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Application of paraconsistent logic to support the decision on the return of face-to-face academic activities at the university after Covid-19

Aplicação da lógica paraconsistente como suporte à decisão sobre o retorno das atividades presenciais em universidade pós Covid-19

Aplicación de la lógica paraconsistente como apoyo a la decisión sobre el retorno de las actividades presenciales en una universidad post-Covid-19

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Abstract
During the Covid-19 pandemic peak period, changes were devised for society to adapt to the new lifestyle without affecting its development. Among others, education was one of the most affected areas in this period due to the mandatory social distancing. Education institutions adapted to this new scenario by switching from face-to-face to remote teaching, which brings advantages and disadvantages. To better understand this new teaching-learning pedagogical approach, it is important to listen to those intimately connected in this process: professors and students. Since they provide personal and subjective opinions connected to their own cultures, perceptions, and other very personal variables, assessing their opinions requires a different approach based on unusual logics, in which the paraconsistent logic appears as a potential tool. This research aims to apply the paraconsistent annotated evidential logic Eτ (PAEL) in the opinion of students and professors of an engineering post-graduate program in the state of São Paulo to evaluate whether or not to return to face-to-face academic activities at the university, after the Covid-19 pandemic. A survey was applied to a sample of professors and students, embracing nine variables related to teaching, research, economics, time, and efficiency. Results show that, although research and time indicators are located within the 'truth' region of the cartesian unitary square, the barycenter is in the 'almost true' region, indicating an inconclusive response as to whether or not to return to face-to-face academic activities. This study contributes to discussions about the newly imposed after Covid-19-scenario towards more effective pedagogical approaches.
Keywords: Coronavirus; Remote teaching; Teaching; Paraconsistent Annotated Evidential Logic.

Resumo
Durante o período de pico da pandemia do Covid-19, mudanças foram planejadas para que a sociedade se adaptasse ao novo estilo de vida sem afetar seu desenvolvimento. Entre outras, a educação foi uma das áreas mais afetadas neste período devido ao distanciamento social obrigatório. As instituições de ensino se adaptaram a esse novo cenário, passando do ensino presencial para o remoto, o que resulta em vantagens e desvantagens. Para melhor entender essa nova abordagem pedagógica de ensino-aprendizagem, é importante ouvir aqueles que estão intimamente ligados nesse processo: professores e alunos. Uma vez que ambos fornecem opiniões pessoais e subjetivas ligadas às suas próprias culturas, percepções e outros aspectos pessoais, avaliar suas opiniões requer uma abordagem diferente àquelas baseadas em lógicas tradicionais, onde a lógica paraconsistente aparece como uma abordagem alternativa. Esta

pesquisa objetiva aplicar a lógica paraconsistente anotada evidencial Eτ (LPAE) na opinião de alunos e professores de um programa de pós-graduação em engenharia do estado de São Paulo, para avaliar se dever-se-ia ou não retornar às atividades acadêmicas presenciais na universidade após a pandemia de Covid-19. Um questionário foi aplicado a uma amostra de professores e alunos, abrangendo nove variáveis relacionadas ao ensino, pesquisa, economia, tempo e eficiência. Os resultados mostram que, embora os indicadores relativos às variáveis 'pesquisa' e 'tempo' estejam localizados dentro da região 'verdade' do quadrado unitário cartesiano, o baricentro está na região 'quase verdadeiro', indicando uma resposta inconclusiva quanto ao retorno ou não das atividades acadêmicas presenciais. Este estudo contribui para as discussões sobre o recém-imposto cenário pós-Covid-19 em direção a abordagens pedagógicas mais efetivas.
Palavras-chave: Coronavírus; Aulas remotas; Ensino; Lógica Paraconsistente Anotada Evidencial.

Resumen
Durante la pandemia del Covid-19, se diseñaron cambios para que la sociedad se adaptara al nuevo estilo de vida. Entre otros, la educación fue una de las áreas más afectadas en este período debido al distanciamiento social obligatorio. Las instituciones docentes se han adaptado a este nuevo escenario, pasando de la enseñanza presencial a la enseñanza en línea, lo que, a su vez, trae ventajas y desventajas. Para comprender mejor este nuevo enfoque pedagógico de enseñanza-aprendizaje, la mejor acción es escuchar a quienes están íntimamente ligados en este proceso: docentes y estudiantes. Ya que aportan opiniones personales y subjetivas ligadas a sus propias culturas, percepciones y otras variables muy personales. Evaluar las opiniones de los encuestados requiere un enfoque diferente basado en una lógica inusual y, en este sentido, la lógica paraconsistente aparece como una herramienta potencial. Este trabajo aplica la lógica evidencial anotada paraconsistente Eτ (LEAP) en la opinión de estudiantes y profesores de un programa de posgrado en ingeniería en el estado de São Paulo. Se aplicó una encuesta a una muestra de docentes y estudiantes, que incluyó nueve variables relacionadas con la docencia, la investigación, la economía, el tiempo y la eficiencia. Los resultados muestran que, aunque los indicadores de tiempo y búsqueda están ubicados en la región 'verdadera' del cuadrado unitario cartesiano, el baricentro está en la región 'casi verdadera' (0.60, 0.40), lo que indica una respuesta no conclusiva de volver o no a las actividades académicas presenciales. Este estudio contribuye a las discusiones sobre el nuevo escenario impuesto después del Covid-19 hacia enfoques pedagógicos más efectivos.
Palabras clave: Coronavirus; Clases a distancia; Enseñanza; Lógica Evidencial Anotada Paraconsistente.

