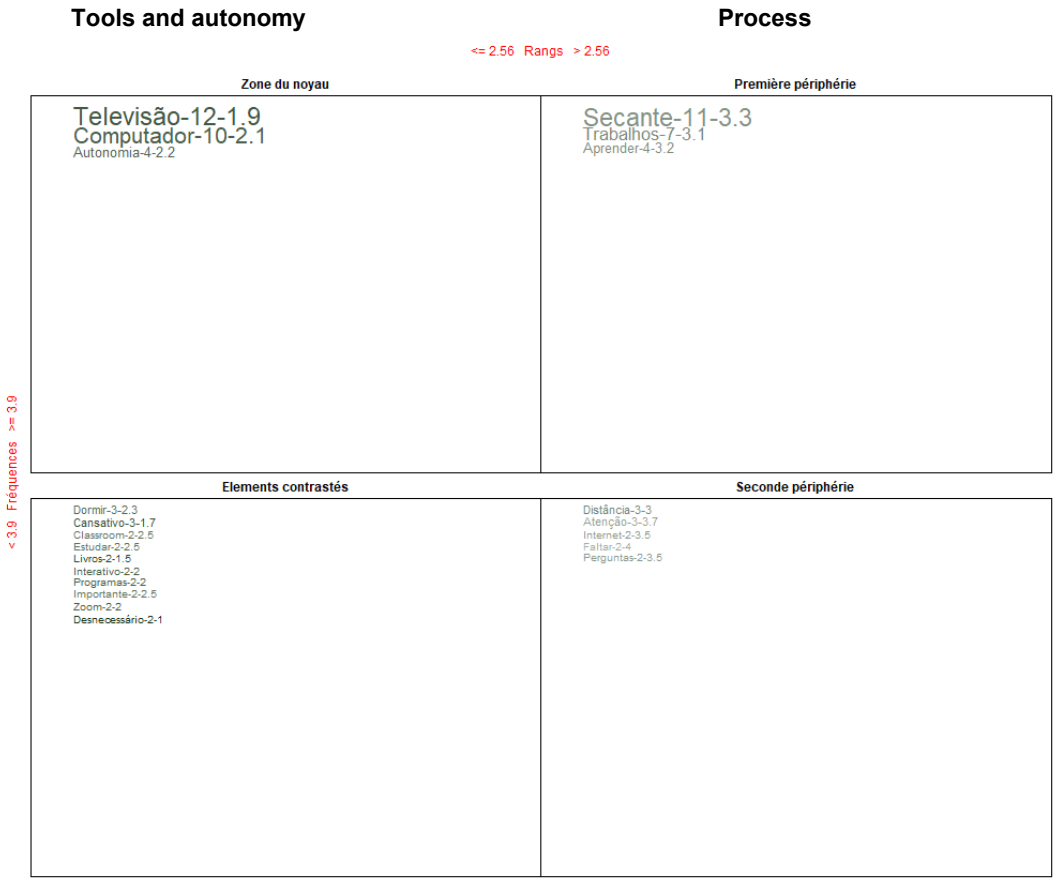
Note. Labels of the axes and quadrants added by the authors to the DTM-Vic output. Only statistically significant data reported. Tensions in the X axis are Tools / Environments and Results / Processes. Tensions in the Y axis are Self and Social.

ESTUDO EM CASA

The central nucleus of the prototypical analysis of *estudo em casa* (Figure 56), consists of the themes television, computer, and autonomy. The representations in this nucleus, relate to the theme "Tools and autonomy". The first periphery presents the words boring, schoolwork, and learn, indicating some dissatisfaction with the schoolwork, but also the results of this process in the form of the term learn, therefore, this groups was labelled "Process". The contrasting elements consists of the words sleep, tiring, classroom (Google Classroom), study, books, interactive, programmes, important, Zoom, and unnecessary. The second periphery also presented no clear theme and consisted of the words distance, attention, internet, skip classes, and questions.

Figure 56

Prototypical analysis conducted with the stimulus "Estudo em casa"

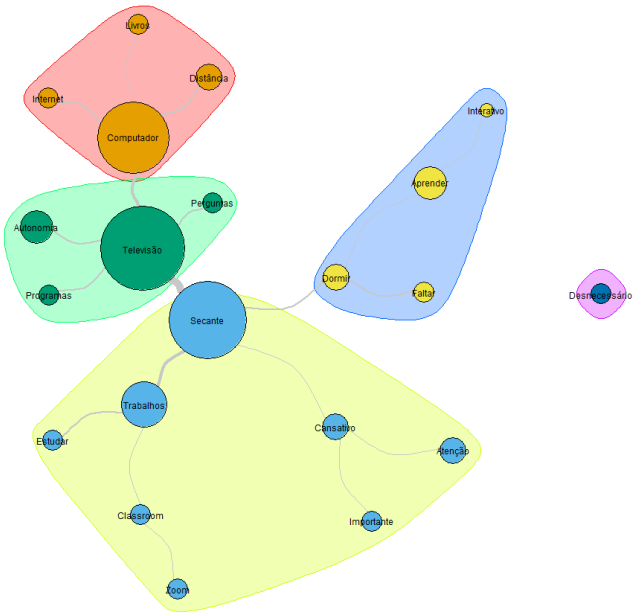


The similarity analysis (Figure 57) presents five different groups. The pink group, isolated in the upper right corner, consists of a single word: unecessary. The other four groups are connected.

The bigger group, in yellow, focuses on the word boring. Other words that are present in this group are: study, Zoom, Classroom (Google Classroom), schoolwork, important, attention, and tiring. This groups represents challenges to overcome and learn through the educational initiative. The green group is strongly connected with the yellow one, and revolves around "television". The other words present are autonomy, questions and programmes, representing the dynamics with the transmitted classes. The red group is focused on the word computer. Along with it, words such as internet, books, and distance are also present, symbolising the computer as way to mediate distance, and access academic content. Finally, the less strongly connect group is the blue one. It consists of the word sleep, learn, skip school, and interactive. This group presents the relevance of maintaining the routine, in the context of *estudo em casa*.

