

COVID PANDEMIC AS A DISRUPTIVE FACTOR ENHANCING ICT USE IN SOCIAL SCIENCES' TEACHING PRACTICES

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Purpose: Our research attempts to understand a change in social sciences' academics' teaching practices that can be observed during the COVID pandemic and that are predicted after the pandemic.

Design: We investigate – in the light of the Blin's and Munro's activity theory (2008) – whether the COVID pandemic is a disruptive factor that may lead to the transformation of social sciences academics' teaching practices. The research instrument was a worldwide survey conducted among social sciences' academics.

Findings: COVID pandemic has already introduced changes into academics' teaching practices in a form of broad ICT usage as well as initiated changes in the teaching activities design.

Research limitations: The number of responses is limited to 382 with only a collection of 77 responses from outside of Europe. We applied a general approach for ICT means not asking respondents about particular ICT tools. COVID as a pandemic evolves continuously indicating the need for further, in-depth research in this field.

Practical implications: COVID pandemic might serve as a disruptive factor enforcing further changes in social sciences' academic teaching practices after the pandemic.

Social implications: Our results indicate that the quality of social sciences teaching has worsened during the pandemic and most of the respondents do not predict significant changes in the quality of teaching after the pandemic compared to the quality of teaching before the pandemic.

Originality: We contribute by showing that introduction of a new tool (ICT) and modified teaching activity design resulted in a serious alteration of the teaching practice of social sciences' academics. We did not confirm that COVID disruption was expansive enough to permanently transform teaching practices of social sciences academics, hence we suggest that obstacles to successful incorporation of ICT in teaching practices are still present. We showed that ICT is predicted to be used more frequently rather than before (when it was only utilised as a platform to transfer traditional material) and will not modify the well-established practices referring to instructional tools. Our study suggests that the relation between teacher and teaching activity design is not mediated by ICT tools, which may result in resistance from the teachers.

Keywords: Covid, technology in teaching, activity theory, ICT use, higher education.

Category of the paper: research paper.

1. Introduction

The teaching process in higher education, and in teaching itself, is, on the one hand, a dynamic process which goes through constant changes. Still, on the other, it is a very stable activity, which is resistant to an introduction of changes within well-established teaching practices and tools. One of the main areas where higher education has been remarkably immune to changes was the adoption of e-learning as well as information and communication technologies (ICT) in distance teaching and online learning. Researchers interested in the topic of the use of new technologies in teaching assumed that academics would easily accept new technologies because they would allow them to perform specific tasks faster and more efficiently, "re-vision" the teaching, or simply create opportunities impossible in the real class (Kellner, 2004; Burbules, Callister, 2000). Unfortunately, those predictions did not meet reality. Although universities had introduced ICT and e-learning tools, their significance for teaching and learning strategies was very low, as a large body of evidence confirmed (Tearle, 2003; Conole, 2004; Kirkup, Kirkwood, 2005; Löwström, Nevgi, 2007; Selwyn, 2007; Blin, Munro, 2008; Kirkwood, 2009; Bond et al., 2018; Liu et al., 2020).

Blin and Munro (2008) performed a study based on the activity theory (AT), in which they investigated academics' resistance to changing their teaching practices. Their principal findings indicated that the digital transformation had impacted the universities, mainly the administration processes. In contrast, it has not significantly affected teaching itself to enforce the transformation of teaching practices. In addition, they showed that academic teachers used ICT and e-learning to replicate existing teaching tools and methods rather than create new and innovative teaching methods. They suggested that one of the possible reasons is the lack of proper competencies among academics, as there were no programs and curriculums dedicated to training and developing such competencies. Blin and Munro (2008) concluded that, based on the activity theory model, there is a need for a more radical transformation or event to occur, creating a substantial disruption and allowing the evolution of the existing academics' teaching practices. Also, other studies confirm the need for a motivator or other radical factor to change the current use of ICT in teaching at universities (Bond et al., 2018; Marks et al., 2020).