1. Introduction

Coronavirus Disease 2019 (Covid-19) is caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (WHO, 2020a). The World Health Organization declared the Covid-19 outbreak a Public Health Emergency of International Concern on 30 January 2020 (WHO, 2020b) and thereafter, based on alarming levels of spread and severity, and alarming levels of inaction, a pandemic was declared in March 2020 (WHO, 2020c; Bedford et al., 2020). In addition to human health issues, Covid-19 has unleashed a host of social problems. Thus, governments and scientists are being asked to find alternatives and develop actions against the virus and its impact.

Even with the measures taken to prevent the spread of the Coronavirus Disease 2019, the number of Covid-19 cases on October 11, 2022 reached ~626 million people worldwide while the number of fatal victims was at the ~6.5 million mark (Worldometer, 2022). The measures sought to adapt face-to-face activities to be carried out remotely, including those of educational nature. Government interventions encompassed measures such as social distancing, home isolation for those infected, movement restrictions, public health measures, social/economic measures, among others. According to Lyócsa et al. (2020), social distancing includes closing schools and public service facilities, lockdowns, and limits for public gatherings. Many countries have implemented nationwide school closures as part of lockdown measures in an effort to slow down community transmission of Covid-19 (Yung et al., 2021).

Although the practice of remote activities has been an alternative to avoid higher contamination rates without causing socioeconomic loss or damage to society, there are insecurities about their real contribution and to what extent this is valid. Colleges and universities had to adapt to this new reality, by promoting remote classes. The post-Covid-19 scenario still generates uncertainties for education, since remote classes have their benefits and disadvantages. As for benefits, the reduction in transportation costs and greenhouse gas emissions, and greater family presence can be mentioned, while disadvantages

include the demand for computational equipment that allows online access, lower interactivity among teachers and students, which could affect teaching efficacy, as well as other types of social interaction that are important for human development. Unequal access to internet is one of the main problems that higher education institutions worldwide have faced (Batanero et al., 2022). According to Auxier and Anderson (2020), students in different countries and institutions have no access to high quality internet at home (high speed and without breakdowns), especially those who come from low-income families. Analyzing the advantages and disadvantages of learning neurology disciplines during the Covid-19 pandemic in a Ukraine University, Odintsova et al. (2022) have found as advantages a reduction on anxiety levels (72.8%), flexibility of class time (52%), better interaction among teachers (50%), and time-saving (44.4%). On the other hand, the disadvantages are related to the lack of clinical practice (61%), constant distractions (51.4%), and network issues (50%). Additionally, an online survey applied by Banna et al. (2022) in a representative sample of home-quarantined Bangladeshi adults assessed their mental health by the DASS-21 measure and revealed that 65.8% of graduate level students are stressed, 33.4% have anxiety disorder, and 54% are depressed.

By mid-November 2022, around 68% of the world population had received at least one dose of Covid-19 vaccine, the equivalent of 12.92 billion doses administered globally; 2.73 million are now administered each day (Our World in Data, 2022). Approximately 88% of the Brazilian population, or 187 million people, has already received at least one dose of the vaccine (Our World in Data, 2022). Statistics show that the pandemic is under control and that a new moment is being faced, in which companies, businesses, education, and other sectors have realized that technology, especially information technology, can be used to develop distance activities and continue producing. New markets have emerged while others are being closed. The Covid-19 pandemic has created barriers and opportunities within the education system, as well. Although distance learning has been partially applied in some institutions, it has been causing an increase in the discussions about the need to return to the face-to-face modality, as it is imperative for learning, research, and aspects of socialization. Furthermore, Abu Talib et al. (2021) highlighted a lack of research discussing the direct effects of the digital transformation occurred in higher education, caused by the pandemic, its pros, cons, and future implications.