Figure 57

Similarity analysis conducted with the stimulus "Estudo em casa"



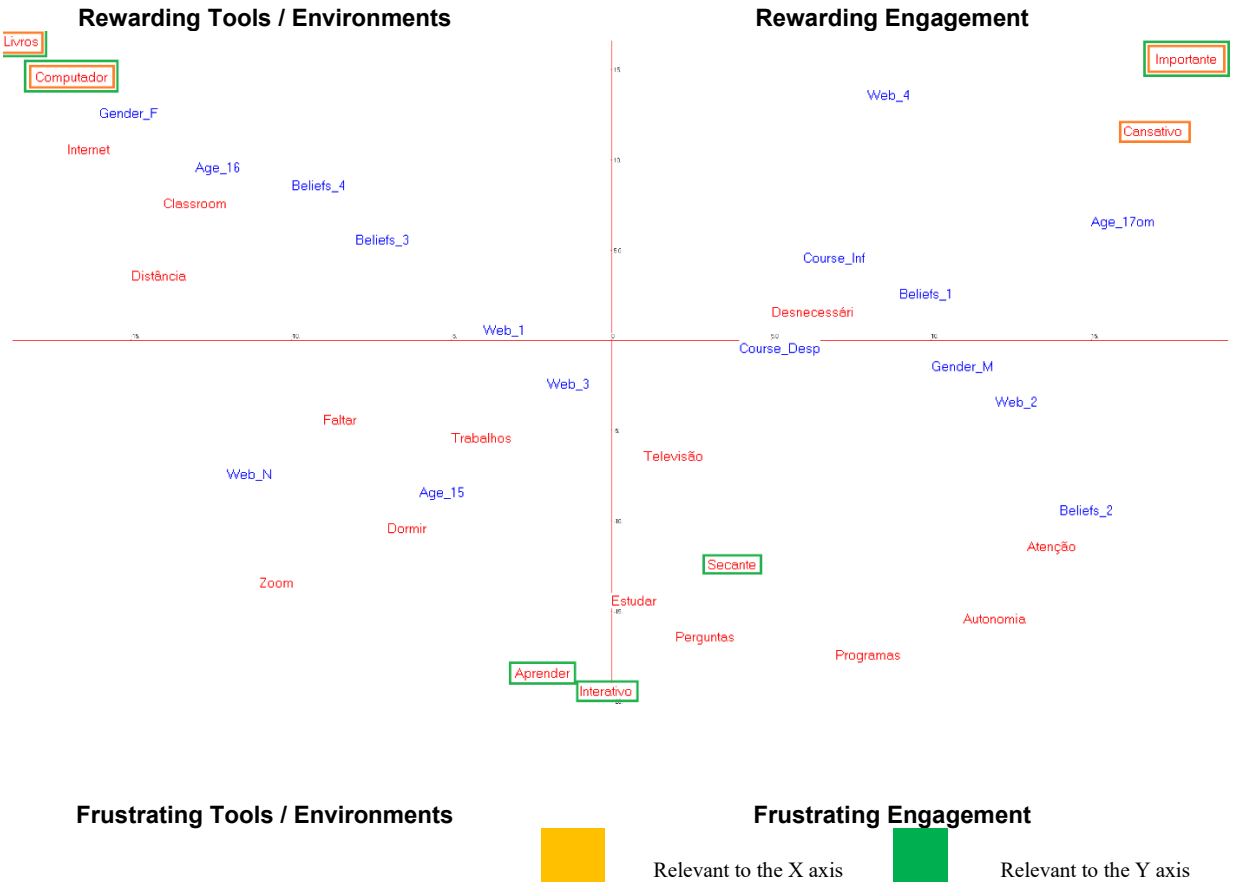
The correspondence analysis (Figure 58) of the stimulus Estudo em casa, utilized factors 2 and 3 of the Dtm-Vic analysis, as they presented more relevant information than factor 1. The X axis presents a tension between the words books and computer, on the left, and important and tiring, on the right. A tension that moves from Tools / Environments to Engagement. The Y axis presents

a dynamic between books, important, and computer, on the upper quadrants, and boring learn, and interactive, in the lower quadrants. The word interactive was associated with negative words before the data was prepared for the analysis, therefore, the tension between these terms can be summarized by the Rewarding and Frustrating.

The revelant variables in this stimulus were also *gender* and *course*. The male group representations were associated with the Frustrating Engagement quadrant, while the female group is positioned in the Rewarding Tools / Environments quadrant. The physical education course representations are situated in the Frustrating Engagement, and the computer technician course is positioned in the Rewarding Engagement quadrant.

Figure 58

Correspondence analysis of the stimulus "Estudo em casa"



Note. Labels of the axes and quadrants added by the authors to the DTM-Vic output. Only statistically significant data reported. Tensions in the X axis are Tools / Environments and Engagement. Tensions in the Y axis are Rewarding and Frustrating.

4.4 DISCUSSION

The study presented in this chapter consisted of a survey with 10th grade students of two different technical courses: physical education technician and computer technician. The questionnaire aimed to identify the social representations of ERE in circulation in Portuguese high school, and to verify how variables such as gender, age, course, digital literacy and perceptions regarding the Portuguese education system and internet use in education.

The Web-Use Skill Measure Index identified an average level of self-perceived digital literacy from students, and contrary to the expectations, the computer technician and the physical education technician courses did not present significant mean differences. The social representations of vocational courses in Portugal, such as the courses of the participants, present a majority of pejorative representations (Moreira, 2012). These pejorative representations may influence the decision-making process of students, which may not see vocational courses as their first option. This may lead us to believe that despite their current course, they may have not possessed a great level of interest or skill in the disciplines, which may have resulted in similar results between courses and average levels overall.

The Beliefs on Education Scale presented an average perception of the school system and a positive view of internet use in education. In fact, this perception of internet use in school was more positive than the results achieved in the original study (Moreira, 2021), however, this difference may be attributed to the small sample size of this study. Internet use in education has been identified to positively impact academic performance, while internet use for general purposes presented a negative impact (Kim et al., 2017; Xu et al., 2019). Therefore, simply implementing internet use in school may negatively impact academic performance, as internet must be utilized in an educational context. Despite that, some students suggested that there should be unrestricted access to internet in school, as they relied on limited equipment or data packages that did not grand them unlimited access while on school grounds.