Year 2020 has shown that nothing is "set in stone" in the world and that one event can dramatically influence everyone's lives and habits. The COVID pandemic has rapidly changed how people work, communicate, and function. The daily impact of the COVID pandemic on people's lives can be measured in various ways. Many researchers focus on business-related issues and the problem of how the COVID pandemic has impacted businesses (Hea, Harris, 2020; Carnevale, Hatak, 2020; Pisz, 2021). Others stress the increase in ICT use during the COVID pandemic, but mainly as the tools for online meetings which replaced or superseded face-to-face ones (Byrnes et al., 2020, Ramkissoon et al., 2020). The researchers also emphasise the psychological impact of the COVID pandemic, arguing that, in general, the prevalence of

stress, anxiety, and depression is significantly higher in populations than before this COVID pandemic (Salari et al., 2020; Tee et al., 2020). However, we noticed a lack of investigation regarding the widespread ICT use in academic teaching practices. Taking Blin's and Munro's conclusions as the underpinnings for our consideration, the aim of this paper is to investigate, in the light of the activity theory, whether the COVID pandemic is a disruptive factor that may lead to the evolution of the academics' teaching practices? Thus, we used a survey questionnaire to find out, in the opinion of academic teachers, whether the COVID pandemic is a disruptive factor that has changed academics' teaching practices.

The remainder of this paper is organised in parts. First, to provide a theoretical basis for the research, the following sections describe the COVID pandemic and its impact on teaching practices and universities and provide the theoretical background of the activity theory. Further on, we describe our survey's methodology in detail and present the results. The final section discusses these results and outlines the study's implications, limitations, and conclusion.

2. Literature review

2.1. Covid pandemic and its impact on academics and universities

The COVID pandemic, also known as the coronavirus pandemic, is a pandemic caused by severe acute respiratory syndrome SARS- CoV- 2 (WHO, 2020a). The disease was first identified in December 2019 in Wuhan, China. The World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern on January 30, 2020, and a pandemic on March 11, 2020 (WHO, 2020b). The outbreak has spread to every province of mainland China and 221 other countries and regions.

The onset of the COVID global pandemic has led to fundamental changes worldwide. Healthcare systems, economies, and citizens' lives have altered in unimaginable ways at the beginning of 2020. People were encouraged or forced to maintain social distancing, wear face masks in public places and work from home (WFH) or switch to distance/online teaching (Brynjolfsson et al., 2020; Weill et al., 2020). Uncertainty about the pandemic's duration and future infection waves led enterprises to view WFH as a "new normal" way of working (Bonacini et al., 2021). Large event organisers, sports events (e.g., Olympic Committee), enterprises and public sector organisations have also taken a range of precautions, including travel restrictions, event cancellations, remote work mandates, and events being held without spectators (Zraick, Garcia, 2020).

The higher education sector has been impacted profoundly by the pandemic as well. The lockdowns imposed in most countries shortly after the pandemic outbreak resulted in the immediate closure of universities and colleges and the move to the remote delivery of all

academic activities and related support services (Sangster et al., 2020). As a result, the functioning of the higher education institutions was limited and rapidly moved into an online mode initially for a few weeks, but was quickly extended for a longer period, depending on the country, to the fall of 2021 or even longer (Desvars-Larrive et al., 2020; MSHE, 2020; Rizun, Strzelecki, 2020).

Some researchers claimed it was a test of organisational agility (Wu, 2020). Many academics initially focused on transitioning content to an online environment (Crawford et al., 2020). Crawford et al. (2020) studied a series of universities and noticed that universities worldwide rapidly closed their face-to-face operations and moved to digitalised distance teaching. The observed phenomena were more noticeable, particularly in countries categorised as developing economies. According to the OECD data (2021), 95% of students in Switzerland, Norway, and Austria have computers to use for their schoolwork, whilst only 34% in Indonesia.

The research on governments' interventions and decisions related to rapidly changing Covid-19 epidemiological situations showed that despite the drawbacks of online teaching listed above, mandatory WFH and closure of educational institutions is the most effective intervention to fight the pandemic (Haug et al., 2020). It meant that universities and other higher education institutions had to implement ICT for distance teaching and online learning, which has become a prominent way of teaching.

2.2. Tools for online teaching before and during the pandemic

Remote teaching and learning have been used for years, but often in a simple form as a supplemental way of teaching. Currently, higher education institutions can use numerous ICTs that are constantly developed and upgraded to enhance teaching strategy. Among different ICTs, one can list e-learning platforms, e.g., Moodle, Google Classroom, Docebo, Wiz IQ, and ATutor; communication apps, e.g., Skype, WhatsApp, and Google Meet; as well as social media, e.g., Facebook, Twitter, LinkedIn, Youtube, and Instagram.