Understanding its complexities and inherent uncertainties, this work seeks to verify the following hypothesis H0: Remote classes and scientific advising should continue after the Covid-19 pandemic. Specifically, this work focuses on remote classes and scientific advising in a postgraduate program in engineering at a private university in São Paulo, considering the opinion of professors and students. Since opinions are always subjective, the use of a proper logic is important in considering the uncertainties involved. At this point, the Paraconsistent Annotated Evidential Logic Eτ (PAEL; Da Costa, 1999) is an alternative approach to help decision-making based on expert opinion, supporting the acceptance or rejection of the established H0 hypothesis. The paraconsistent logic Et has been used in many different fields, such as engineering, to verify whether the global initiative report's indicators are related to the strong sustainability concept (Langa et al., 2021), in the health areas to illustrate how a reusable multi-criteria decision analysis framework based on paraconsistent theory could be used to aggregate expert perspectives when valuing cancer treatments (Campolina et al., 2022) and, to aid decision-makers in the planning process to solve problems related to the Elective Orthopedic Surgery Agenda, regarding to cancellation or even lack of instruments and consigned material (Duarte et al., 2022), in agriculture to support the developing of a software that predicts stress in the piglet using the vocal calls and committed during stressful conditions (Da Silva et al., 2019), and in the business area to develop and evaluate an instrument's reliability for assessing behavioral competencies for hiring project managers, minimizing subjective bias and possible conflicts of evaluators in the selection process (Do Nascimento et al., 2021) and to evaluate the usability of a software in conjunction with the Para-analyzer, enabling a more detailed analysis (Forçan et al., 2021). In all these studies, the PAEL showed to be an appropriate tool for quantifying subjective opinions and data to sustain a decision.

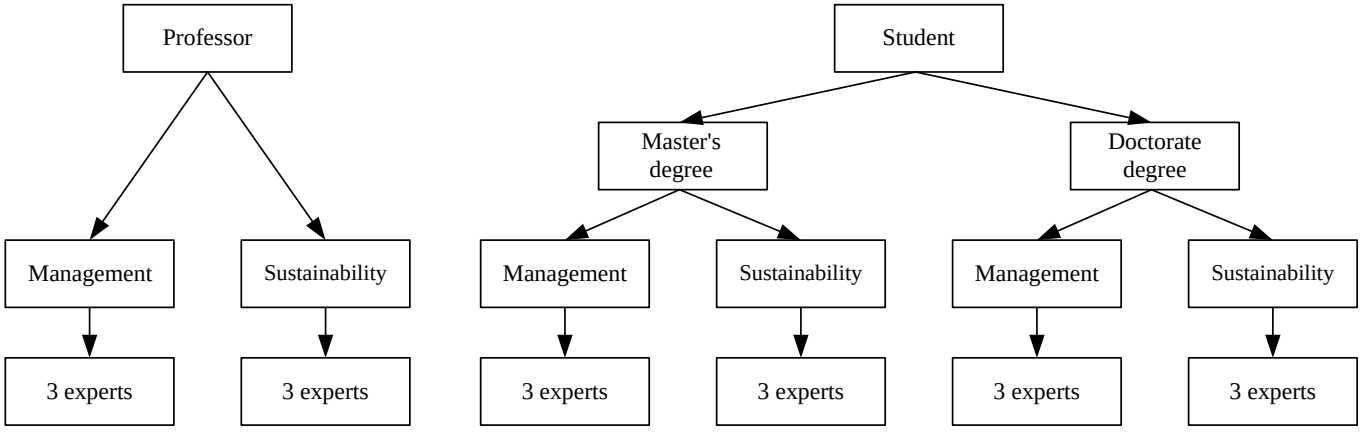
In addition to testing the established hypothesis, this work contributes to discussions around the important theme of education, from a different logic perspective, which complements the traditional logic for more effective decision-making.

2. Methodology

2.1 Definition of type and number of experts

The case study of this work was carried out in a postgraduate program (PPG) of a private University located in São Paulo state, Brazil, during the Covid-19 pandemics social-distancing period, where professors and students belong to two different thematic concentration areas, including operation systems management and sustainability in production systems. In an attempt to consider the opinion of a representative sample of professors and students, those were grouped according to Figure 1, resulting in three experts representing each group within the PPG, totalizing 18 specialists as a sample. The single criterion used for selecting students is related to how long they have been enrolled in the course, to better reflect their postgraduate experiences, especially before and during the Covid-19 pandemic period.

Figure 1 - Schematic representation of distribution for considerable sample.