The results of the Perceived Internet School Usage presented a similar overall mean when compared to the original study (Moreira, 2021), and students identified that there was some influence of the ERE experience in this perceived used of the internet in education. Still regarding the internet use in the classroom, students identified that it was frequently used but still indicated in the open-ended question that there should be more internet use in classes.

The social representations of ERE obtained through the free association technique did not present any words describing the exceptional condition regarding this modality of education. Words such as emergency and exception were absent, which is in line with the social representations identified in Twitter. The nucleus, present in the prototypical analysis, consists of the terms computer, home, learning, online, and Zoom, indicating. The lack of the word distance might mean that the anchoring in distance education was being surpassed by an objectification process. The similarity analysis of the stimulus ERE revolved around the term computer, indicating an objectification process (Abric, 2003; Vala & Monteiro, 2013), which is in line with previous studies with Potuguese students (Moreira, 2021) that identified tha the computer is mosty associated with work by students. Also, this analysis presented the difficulties students faced in ERE, as there was a large group focused on this topic. Words such as boring and difficult were associated with online classes and learning. The prototypical analysis of the stimulus distance education identified tensions between virtual and physical and Environment and processes. Female students were associated with the Virtual processes' quadrant, while male students were mainly positioned at Physical processes. This association may indicate that female students were more focused on the virtual aspects, while male students were attached to the physical and presented more difficulty to engage with the virtual. One interesting point is that the figure of the guardian is absent in the analysis associated with distance education. This lack of familiar presence, despite the presence of the environments of distance education, may indicate that, in this case, guardians did not have a strong presence in ERE. In the scoping review (chapter 2), it was identified that parental support was essential during ERE, with studies even recommending the inclusion of parents in the decision-making processes of ERE (Manca & Delfino, 2021; Williams & Corwith, 2021) and highlighting the heavy burden ERE had on legal guardians (Misirli & Ergulec, 2021). However, the fact that terms related parents and legal guardians were not present in the representation lead us to question if students shared the same perspective as the studies analised.

When we analyse the results related to the stimulus education, it is possible to identify a strong relationship with the physical aspects of education, such as attending school and the presence of classmates and teachers. The prototypical analysis of stimulus education presented the terms school, learn, classes, study, books, friends, tiring, notebook, and pen, indicating a focus on the face-to-face aspect of education. Also, it was possible to identify that student have a better impression of face-to-face education when compared to ERE, which is expected. Despite these

results, it was frequent in the open-ended question for students to request more computer and cell phone use in classes. Previous literature indicates that education professionals tend to see students as addicted to the mobile phones, and that it is perceived as a threat as it exposes the safe and closed space that is a classroom (Moreira, 2021). This perception may influence the resistance in utilizing the smartphone in an academic context, while the computer is used more frequently.

While ERE was anchored in distance, and education with the physical aspect, the social representations of *estudo em casa* revolved around the television, and was heavily criticised by the students, being considered "boring" and being associated with lack of motivation.

The presence of commercial platforms in the representations (Zoom and Google Classroom) and lack of open-source platforms (Moodle), indicates that the ERE relied on private solutions, even if open-source tools present the advantages of low cost and the possibility of customization to better suit the course's needs (Mohammed et al., 2019). Furthermore, it was identified that there was little variation in the solutions utilized, and most were developed and maintained by the same large corporations (such as Google). This may be troublesome as it was identified that these companies are gathering commercial advantages due to the ERE (Dias-Trindade et al., 2020; Knox, 2020). The presence of these solutions in the representation indicates an objectification process with these platforms (Abric, 2003). The objectification process tends to be commercially or technologically driven (Moreira, 2021), and in this case it seems that it was commercially driven.

Finally, it is possible to conclude that ERE was anchored on traditional distance education and the representations identified in this study also lacked terms that connected education during the pandemic with emergency remote education. The representations of education were strongly associated with physical aspects of education. Also, there has been an increase in the perception of the benefit of internet use in education by students. However, internet use in classes should be associated with academic activities, as general use is correlated with a negative impact in academic performance. ERE was objectified to the computer, and the platforms utilized, however, the platforms were all commercially available solution and open-source solutions were ignored.

5. FINAL DISCUSSION

This chapter contains the discussions of the studies presented in previous chapters of this dissertation. All the information presented will be compared and confronted in a final general discussion. The first study (chapter 2) consisted in a scoping review which identified that most main findings of the studies analysed were already being discussed before the COVID-19 pandemic, with the exception of Cultural or socioeconomic circumstances, which brought a new perspective to an issue that already existed. Also, studies favoured teachers as participants, which may have biased the frequency of findings in results, and ERE tended to rely on face-to-face pedagogies in an online environment.

Chapter 3 consisted of analysis of social representations in circulation in the social network Twitter. This study identified that, the most common words in the cluster did not present any word related to emergency or exception, suggesting that ERE was anchored to distance education. This anchoring may have influenced perception and conduction of ERE.

Finally, the study in chapter 4 turned to classrooms to identify the social representations in circulation inside a Portuguese high school, after classes returned to the face-to-face modality. As it was previously seen in chapter 3, the representations surrounding ERE relied on terms associated with distance education and online education, indicating an anchoring process. Results in this section also point to objectifying ERE to the computer and platforms, such as Zoom and Google Classrooms. The social representations of ERE were divided into two different tensions in the correspondence analysis: virtual and physical and environment and processes.

It is possible to recognize a consistency between studies, as ERE was mostly associated with distance education, and relied on face-to-face strategies through an online environment. In Portugal and the other countries studied in the scoping review, it was not possible to identify structural changes in pedagogy, such as changes in the curriculum, as it seemed that educational policies tried to make ERE as close as possible to pre-pandemic face-to-face education. Academic literature that investigates topics relevant to ERE, such as distance learning, emergency learning, and e-learning, could have been utilized to develop solutions that differed from the strategies utilized in face-to-face education and to better utilize ICT in and online educational context. Furthermore, curricular changes, in an exceptional period marked by two different states of emergency, could identify relevant core skills that students should acquire, and decrease synchronous class frequency and duration (Schultz & Sharp, 2007; Zhao, 2020).