Indisputably, a considerable number of higher education institutions have been using Moodle or other e-learning platforms for years now to enrich traditional teaching methods and to make the classes more interesting for the students (Ramkissoon et al., 2020; Klimkiewicz, 2016; Huang, Hew, 2018). The experience with e-learning platforms made it easier for universities to switch from mainly traditional but supported by Moodle or other e-learning platforms to purely online teaching. E-learning platforms seemed to confer the main advantage for the higher education institutions at the beginning of the COVID-19 lockdown in 2020. Some universities have decided to implement other software and online solutions, such as Microsoft Teams and Zoom, which instantly provide convenient features and tools (Almarzooq et al., 2020). Others had implemented Google online solutions. Google Classroom is accessible directly through web browsers as well as intelligent applications on Chrome OS, iOS and Android. The main advantage of Google Classroom is that it is easy to access, simple but flexible and convenient, quickly enabling anyone to use it (Azhar, Iqbal, 2018). Kumar, Bervell

(2019) stated that Google Classroom is an online communication platform that makes it easier for teachers to post announcements, share learning materials, assess students' work, and evaluate their assignments.

Regardless of e-learning platforms and communications apps, universities have implemented well-known social media to enhance teaching methods and communication with students and co-workers (Carpenter et al., 2020). Ramkissoon et al. (2020) concluded that higher education institutions should consider a shift from classic e-learning platforms to more suitable forms of communication and interactions like social media to enhance their teaching and learning process. Their results indicate that students preferred WhatsApp due to its knowledge sharing and construction facility, interactivity, usability, respect for privacy, and instant communication compared to Moodle, which was recognised as less pedagogically efficient. On top of that, many universities enabled online access to their software resources as it was necessary to ensure the smoothness of the classes.

Based on the above, we argue that this coronavirus pandemic has rapidly changed academic teaching practices. However, as the subject literature review suggests, these changes have not occurred in the previous years, even though the tools were available for academic teachers to implement them in their teaching practices. In other words, academics had access to the right software and all the resources needed to improve their teaching practices and start using e-learning platforms on a large scale, but they have not done it.

2.3. Activity theory in academics' teaching practices

As Thompson (2004) said, "activity theory is less of a 'theory,' in the sense of a well-defined approach and set of constructs than an explicit focus on the interaction between actors and their surrounding environment." In other words, the activity theory (AT), also known as cultural, historical activity theory (CHAT) (Lu et al., 2018), is a construct that allows explaining how various means in the world influence each other and the human as well. It creates a specific model representing a current situation appearing in the real world or investigating the proposed situation in the future and the possibility of enforcing it. In accordance with the activity theory, the particular activities are motivated by the need to transform an object (physical or conceptual) into the desired goal (outcome) and influenced by the use of instruments (tools), which can again be physical or conceptual (Leont'ev, 1978). The motive directs action, which is carried out by individuals or groups of people (subject). The theory was further developed by Engelström (1987, 2001), who provided the representation of socio-cultural context (community), the restrictions imposed by legislation (rules) and the allocation of responsibilities (division of labour). The concept is presented in the form of a triangle to represent possible interrelations between the elements described (Figure 1).

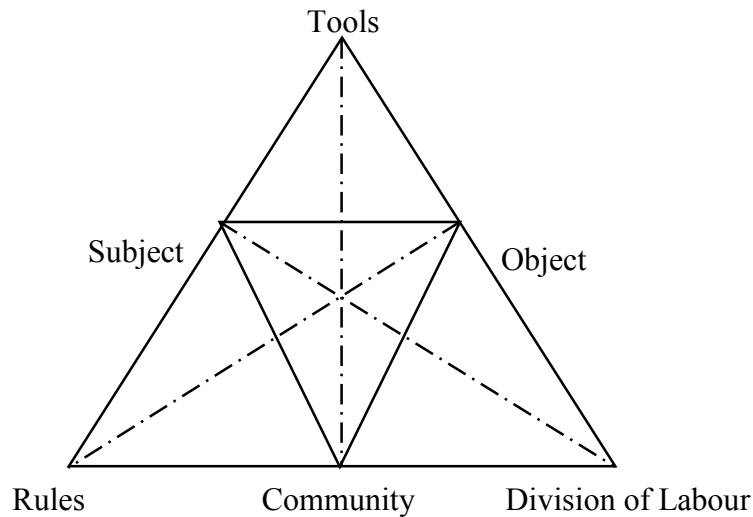


Figure 1. The design of the activity system based on the activity theory. Source: (Blin, Munro, 2008).