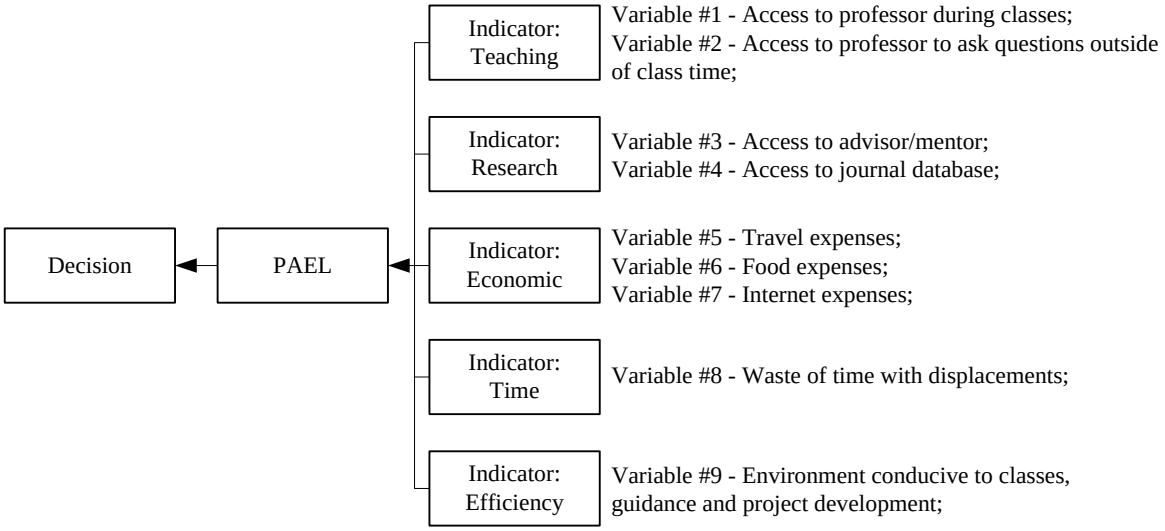


Source: Authors.

2.2 Survey structure

The eighteen experts were asked to answer a structured survey, which is a common method for obtaining opinions to be used within the Eτ Logic (Sanches et al., 2010; Ito et al., 2008; Kirilo et al., 2018; Dill and Sothë, 2014). Figure 2 presents the established indicators, including teaching, research, economic, time and efficiency, all of which considered as the most relevant to test the hypothesis established in this study. Higher importance was attributed to the teaching and research indicators (weight 2) than for all others (weight 1), as it is understood that PPGs' main objective is to promote teaching and scientific research activities.

Figure 2 - Variables and indicators considered in the survey applied to students and professors. PAEL, paraconsistent annotated evidential logic Eτ.



Source: Authors.

Each variable that characterizes the indicators in Figure 2 is initially evaluated by the selected experts through a survey applied via Microsoft Forms®. Survey applied to experts is as follows: (i) We would like to know about 'Your occupation in PPGEP': ( ) Professor, ( ) Master's student or ( ) Doctoral student; (ii) We would like to know about 'Area of concentration of the PPGEP in which you are inserted': ( ) Management of Operating Systems or ( ) Sustainability in Production Systems; (iii) We would like to know about the 'teaching' aspect: (1) Access to teacher or student during classes to ask questions and/or make comments is similar or has been improved compared to face-to-face classes before the pandemic, and (2) Access to teacher or student outside of class hours to ask questions and/or make comments about the subject is similar or has been improved compared to face-to-face classes before the pandemic; (iv) We would like to know about the ' scientific advising & research' aspect: (3) Access to advisor or student to ask questions and/or make comments about your research project is similar or has been improved compared to face-to-face classes before the pandemic, and (4) Access to database/journals is similar or improved compared to face-to-face classes before the pandemic; (v) We would like to know about the ‘money saving’ aspect: (5) Monetary expenditure on travel related to university activities is similar or lower compared to face-to-face classes before the pandemic, (6) Monetary expenditure on food related to university activities is similar or lower compared to face-to-face classes before the pandemic, and (7) Monetary spending on internet and computer related to university activities is similar or lower compared to face-to-face classes before the pandemic; (vi) We would like to know about the 'time' aspect: (8) The time spent on commuting related to university activities is similar or less compared to face-to-face classes before the pandemic; and (vii) We would like to know about the 'efficiency' aspect: (9) The homework environment is similar or more conducive to classes, orientation and development of your research project compared to the academic environment before the pandemic. The experts’ opinions were quantified using the ‘Likert’ scale as presented in Table 1.

Table 1 - Conversion of the qualitative 'Likert' scale into quantitative values.