Furthermore, E-learning allows that the delivery of content can be adapted to focus the process on the student and his needs. However, what was observed in the studies analysed in this dissertation were standardized responses that tried to keep up with face-to-face education (Zhao, 2020).

According to Hodges et al. (2020), ERE is a "temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances", however, during the COVID-19 pandemic, the temporary lasted for longer that what was initially perceived, and measures should have adapted to try to accommodate to a longer lasting solution that would rely on more autonomous pedagogies for those students that proved to be more responsible and better perceived the content, and more attention to those that required more support (Ghazali, 2020). Though this definition is broadly utilized in the studies of the scoping review, it is important to point out that, later, the author also states that "it is a way of thinking about delivery modes, methods, and media". The emphasis of the implementation of ERE was on the delivery mode, and it seemed that more focus on the methods and pedagogies of ERE would greatly benefit the experience for all involved.

Based on previous results and discussion, this study presents four suggestions that have not been previously addressed in the analysed contend, and could provide a better ERE implementation:

Propose curricular changes, focusing on core skills and contents: Trying to keep up with the academic curriculum adopted in face-to-face education academic was cause of long hours of work for teachers and students. Focusing on core skills and contents and reducing the administered content would provide the opportunity for teachers to focus on teaching less content with more quality and support for students, and to students to be present in less expository classes, and more focused on personal study and project development.

Adapt evaluation moments: Maintaining conventional evaluation processes during ERE was challenging (Beardsley et al., 2021; Calderón-Garrido & Gustems-Carnicer, 2021; Godoi et al., 2020; Nilsberth et al., 2021) and different approaches could be useful to validate the progress of students and make sure they are reaching the expected level of comprehension, especially in a more autonomous context (Adesope et al., 2017; McDaniel et al., 2011; Yang et al., 2021).

Utilize previous frameworks and literature: Previous studies may be utilized as a starting point to adapt a course to the online modality. It is important to build upon what has already been discussed to take advantage of the available resources.

Focus on equity: Equity was a great concern during the pandemic, and measures to address it should be taken throughout time, and not only during emergencies. Identify the individual necessities of students, and supply equipment, training, or access are some of actions that can taken to provide equity (Back et al., 2021).

The suggestions presented above should be validated before being incorporated in ERE, however, they present a distinct perspective that may be useful in the future.

This study identified the main trends regarding academic production, the social representation in circulation in Twitter, and finally, in Portuguese classroom. It was identified that ERE measures mirrored face-to-face education and no major change to pedagogy or academic content was performed. The recommendations present in this discussion can be utilized to support the development of educational policies, further adoptions of ERE, and e-learning in general.

6. CONCLUSION

In 2019 a new infectious disease named COVID-19, caused by the SARS-CoV-2, a recently detected coronavirus, emerged. Education went through a forced transition from face-to-face education to distance learning with limited resources and time, and little is known regarding the consequences of this transition.

This dissertation was composed by three structuring and interconnected components, and aimed to explore academic production, social representations in circulation in the social network Twitter, and social representations in circulation in a public school in Portugal regarding the implementation of emergency remote education during the pandemic of COVID-19. The first part of the study consisted of a scoping review which identified the main findings, limitations, and methodological tendencies. Through these results it was possible to identify that ERE mostly replicated face-to-face strategies in an online context, and that teachers were favoured as participants, which may have influenced the frequency of findings. Also, the themes discussed in the studies analysed, have already been addressed in similar ways in the past, with the exception of equity.

Following the scoping review, and based on the results identified in that step, an analysis of posts from the social network Twitter identified the social representations of ERE in circulation in the social network. Results pointed to an anchoring process with distance education, and a lack of representations that characterized the severity of the period, which may be explained by the pedagogical choices utilized.

Finally, the third study consisted of identifying the social representations of ERE in a Portuguese high school, along with assessing the digital literacy, beliefs on education, and internet use of students. Once again, results indicate that emergency remote education was anchored to distance education, which may have influenced pedagogical choices. Furthermore, students perceived that there was more benefit to internet use in education, when compared to other studies.

The three studies point to ERE being heavily associated with distance education, and even with this strong comparison between both, effective distance learning pedagogies were neglected in favour of face-to-face pedagogies. Based on these findings, this study suggests four recommendations that could be utilized and greatly benefit future similar situations: propose curricular changes focusing on core skills, increase frequency of tests, pay attention to equity in education, and utilize previous frameworks and literature.

The limitations related to the first study may be associated with the time window of the article collection, as relevant studies that presented a greater variety of participants may have been published after the date of collection. Future scoping reviews should try to have a larger window of article collection and compare different time periods to identify how the information evolved through the pandemic.

The social representations of Twitter presented a limitation related to a possible participant bias, as people that have access to the social network and may present a similar profile. Future studies should try to assess the social representations in circulation in different social media and compare them.

The limitations of the third study are associated with the sample size, as this sample may not be generalizable to the Portuguese population. Future studies should try to assess the social representation of ERE in more classes and in different schools thorough Portugal. Also, education profession and legal guardians should participate in the study as well, so social representations could be compared.

This study offers four recommendations based on pedagogical approaches and taking into consideration the findings to better prepare for future similar situations: (i) propose curricular changes focusing on core skills and contents, (ii) adapt evaluation moments, (iii) utilize previous frameworks and literature, and (iv) focus on equity. Furthermore, three software were developed to conduct this study and their complete Python code are displayed in this dissertation.