Figure 1 shows that each of the vertices of the triangle influences each other, consequently affecting the desired outcome.

The AT framework is universal and has been widely used over the years in many disciplines and contexts to explain the complexities of learning and teaching (Kirby, Anwar, 2020). One of the areas where AT has been utilised is the investigation of Human-Computer Interaction (Kapterlinin, Nardi, 2006), where it was used to diagnose interaction and adoption issues related to the implementation of new technology (McAndrew et al., 2006; Blin, Munro, 2008; Karasavvdis, 2009; Peña-Ayala et al., 2014; Kirby, Anwar 2020). Even though the concept was initially created in 1978, the extended version from 1987 is repeatedly used in research regarding university teaching, evaluating learning or building e-learning (Clemmensen et al., 2016; Chung et al., 2019; Liu et al., 2020).

While using the AT, the researchers may take various approaches. For example, they can use AT to explain a particular activity (Nguyen, Habók, 2021; Lee et al., 2021) and how specific indices of the AT triangle influence each other (McAndrew et al., 2006; Reid et al., 2015), use of AT in the teaching process (Fletcher, 2021) or how a particular disruptive element: event or factor, can change the activity represented by the triangle (Barab et al., 2002; Engelström, 1987, 2001; Helle, 2000; Blin, Munro, 2008; Holen et al., 2017; Lei, Hu, 2019).

The literature uses the expressions "disruption" and "contradiction" as synonyms. Disruption in teaching is understood as a severe transformation or alteration of the structure of teaching and learning activities in formal education, focusing on those transformations arising from an institution-wide deployment of e-learning technologies (Blin, Munro, 2008).

A severe interruption in an existing AT model can followingly either:

- evolve by accepting new components or replacing previous components; or
- remain unchanged by rejecting new components.

The recalled studies identified tools as e-books, tablets and digital pens, curricula content or technology, while subjects were teachers, students, tutors and educational technologists. Further, the construction of a unit of learning, pedagogical environment to provide personalised education, online course design or the supply of tablets were treated as objects in case of investigation of learning practices. Educational law, cognitive theory, academic structure or teaching strategies served as a rule in the past research. Unit coordinators, device providers, students, teachers, and colleagues from a discipline were meant to represent the community under investigation. Finally, division of labour was represented by members' functions and responsibilities or those who control the teaching process.

3. Research question and hypotheses

Our research attempts to understand a change in academics' teaching practices that can be observed during the COVID-19 pandemic. In particular, we try to assess whether the pandemic is a sufficiently strong disruptive factor that changes teaching activity and, consequently, can affect the outcome, i.e. academics' teaching practices. Consequently, we formulated the following research question:

RQ: Is COVID a disruptive factor that has changed academics' teaching practices (outcome)?

Blin and Munro (2008) argued that a severe and powerful contradiction needs to occur to result in the everyday use of ICT in daily academic teaching practice. In our opinion, that happened in 2020 as the coronavirus pandemic forced almost all universities to move to fully online teaching. We assume that such rules will not prevail after the pandemic, thus allowing us to infer whether the pandemic is a strong enough contradiction to change academics' teaching practices. Based on the above-described distinction, the research design encompasses three time spans: before COVID pandemic (T0), during COVID pandemic (T1), and after COVID pandemic (T2), as is presented in Figure 2.

The rules are conceptualised as the national regulations together with the university law regarding mostly traditional (on-campus) teaching before (T0), the obligatory online teaching during (T1) COVID pandemic, and a projected departure from obligatory online teaching after (T2) COVID pandemic. The community encompasses a society of teachers and other university staff taking an active part in the teaching processes. At the same time, the division of labour is linked to the position at the university, which means that we implement a vertical approach.