Likert scale	Value
Totally agree	1
Agree	0.75
Do not agree nor disagree	0.5
Disagree	0.25
Totally disagree	0

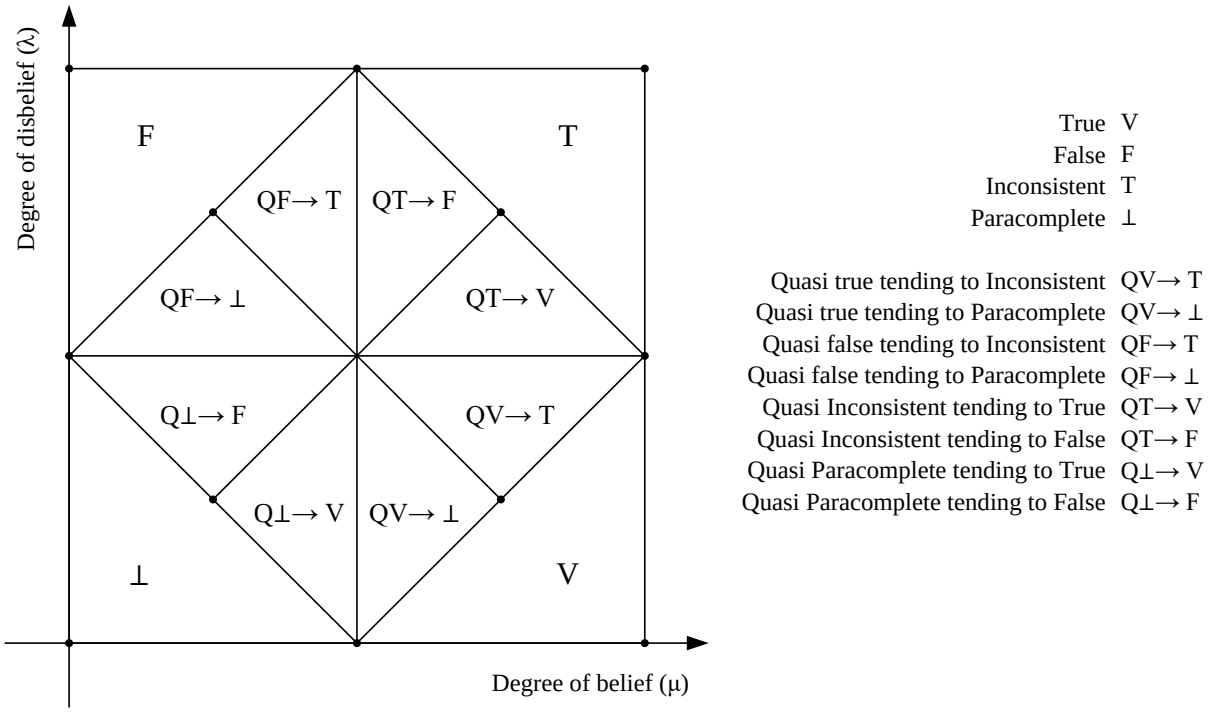
Source: Authors.

2.3 Paraconsistent Annotated Evidential Logic Eτ

Paraconsistent logic is a non-classical logic that was initially suggested as an alternative to analyze real situations that are outside the rigid binary laws of classical logic (Sousa et al., 2014). For Priest et al. (1996), paraconsistent logics are those that allow inferring inconsistent information in a non-trivial way.

According to Da Costa et al. (1999), the Paraconsistent Annotated Evidential Logic Eτ is a particular case of paraconsistent logic, in which degrees of belief and disbelief are attributed to each indicator studied, both supported by the cartesian unitary square (Figure 3). According to Abe et al. (2015), the propositions of Logic Eτ are type p(μ, λ), where p is a proposition and μ, λ ∈ [0, 1] (unit real interval). Therefore, p(μ, λ) can be intuitively read as: the degree of favorable evidence of p is μ and the degree of contrary evidence of p is λ. Thus, the following particular readings: p(1, 0) → true; p(0, 1) → false; p(1, 1) → inconsistent; p(0, 0) → paracomplete; p(0.5, 0.5) → undefined. The Eτ logic is appropriate for the treatment of uncertain and contradictory data as opinions of different people with different profiles and worldviews. Details on PAEL Eτ can be found in Abe et al. (2015).

Figure 3 - Cartesian unitary square of PAEL Eτ application model.



Source: Adapted from Abe (2015).

From the survey applied to the experts, it is possible to obtain favorable evidence of p(μ). For the contrary evidence of p(λ), the amalgam rule is considered in this work, that is, the complement to the maximum score of another expert within the

same group is considered. The amalgam rule is a formal operation that, given two terms, a third can be found as a combination of the two original terms (Ontanón and Plaza, 2010).