Finally, the relevance of this project lies in generating new evidence that can assist in the development of pedagogical practices, in the directing of education politics, in the application of ERE in future contexts, and the use of e-learning in education

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Appendix

Appendix 01 – Scoping review reference

Identification Number	Authors	Title
1	Back, M., Golembeski, K., Gutiérrez, A., Macko, T., Miller, S., Pelletier, D.L.	"We were told that the content we delivered was not as important:" disconnect and disparities in world language student teaching during COVID-19
2	Peterson, L., Scharber, C., Thuesen, A., Baskin, K.	A rapid response to COVID-19: one district's pivot from technology integration to distance learning
3	Mehrotra, A., Giang, C., El-Hamamsy, L., Guinchard, A., Dame, A., Zahnd, G., Mondada, F.	Accessible Maker-Based Approaches to Educational Robotics in Online Learning
4	Calderón-Garrido, D., Gustems-Carnicer, J.	Adaptations of music education in primary and secondary school due to COVID-19: the experience in Spain
5	Manca, S., Delfino, M.	Adapting educational practices in emergency remote education: Continuity and change from a student perspective
6	Baran, A.A., Baran, H.	An investigation of mathematics teachers' emergency remote teaching experiences
7	Williams, K.M., Corwith, A.	Beyond Bricks and Mortar: The efficacy of online learning and community-building at College Park Academy during the COVID-19 pandemic
8	Lepp, M; Luik, P	Challenges and Positives Caused by Changing Roles during Emergency Remote Education in Estonia as Revealed by Facebook Messages
9	Muhterem Dindar | Anna Suorsa | Jan Hermes | Pasi Karppinen | Piia Näykki	Comparing technology acceptance of K-12 teachers with and without prior experience of learning management systems: A Covid-19 pandemic study
10	Kevin M. Wong, Benjamin Luke Moorhouse	Digital competence and online language teaching: Hong Kong language teacher practices in primary and secondary classrooms
11	Emanuel do Rosário Santos Nonato, Mary Valda Souza Sales, Társio Ribeiro Cavalcante	Digital culture and digital teaching resources: an overview of teaching during the covid-19 pandemics
12	Marie Nilsberth, Yvonne Liljekvist, Christina Olin-Scheller, Johan Samuelsson, Claes Hallquist	Digital teaching as the new normal? Swedish upper secondary teachers' experiences of emergency remote teaching during the COVID-19 crisis
13	Marc Beardsley | Laia Albó | Pablo Aragón | Davinia Hernández-Leo	Emergency education effects on teacher abilities and motivation to use digital technologies
14	Christine Elizabeth (Noor) Couttsa, Mohamed Buhejib, Dunya Ahmedb, Talal Abdulkareemd, Budhoor Buhejie, Sajeda Eidand and Nikolay Perepelkinf	Emergency remote education in Bahrain, Iraq, and Russia During the COVID-19 pandemic: A comparative case study
15	María José Sosa Díaz	Emergency Remote Education, Family Support and the Digital Divide in the Context of the COVID-19 Lockdown
16	Lígia Beatriz Carvalho de Almeida, Iasmin Araújo Bandeira Mendes, Jamila Monteiro de Araújo	Ensino remoto emergencial: as experiências de uma escola pública e de uma particular em campina grande/pb
17	Zuheir N. Khlaif · Soheil Salha · Bochra Kouraichi	Emergency remote learning during COVID-19 crisis: Students' engagement
18	Filipa Seabra, António Teixeira, Marta Abelha and Luísa Aires	Emergency Remote Teaching and Learning in Portugal: Preschool to Secondary School Teachers' Perceptions
19	Torrey Trust & Jeromie Whalen	Emergency remote teaching with technology during the COVID-19 pandemic: using the whole teacher lens to examine educator's experiences and insights
20	Clayton Whittle, Sonia Tiwari, Shulong Yan and Jeff Williams	Emergency remote teaching environment: a conceptual framework for responsive online teaching in crises

21	M. Eulalia Torras Virgili	Emergency Remote Teaching: las TIC aplicadas a la educación durante el confinamiento por Covid-19
22	Lara Carlette Thiengo, Maria Fernanda Diogo, Lucídio Bianchetti, Kaue Tortato Alves, Neiva de Assis	Encontros e desencontros entre professores e o ensino remoto emergencial
23	Sara Dias-Trindade, Joana Duarte Correia, Susana Henriques	Ensino remoto emergencial na educação básica brasileira e portuguesa: a perspectiva dos docentes
24	Jacks Richard de Paulo, Stela Maris Mendes Siqueira Araújo, Priscila Daniele de Oliveira	Ensino remoto emergencial em tempos de pandemia: tecendo algumas considerações
25	Tamar Shamir-Inbal and Ina Blau	Facilitating Emergency Remote K-12 Teaching in Computing-Enhanced Virtual Learning Environments During COVID-19 Pandemic - Blessing or Curse?
26	Ricardo Chaves de Farias e Denise Mota Pereira da Silva	Ensino remoto emergencial: virtualização da vida e o trabalho docente precarizado
27	Ozge Misirli · Funda Ergulec	Emergency remote teaching during the COVID-19 pandemic: Parents experiences and perspectives
28	Azlin Norhaini Mansor, Nur Hidayah Zabarani, Khairul Azhar Jamaludin *, Mohamed Yusoff Mohd Nor, Bity Salwana Alias and Ahmad Zamri Mansor	Home-Based Learning (HBL) Teacher Readiness Scale: Instrument Development and Demographic Analysis
29	Fernanda Araujo Coutinho Campos, Rute Pereira	Formação de professores nas ilhas portuguesas Madeira e Açores: estratégias para o ensino remoto em tempos da COVID-19
30	Sheng-Yi Wu	How Teachers Conduct Online Teaching During the COVID-19 Pandemic: A Case Study of Taiwan
31	Angelos Sofianidis, Maria Meletiou-Mavrotheris, Panagiota Konstantinou, Nayia Stylianidou and Konstantinos Katzis	Let Students Talk about Emergency Remote Teaching Experience: Secondary Students' Perceptions on Their Experience during the COVID-19 Pandemic
32	Gonzalo Cortes Abarca	Implementation of Emergency Remote Teaching in Chilean Schools due to COVID-19
33	Fahmi Ibrahim · Nena Padilla-Valdez · Umi Kalthum Rosli	Hub-and-spokes practices of blended learning: trajectories of emergency remote teaching in Brunei Darussalam
34	Jillianne Code, Rachel Ralph and Kieran Forde	Pandemic designs for the future: perspectives of technology education teachers during COVID-19
35	Raquel Mignoni de Oliveira, Ygor Corrêa	Ensino de língua portuguesa com a mediação das tecnologias digitais em tempos de pandemia
36	SILVA, Ana Carolina Oliveira; SOUSA, Shirlaine de Araújo; MENEZES, Jones Baroni Ferreira de. O	O ensino remoto na percepção discente: desafios e benefícios
37	Susana Henriques, Joana Duarte Correia and Sara Dias-Trindade	Portuguese Primary and Secondary Education in Times of COVID-19 Pandemic: An Exploratory Study on Teacher Training and Challenges
38	Daniel Acosta, Yui Fujii, Diana Joyce-Beaulieu, K. D. Jacobs, Anthony T. Maurelli, Eric J. Nelson and Sarah L. McKune	Psychosocial Health of K-12 Students Engaged in Emergency Remote Education and In-Person Schooling: A Cross-Sectional Study
39	Bingqing Li	Ready for Online? Exploring EFL Teachers' ICT Acceptance and ICT Literacy During COVID-19 in Mainland China
40	Luis J. Rodríguez-Muñiz , Diego Burón, Álvaro Aguilar-González and Laura Muñiz-Rodríguez	Secondary Mathematics Teachers' Perception of Their Readiness for Emergency Remote Teaching during the COVID-19 Pandemic: A Case Study
41	Mas Ayu Mumin, Nena Padilla-Valdez, Lee Kok Yueh Norihan binti, Abu Hassan, Hjh Shanafizahwatty, Hj Mat Salleh	Reflective Roles and Resilience Building Opportunities of Parent-Teachers in Emergency Remote Teaching: Trajectories toward Inclusive Recovery