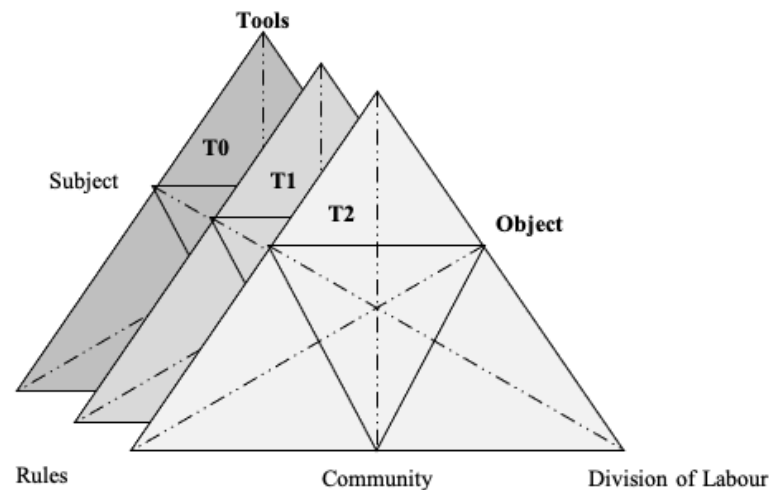


Figure 2. Research design – activity theory triangle in three-time spans – general outlook. Source: Own work based on Blin, Munro, 2008.

The activity of academic teaching is performed by a university teacher (subject) and is motivated by the teaching activities design (object). Therefore, the tool is an artefact that facilitates the outcome by the subject: enhanced academic teaching practices due to the changes in the ICT use (tools) and through the changes in the teaching activities design (object) impact the outcome, which is the academic's teaching practices. The AT triangle built for this research is presented in Figure 3.

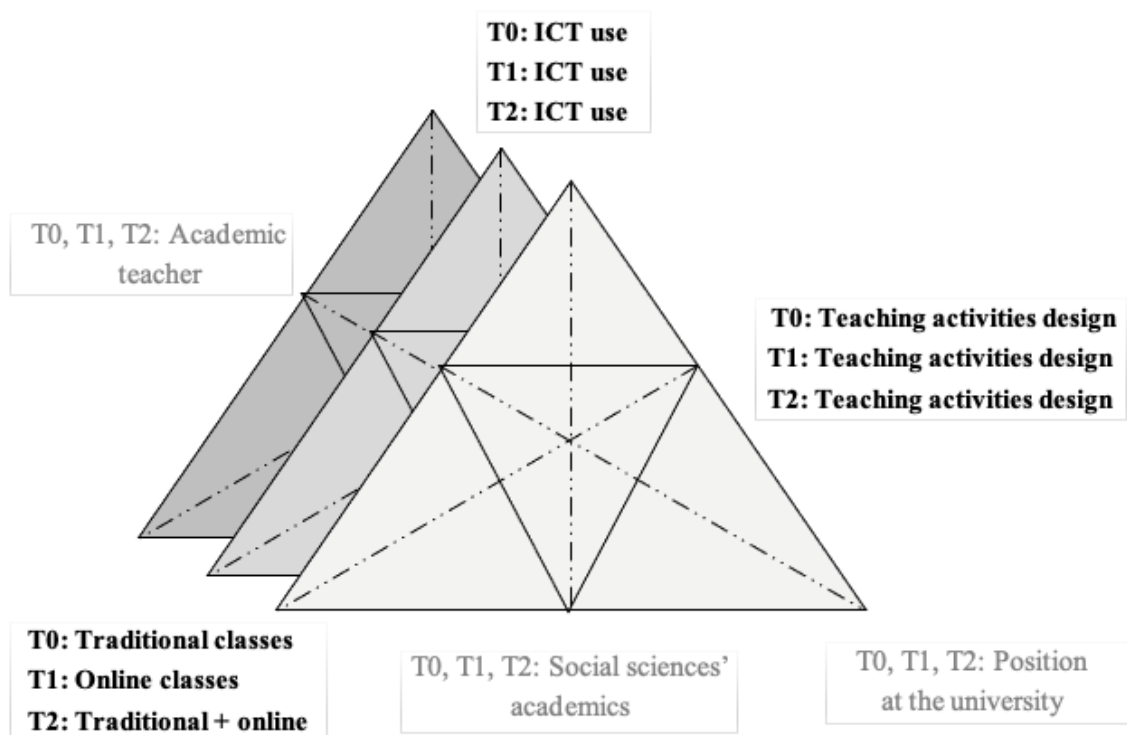


Figure 3. Research design – academics' teaching practices before (T0), during (T1), and after (T2) the COVID pandemic. Source: Own work based on Blin, Munro, 2008.