After quantifying the favorable and unfavorable evidences, the maximization and minimization rules within and between groups are used. Initially, the rule for maximizing favorable evidence within each group (intragroup) is applied, with the connective 'Max' in the favorable evidence, and the connective 'Min' in the contrary evidence. Then, the rule of minimization of favorable evidence between groups (between groups) is applied, with the connective 'Min' in the favorable evidence, and 'Max' in the contrary evidence.

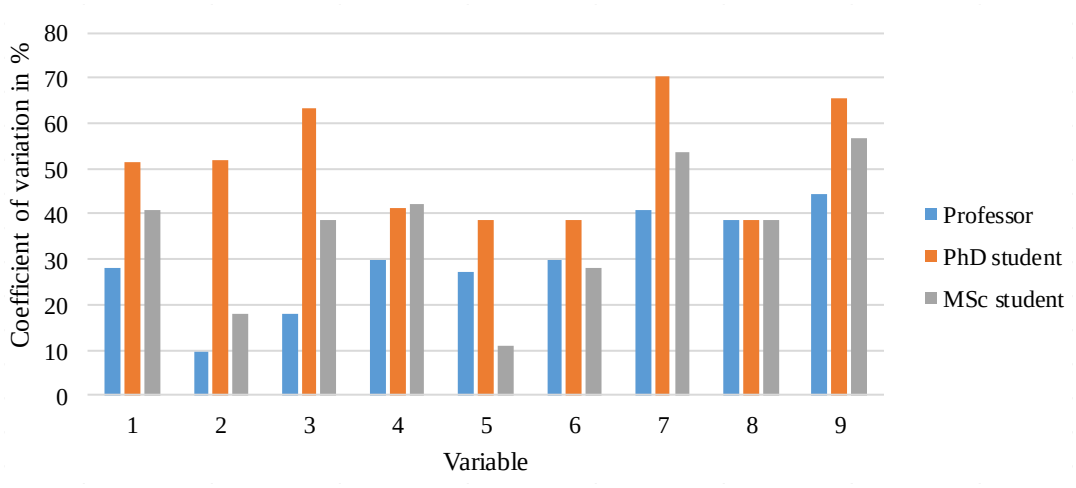
The requirement level or degree of certainty established in this work is 50%. The degree of certainty is calculated by the difference between μ1 and λ1 (Gcer = μ1-λ1), while the degree of uncertainty is obtained by the sum of μ1 and λ1 minus 1 (Ginc = μ1+λ1-1), obtained from the minimization rule. This means that: (i) if the degree of certainty is lower than or equal to -0.5, the initial H0 hypothesis is rejected, i.e. remote classes are not viable; (ii) if the degree of certainty is higher than 0.5, the hypothesis H0 is accepted, i.e. remote classes are viable; (iii) if the degree of certainty is between -0.5 and 0.5, the result is inconclusive, i.e. the hypothesis H0 cannot be accepted, nor rejected. This interpretation allows for the determination of 12 regions or states in the cartesian unitary square of Figure 3, which graphically represents the results of ET Logic. For the H0 hypothesis to be accepted, the barycenter must be in the 'V' (True) region.

3. Results and Discussions

3.1 Dispersion analysis of expert opinions

The well-known coefficient of variation (CV) seeks to understand the degree of dispersion of the answers obtained from experts. Prior to presenting the results of the PAEL Eτ, the CV is calculated, to help understand the differences between the experts' opinions. Figure 4 shows the CV for the expert groups 'Professors', 'PhD Students' and 'MSc. Students'. For the Professors expert group, it is possible to observe that variables 1 to 6 (especially question 2, which is related to access to teacher and/or student outside in-class activities), related to the Teaching, Research and Economic indicators, present a maximum coefficient of variation of 30%, showing that these experts had similar opinions. On the other hand, variables related to Time and Efficiency indicators showed a coefficient of variation between 38% and 45%, indicating that Teachers have a different opinion on these indicators. Especially for the Efficiency indicator (question 9), the divergence found among Teacher experts is noteworthy, since a healthy working environment is strongly related to a higher quality of teaching/research, generating a greater number of good results that can be published in high-quality scientific journals.

Figure 4 - Coefficient of variation for the expert groups 'Professor', 'PhD student' and 'MSc student'. Legend: Teaching indicator (variables 1 and 2), Research indicator (variables 3 and 4), Economic indicator (variables 5 to 7), Time indicator (variable 8) and Efficiency indicator (variable 9).



Source: Authors.

Regarding the expert group 'PhD students', there is greater divergence in opinions compared to the 'Professors'. Although it can be seen that variables 7 and 9 again presented higher variation, all variables indicate divergent opinions among PhD students as they have a CV higher than 35%. Still focusing on the economic aspects, question 7 (internet and computer expenses) was the one that diverged the most in this group of experts. Maybe this is a result of sample heterogeneity, as while some students already had internet equipment and software packages before the pandemic outbreak, others were forced to buy new or upgrade their equipment and expand their contracts with internet providers.