42	Dr Christopher Rwodzi, Dr Lizette de Jager	Resilient English teachers' use of remote teaching and learning strategies in Gauteng resource-constrained township secondary schools
43	Katarzyna Potyrała, et al.	Head teachers' opinions on the future of school education conditioned by emergency remote teaching
44	Jorge-Manuel Prieto-Ballester, Francisco-Ignacio Revuelta-Domínguez, and María-Inmaculada Pedrera-Rodríguez	Secondary School Teachers Self-Perception of Digital Teaching Competence in Spain Following COVID-19 Confinement
45	Fangfei Li, Tinghe Jin, Palitha Edirisingha and Xi Zhang	School-Aged Students' Sustainable Online Learning Engagement during COVID-19: Community of Inquiry in a Chinese Secondary Education Context
46	Javier Portillo, Urtza Garay, Eneko Tejada and Naiara Bilbao	Self-Perception of the Digital Competence of Educators during the COVID-19 Pandemic: A Cross-Analysis of Different Educational Stages
47	XINNING GUI, YAO LI, USA YANLAI WU	Teacher-Guardian Collaboration for Emergency Remote Learning in the COVID-19 Crisis
48	Matthew A. Kraft, Nicole S. Simon & Melissa Arnold Lyon	Sustaining a Sense of Success: The Protective Role of Teacher Working Conditions during the COVID-19 Pandemic
49	Yang Yang, Keqiao Liu, Miao Li & Siqi Li	Students' affective engagement, parental involvement, and teacher support in emergency remote teaching during the COVID-19 pandemic: Evidence from a cross-sectional survey in China
50	Magdalena Jelińska and Michał B. Paradowski	Teachers' Engagement in and Coping with Emergency Remote Instruction during COVID-19-Induced School Closures: A Multinational Contextual Perspective
51	Brantina Chirinda , Mdutshekelwa Ndlovu and Erica Spangenberg	Teaching Mathematics during the COVID-19 Lockdown in a Context of Historical Disadvantage
52	Zuheir N. Khlaif, Soheil Salha, Saida Affouneh, Hadi Rashed & Lotfia Ali ElKimishy	The Covid-19 epidemic: teachers' responses to school closure in developing countries
53	Ninosca Bravo Villa, Juan Guillermo Mansilla Sepúlveda, Alex Véliz Burgos	Teletrabajo y agobio laboral del profesorado en tiempos de COVID-19
54	Magdalena Jelińska and Michał B. Paradowski	Teachers' Perception of Student Coping With Emergency Remote Instruction During the COVID-19 Pandemic: The Relative Impact of Educator Demographics and Professional Adaptation and Adjustment
55	Carlo Giovannella, Marcello Passarelli, Donatella Persico	The Effects of the Covid-19 Pandemic on Italian Learning Ecosystems: The School Teachers' Perspective at the steady state
56	GODOI, Marcos; KAWASHIMA, Larissa Beraldo; GOMES, Luciane de Almeida.	Temos que nos reinventar": os professores e o ensino da educação física durante a pandemia de COVID-191
57	Brenda Cecilia Padilla Rodríguez, Alejandro Armellini ans John Traxler	The Forgotten Ones: How Rural Teachers in Mexico are Facing the COVID-19 Pandemic
58	Zuheir N Khlaif and Soheil Salha, An Najah, Shahid Fareed, Hadi Rashed	The Hidden Shadow of Coronavirus on Education in Developing Countries
59	Kelly A. Parkes, Joshua A. Russell, William I. Bauer and Peter Miksza	The Well-being and Instructional Experiences of K-12 Music Educators: Starting a New School Year During a Pandemic
60	Liz O. Boltz, Aman Yadav, Brittany Dillman, Candace Robertson	Transitioning to remote learning: Lessons from supporting K-12 teachers through a MOOC

Appendix 02 – Twitter scrapper code

```
import tweepy
import json
import logging
import yaml

with open('config.yaml', 'r') as f:
    config = yaml.safe_load(f)

logging.basicConfig(level=logging.DEBUG)

client = tweepy.Client(bearer_token=config['token'], wait_on_rate_limit=True)

# Replace with your own search query
query = 'ensino place_country:PT -is:retweet'

# Replace with time period of your choice
start_time = '2019-01-01T00:00:00Z'

# Replace with time period of your choice
end_time = '2021-12-31T00:00:00Z'

tweets = tweepy.Paginator(client.search_all_tweets,
                          query=query,
                          tweet_fields=['attachments', 'author_id',
'context_annotations', 'conversation_id', 'created_at', 'entities', 'geo',
'in_reply_to_user_id', 'lang', 'possibly_sensitive', 'public_metrics',
'referenced_tweets', 'reply_settings', 'source', 'withheld'],
                          user_fields=['created_at', 'description',
'entities', 'location', 'pinned_tweet_id', 'profile_image_url', 'protected',
'url', 'verified', 'withheld'],
                          start_time=start_time,
                          end_time=end_time,
                          expansions=['author_id', 'referenced_tweets.id',
'in_reply_to_user_id', 'attachments.media_keys', 'attachments.poll_ids',
'geo.place_id', 'entities.mentions.username',
'referenced_tweets.id.author_id'],
                          max_results=100).flatten(limit=100000)

o = open("resultados.jsonl", "w")

for tweet in tweets:
    data = tweet.data
    o.write(json.dumps(tweet.data))
    o.write("\n")

o.close()
```