The authors argue that while the teachers were forced to work online and change what tools (ICT) they used for teaching and how they designed their classes (object), they still were under the same community and division of labour. In consequence, these indices of AT triangle – together with the subject – were not investigated in this research. Instead, the subject is the teacher we ask directly in the questionnaire about his/her academic teaching practices (the outcome). Therefore, changes in tools and objects are expected to be observed in three timespans, which we recall later on as (T0-T1) for before and during the COVID pandemic, (T0-T2) for before and after the COVID pandemic as well as (T1-T2) for during and after COVID pandemic.

Based on the research design (Figure 3) and Blin and Munro's (2008) past findings, we hypothesise:

H1: There are statistically significant differences in ICT use (tools) in academic teaching practices between the time spans before, during, and prediction after the COVID pandemic.

H2: There are statistically significant differences in teaching activities design (object) in academic teaching practices between the time spans before, during, and prediction after the COVID pandemic.

Further, building upon the hypothesised statistically significant differences (i.e. changes) in tools and objects, we assume academic teaching practices may also transform after the COVID pandemic presenting a unique opportunity for permanent and substantial transformation of well-established, regular universities' practices.

4. The methodology of our research

The data, results, and conclusions presented in this paper are part of broad research. The main focus of that research was to survey academics from different countries to collect their opinions on the COVID pandemic's impact on research and teaching as well as everyday academics and universities' work. Six academic teachers and researchers elaborated on the survey questionnaire and spread this questionnaire around. First, the questionnaire embraced general questions, such as demographics and professional information. Then, the questions concerned three areas: (1) general questions related to the work at university, (2) questions related to scientific research, and (3) questions related to the teaching process.

In turn, two papers have been already published. The first one focuses on the scientists' opinions and aims to investigate the influence of the COVID pandemic on scientific research exclusively (*the reference will be provided after review*). The second one focuses on the effect of the COVID pandemic on ICT use by academics, recognising the nature, magnitude, and trends of the changes related to bringing ICTs to the forefront of academic work life, both in research and teaching (*the reference will be provided after review*). This research

focuses on AT and recognises whether the COVID pandemic is a disruptive factor that leads to the evolution of academics' teaching practices. Moreover, our data, results, and conclusions are limited to social science and employ the questions on the teaching practices at the universities exclusively. Thus, our study's main assumption was the COVID pandemic is a disruptive factor that significantly contributed to the changes in teaching practices, particularly ICT use and the teaching activities design. For our analyses and deliberations, we chose only these questions related to the teaching process, especially the quality and use of ICT in the timespans presented earlier in Figure 2 – T0, T1, and T2. The respondents' task was to assess their teaching practices, i.e., ICT use, instructional tools, and overall teaching processes in T0, T1 and T2.

4.1. Research subject

Stratified sampling was used to obtain a research sample allowing for both the results interpretation and generalising to the social sciences. Efforts were made to invite respondents from social sciences. The appropriate number of women and men participated in the survey representing different age generations. Referring to work at the university, we did our best to invite academics employed in various academic positions. As we intended to collect as many questionnaires as possible, the snowball sampling method was used. Snowball sampling is recognised as a reliable, viable, and widely used method of recruiting study participants who are not easily accessible or known to the researchers (Leighton et al., 2021; Marcus et al., 2017). We started with a small number of academics who fit the research criteria and were invited to become participants in the research. Then we asked that academics recommend our survey to the other people who fit the research criteria and who might also be willing participants. Thus, we used our professional networks to establish links and contacts, which resulted in most of our sample representing social science and coming from Europe.