For the group of experts 'MSc Students', there is a strong convergence of opinions for variables 2, 5 and 6 with CV below 30%, while for all other variables the CV was above 38%. These experts converge in their opinions on monetary expenditures for commuting (5), but they strongly differ on spending on computers and the internet (7) and about having a conducive-to-work home office environment (9).

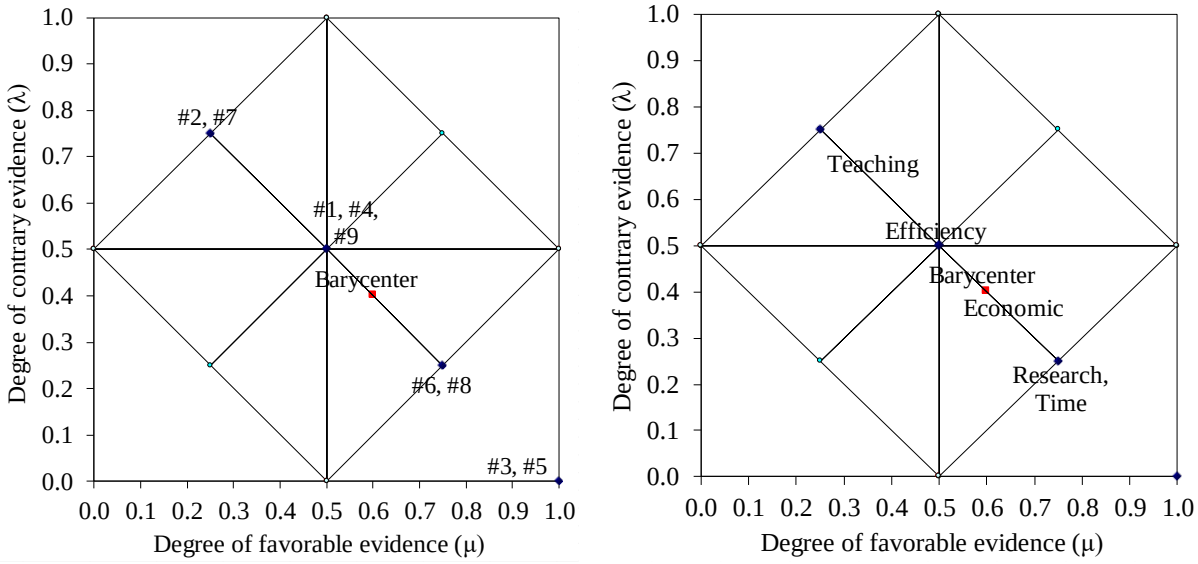
In general, the opinions of the three groups of experts converge on one of the two Teaching indicators (1 - access to teacher or student during classes), one of the two Research indicators (4 - access to database/periodicals) , two of the three Economic indicators (5 and 6) and the Time indicator (8), while they differ on one of the two Teaching indicators (2 - access to teacher or student outside class hours), one of the two indicators Research (3 – access to advisor or student to ask questions), Efficiency (9) and one of the three Economic indicators (7 – internet and computer expenses). Another important outcome from the dispersion analysis is that all experts have similar opinions on the indicators of Teaching (1), Research (4), Economic (5 and 6) and Time (8) – how to improve the performance for these indicators is a topic discussed in the next item. On the other hand, special attention should be given to the Efficiency variables and to variable (7) of the Economic indicator since a high dispersion among experts is observed. Perhaps, some experts already had a suitable place at home to work before the pandemic, while others had to adapt and understand that they could have a more suitable home office environment comparable to what they had in the educational institution facilities before the Covid-19 pandemic.

3.2 Paraconsistent Annotated Evidential Logic Eτ

To verify whether the hypothesis proposed in this work should be accepted or rejected, the Paraconsistent Annotated Evidential Logic Eτ is applied. Figure 5a presents the results obtained for the 9 variables, while Figure 5b presents the results

for the 5 indicators.

Figure 5 - Cartesian unitary square resulting from the application of Paraconsistent Annotated Evidential Logic Eτ: (a) considering the 9 variables (#n); (b) considering the 5 indicators.



(a) (b)

Source: Authors.