Appendix 03 – Corpus cleaner code

```
import re

def remove_emoji(text):
    emoji_pattern = re.compile("["
                               "\U0001F600-\U0001F64F"  # emoticons
                               "\U0001F300-\U0001F5FF"  # symbols &
pictographs
                               "\U0001F680-\U0001F6FF"  # transport & map
symbols
                               "\U0001F1E0-\U0001F1FF"  # flags (iOS)
                               "\U00002500-\U00002BEF"  # chinese char
                               "\U00002702-\U000027B0"
                               "\U00002702-\U000027B0"
                               "\U000024C2-\U0001F251"
                               "\U0001f926-\U0001f937"
                               "\U00010000-\U0010ffff"
                               "\u2640-\u2642"
                               "\u2600-\u2B55"
                               "\u200d"
                               "\u23cf"
                               "\u23e9"
                               "\u231a"
                               "\ufe0f"  # dingbats
                               "\u3030"
                               "]+", flags=re.UNICODE)
    return emoji_pattern.sub(u"", text)


texto = open("resultados.txt", 'r', encoding='utf-8')
saida = open("corpus.txt", "w", encoding='utf-8')
data = texto.read()

new_data = remove_emoji(data)
new_data2 = re.sub(r'https:\S+', '', new_data)

saida.write(new_data2)

texto.close()
saida.close()
```

Appendix 04 – Iramuteq corpus converter code

```
import json
import datetime

e = open(r'resultados.txt', 'w', newline='', encoding="utf-8")
f = open(r'resultados.jsonl', 'r')



for l in f:
    raw = json.loads(l)

    i_antes_1ee = datetime.date(2020, 1, 1)
    f_antes_1ee = datetime.date(2020, 3, 18)

    i_1ee = datetime.date(2020, 3, 19)
    f_1ee = datetime.date(2020, 5, 2)

    i_entre_ee = datetime.date(2020, 5, 3)
    f_entre_ee = datetime.date(2020, 11, 8)

    i_2ee = datetime.date(2020, 11, 9)
    f_2ee = datetime.date(2021, 4, 30)

    i_depois_2ee = datetime.date(2021, 5, 1)
    f_depois_2ee = datetime.date(2021, 12, 31)

    if ("dissertação" and "Dissertação") not in str(raw["text"]):
        e.write("\n")
        text = str(raw["text"])
        date = str(raw["created_at"])
        data_de_date =
datetime.date(int(date[:4]),int(date[5:7]),int(date[8:10]))
        retweet_count = str(raw["public_metrics"]["retweet_count"])
        reply_count = str(raw["public_metrics"]["reply_count"])
        like_count = str(raw["public_metrics"]["like_count"])
        quote_count = str(raw["public_metrics"]["quote_count"])
        e.write("**** *htg_1 *retweet_count_")
        e.write(str((round(int(retweet_count)/100))*10))
        e.write(" *reply_count_")
        e.write(str((round(int(reply_count)/100))*10))
        e.write(" *like_count_")
        e.write(str((round(int(like_count)/100))*10))
        e.write(" *quote_count_")
        e.write(str((round(int(quote_count)/100))*10))
        e.write(" *year_")
        e.write(date[:4])
        if i_antes_1ee < data_de_date < f_antes_1ee:
            e.write(" *antes_do_primeiro_EE")
        elif i_1ee < data_de_date < f_1ee:
            e.write(" *primeiro_EE")
        elif i_entre_ee < data_de_date < f_entre_ee:
            e.write(" *entre_primeiro_e_segundo_EE")
        elif i_2ee < data_de_date < f_2ee:
            e.write(" *segundo_EE")
```

```
        elif i_depois_2ee < data_de_date < f_depois_2ee:
            e.write(" *depois_do_segundo_EE")
        e.write("\n")
        e.write("\n")
        for character in text:
            text = text.replace("""-'"%$""", " ")
            text = text.replace("...", " ")
        e.write(text)

f.close()
e.close()
```

Appendix 05 – Informed consent form

U.PORTO

CONSENTIMENTO INFORMADO – Educando/a
(Cardoso, B., Morais, C., & Moreira, L. - 2022)

Declaro, por este meio, que aceito que o meu/minha educando/a, participe no estudo intitulado *"O que aprendemos na pandemia: As representações sociais da educação remota emergencial"*, desenvolvido pelo investigador Bruno Cardoso no âmbito do seu Mestrado em Educação Multimédia com a orientação de Luciano Moreira e Carla Morais (Universidade do Porto).

Fui informado/a de que os dados são anônimos e os questionários em suporte físico serão preservados durante o período de dois anos em instalações da Universidade do Porto de acesso restrito aos investigadores, salvaguardando assim a necessidade de qualquer verificação adicional durante a realização de análises complementares à base de dados. Atendendo ao seu interesse científico, a base de dados resultante do inquérito por questionário será preservada digitalmente em dispositivo de armazenamento de acesso restrito aos investigadores. A eventual disponibilização futura dos dados em regime de acesso aberto será objeto de medidas técnicas e organizativas que visem assegurar o respeito do princípio da minimização dos dados.

Fui ainda informado/a de que poderei esclarecer quaisquer dúvidas através do seguinte e-mail: brunocardoso@fe.up.pt.