It can be seen in Figure 5a that 3 out of the 9 variables are in the center of the plan, that is, they have a degree of favorable evidence equal to the degree of unfavorable evidence of 0.5. This means that for variables #1, #4 and #9, the result obtained is an indefinite proposition, characterized by p(0.5, 0.5). In contrast, variables #3 and #5 present a 'true' proposition (1, 0), that is, experts agree that access to scientific advisor or student during the pandemic period (#3) and the expenses with travel related to university activities (#5) were improved or remained as they were before the pandemic. Variables #6 and #8 (food expenses and waste of time with displacements) are in the 'edge of truth' region, presenting an inconclusive proposition. On the other hand, variables #2 and #7 are situated in the 'limit of the false region' (0.25, 0.75), also indicating an inconclusive proposition.

Figure 5b presents the results obtained from focusing on indicators. The Efficiency indicator is in the central region, that is, it is qualified as an indefinite proposition as experts concomitantly agree and disagree about efficiency not having changed with remote classes. The Research and Time indicators presented a proposition (0.75, 0.25), being characterized as 'inconclusive'. On the other hand, as both indicators are close to the 'true' region, it can be said that experts agree that the Research and Time indicators remained the same or improved, in comparison with face-to-face classes. The Teaching indicator is between the 'almost false tending to paracomplete' and 'almost false tending to inconsistent' regions, while the Economic indicator is between the 'almost true tending to inconsistent' and 'almost true tending to paracomplete' regions, indicating uncertainties among the opinions of experts.

Regarding the barycenter, which shows the general performance considering all the variables and indicators with their respective weights, it is observed that it is in the 'almost true' region of the cartesian unitary square (0.60, 0.40), indicating that the experts still do not provide elements to reject or to accept the H0 hypothesis about returning to face-to-face classes. This aspect is also justified by the analysis of the degrees of certainty and the uncertainties in Table 2. While the Teaching,

Economic and Efficiency indicators showed to be ‘inconclusive’, since the experts' opinion does not converge to the regions of ‘truth’ or ‘falsity’, the Research and Time indicators are ‘true’. In general, considering all indicators, a ‘not conclusive’ result is obtained, which does not support the acceptance nor does it support the rejection of the H0 hypothesis.

Even recognizing some flaws in e-learning, and that it needs to be improved to continue being practiced, Abumalloh et al. (2021) stated that almost all traditional learning approaches can be conducted to e-learning, except practical teaching, which involves mechanical manipulation, machinery, and chemical or biological experiments. As commented by Lischer et al. (2021), digital literacy changed from a “nice to have” to an indispensable competence for both lecturers and students. As an alternative to overcome educational difficulties during the pandemic, the Brazilian Ministry of Education has started to admit that up to 40% of in-class activities in Higher Education Institutions can be converted into online activities (BRASIL, 2019) – before the pandemics, this percentage was 20% maximum. However, this measure is allowed only for undergraduate courses and not for post-graduation courses. Once again, postgraduate education remains a debatable subject, in regard to its potential to remain with remote classes and scientific advising.

Table 2 - Degree of certainty and degree of uncertainty.

Indicator	Degree of certainty	Degree of uncertainty	Conclusion
Teaching	-0.25	0	Not Conclusive
Research	0.5	0	True
Economic	0.33	0	Not Conclusive
Time	0.5	0	True
Efficiency	0	0	Not Conclusive
General	0.22	0	Not Conclusive

Source: Authors.

This work considers the opinion of 18 experts on 9 variables, within 5 groups of indicators, to test the initial hypothesis H0. Even being a representative number, the small number of specialists could be considered as a limitation to this work, since only a fraction of the professors and students of the PPG were considered. In addition, other indicators or variables could be suggested through a participatory approach in an attempt to better represent the variables involved in the decision on whether or not to carry on with remote classes. Thus, it is suggested that future work could focus on applying the survey to a larger number of experts, as well as prioritizing and expanding the variables associated with each indicator.

4. Conclusions

The application of Paraconsistent Annotated Evidential Logic Eτ (PAEL) on the opinion of experts (professors and students) of a postgraduate program at a private university in São Paulo resulted in a 'non-conclusive' result as for accepting or rejecting the hypothesis that remote classes and scientific advising should be continued after the Covid-19 pandemic. The opinion of experts on the Research and Time indicators converge to the ‘truth’ region of PAEL’s Cartesian unitary square, but the Teaching, Economic and Efficiency indicators showed to be inconclusive. By aggregating the expert opinions on the 9 variables and 5 indicators related to the initial hypothesis, the obtained barycenter is located on the limits between 'almost true tending to paracomplete' and 'almost true tending to inconsistent' regions, which results in a non-conclusive decision.

Despite understanding that the decision-maker (or knowledge engineer) has the autonomy to accept or reject the hypothesis tested in this work, it is suggested that additional efforts be developed by considering a larger sample of experts and applying participative approaches to identify potential new indicators and variables in the survey.

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