_____

(Assinatura)

_____

(Data)

Appendix 06 – Questionnaire

O QUE APRENDEMOS NA PANDEMIA: AS REPRESENTAÇÕES SOCIAIS DA EDUCAÇÃO REMOTA EMERGENCIAL

(Cardoso, B., Morais, C., & Moreira, L. – 2022)

Caro aluno/a,

Todos passamos por um período nos últimos anos, onde vários aspectos da nossa vida mudaram em função da pandemia. A escola também precisou de se adaptar e recorrer à soluções de ensino a distância de emergência.

Neste questionário, estamos interessados no que pensa sobre o assunto e como percebeu a situação que viveu. Algumas vezes pedimos-lhe apenas para fazer uma cruz, mas outras vezes pedimos-lhe para se expressar com as suas próprias palavras para, assim, compreendermos melhor a sua opinião.

Garantimos que as suas respostas serão lidas com muita atenção. Todas as respostas são importantes e não há tempo limite para preencher o questionário. Por favor, leia com atenção as questões que se seguem e responda de acordo com o que pensa, sente ou faz. Não há respostas boas, nem respostas más. As suas respostas são rigorosamente anónimas.

A qualquer momento, poderá entrar em contacto connosco através do e-mail: brunocardoso@fe.up.pt.

Muito obrigado pela colaboração e boas aulas!

Porto, 25 de maio de 2022

Pela equipa de investigação,

(Bruno Cardoso)

Parte I

1. Sexo:

Masculino.	
Feminino.	

2. Idade:

Menos de 15.	
15.	
16.	
Mais de 16.	

3. Nacionalidade:

Portuguesa.	
Outra.	

4. Curso:

Desporto.	
Informática.	

Outro. Qual? _____

Parte II

A. Indique, pelo menos, **CINCO palavras ou ideias** que lhe vêm à mente quando pensa em:

ENSINO A DISTÂNCIA		**ENSINO**		**ESTUDO EM CASA**	

B. Ordene as palavras ou ideias indicadas em cada um dos quadros anteriores por ordem de importância, utilizando as colunas da direita. Atribua **1** à palavra ou ideia mais importante de cada quadro, **2** à segunda palavra mais importante e assim sucessivamente até atribuir o número mais alto à palavra menos importante de cada quadro.

Parte III

(Hargittai, 2011)

Indique o seu nível de conhecimento acerca dos seguintes itens relacionados com a Internet. Escolha um número entre **1** e **5**, em que **1** representa ***nenhum conhecimento*** e **5** ***conhecimento completo***.

Wiki.	1	2	3	4	5
Favoritos.	1	2	3	4	5
Spyware.	1	2	3	4	5
PDF.	1	2	3	4	5
Pesquisa avançada.	1	2	3	4	5
Phishing.	1	2	3	4	5

Parte IV

(Adaptado de Moreira, L., Paiva, J. C., & Morais, C. – 2018)

1. Indique, com um X, o seu grau de concordância com cada uma das afirmações seguintes de acordo com uma escala de **1** a **5** (**1** significa ***discordo fortemente*** e **5** ***concordo fortemente***).

A escola está a viver uma crise de valores profunda.	1	2	3	4	5
A escola está a perder a sua importância na sociedade.	1	2	3	4	5
A escola não acompanha o ritmo da sociedade.	1	2	3	4	5
A escola está a responder às necessidades da sociedade.	1	2	3	4	5
A escola está a cumprir a sua missão na sociedade.	1	2	3	4	5
A Internet está tornar o dia a dia da escola mais difícil.	1	2	3	4	5
A Internet está a melhorar a qualidade das relações entre as pessoas na escola.	1	2	3	4	5
A Internet está a melhorar os processos de ensino-aprendizagem.	1	2	3	4	5
A Internet é prejudicial para a vida na escola.	1	2	3	4	5

2. Pensando num dia de escola típico depois do regresso ao ensino presencial, indique, com um X na primeira coluna, o seu grau de concordância com as afirmações seguintes de acordo com uma escala de **1** a **5** (**1** significa ***nunca*** e **5** ***sempre***). Já na segunda coluna, marque se pensa que que essa afirmação se deve à pandemia seguindo uma escala de **1** a **5** (**1** significa ***nenhuma influência da pandemia*** e **5 muita influência da pandemia**). ***Num dia típico de escola…***

	Concordância					Influência da pandemia				
... os professores usam a Internet na sala de aula para transmitir os conteúdos que têm de lecionar.	1	2	3	4	5	1	2	3	4	5
... os professores usam a Internet na sala de aula para debater os conteúdos com os alunos.	1	2	3	4	5	1	2	3	4	5
.... eu uso a Internet na sala de aula para realizar trabalhos individuais.	1	2	3	4	5	1	2	3	4	5
... eu uso a Internet na sala de aula para realizar trabalhos de grupo.	1	2	3	4	5	1	2	3	4	5
... eu uso a Internet fora da sala de aula para realizar trabalhos individuais.	1	2	3	4	5	1	2	3	4	5
... eu uso a Internet fora da sala de aula para realizar trabalhos de grupo.	1	2	3	4	5	1	2	3	4	5
... eu uso a Internet nos intervalos das aulas.	1	2	3	4	5	1	2	3	4	5
... eu uso o telemóvel para aceder à Internet nas aulas.	1	2	3	4	5	1	2	3	4	5
... eu uso um computador para aceder à Internet nas aulas.	1	2	3	4	5	1	2	3	4	5
... é permitido usar a Internet nas aulas.	1	2	3	4	5	1	2	3	4	5
... os professores recomendam o uso da Internet para os alunos estudarem os conteúdos.	1	2	3	4	5	1	2	3	4	5
... os professores recomendam o uso da Internet em casa para a realização dos trabalhos de casa.	1	2	3	4	5	1	2	3	4	5
... há trabalhos de casa que requerem o uso da Internet.	1	2	3	4	5	1	2	3	4	5

3. Levando em consideração sua experiência com o ensino a distância durante a pandemia, como é que o ensino em tempos de normalidade poderia ser melhorado?

Poderá acrescentar mais informação que considere relevante para este estudo, incluindo se sentiu alguma dificuldade em responder a alguma das perguntas. O seu contributo é muito importante. Obrigado pela sua participação!