4.2. Data collection process

The ongoing COVID pandemic resulted in social distancing, which had to be taken into account while conducting our research. For this reason, we decided to employ the Computer Assisted Web Interview (CAWI) method and use the Lime Survey software. Importantly, researchers show that the validity and quality of the online gathered data are equivalent to the traditional, i.e., conducted in place, data gathering methods (Shatz, 2017).

We used a 5-point Likert scale. Depending on the question, some of the respondents could choose from: definitely worse / rather worse / neither worse nor better / rather better / definitely better; whereas others could choose from: never / seldom / sometimes / often / very often.

We prepared the preliminary version of the questionnaire in April 2020 and conducted a pilot test to validate the instrument. The questionnaire was in English. The pilot study aimed to test the questionnaire, its validity and methodological scrutinising. At this stage, 15 academics from different countries and universities were asked to fill out the questionnaire and share more profound opinions with experts. We amended some minor changes based on

the respondents' clues, especially related to the formal, technical, and language nature. In addition, we enhanced the layout of the questionnaire.

The primary research process aimed at data collection occurred in 2020, from June 11 to August 18. The questionnaire was anonymous, and the participation was voluntary.

The total sample size covers 982 responses (complete and incomplete). After screening for full responses, 476 responses were isolated. Next, we chose answers from social sciences academics only, resulting in a total of 382 valid responses, which were taken into analysis. The demographics of the respondents are presented in Table 1.

Table 1.
Demographic analysis of the respondents

Demographics	Number of respondents	Percentage of respondents
Gender		
Females	201	52.6
Males	174	45.5
Missing data	7	1.8
Age		
20-34	72	18.8
35-49	187	49.0
50-68	113	29.6
>69	10	2.6
Region		
Europe	305	79.8
Other continents	77	20.2
Position		
PhD. Students	40	10.5
Lecturer	38	9.9
Adjunct	119	31.2
Associate Professor	103	27.0
Full Professor	68	17.8
Other	14	3.7

Source: Own work.

4.3. Data analysis

The data were stored in MS Excel and uploaded into SPSS to perform the required tests. For the data analysis purposes, the following statistical tests were employed: (1) Cronbach's alpha for instrument reliability, (2) frequency procedures and descriptive statistics for showing the differences and similarities between variables, (3) the Friedman's ANOVA non-parametric

test for repeated samples as it does not assume a normal distribution. We used the Shapiro-Wilk test to check this distribution. The scale applied in the questionnaire was an ordinal one.

5. Research findings

5.1. The universities' teaching practices and their changes due to the COVID-19 pandemic

Descriptive statistics were employed to partially answer the research question RQ, such as median and mode. The respondents were asked to choose one of the teaching practices out of three suggested, i.e., (1) traditional, (2) traditional and online, and (3) purely online, which is predominant at the university they work for. The results are presented in Table 2.

Table 2.
Teaching model in T0, T1, and T2

Time	N	Median	Mode	Traditional (on-site)	Traditional and online	Online
Which of the following teaching models best describes your university?						
T0	382	1	1	328 (85.9%)	53 (13.9%)	1 (0.3%)
T1	382	3	3	4 (1.0%)	19 (5.0%)	359 (94.0%)
T2	382	2	2	35 (9.2%)	332 (86.9%)	15 (3.9%)

Where: 1 – traditional, 2 – traditional and online, 3 – online.

Source: own work.

The results presented in Table 2 show that in T0, the dominant teaching model was a traditional one. Both mode and median values are equal to 1. It means that teaching *before* COVID (T0) was performed on campus – at the universities. However, in T1, a significant shift in the teaching model was noticed. Both mode and median values are 3. It means that the teaching model switched into an online mode. The prediction on the teaching model in T2 indicates that mode and median values are 2. It shows that academics predict the teaching model as traditional and online mixed together. The above results show that there was a change in the universities' teaching practices due to the coronavirus pandemic, and that is predicted that the teaching model after the pandemic (T2) will not go back to the previous state and mixed teaching strategies (traditional and online) will become a standard. The analyses of data presented in Table 2 can bring the big picture on the changes in the academics' teaching models due to the COVID pandemic and therefore supports us in answering the research question.

5.2. The changes in tools and objects in T0, T1, and T2

To answer the research question **RQ**, we investigate the possible changes in academics' teaching practices (*activity*) in T0, T1, and T2 timespans of the COVID pandemic using descriptive statistics. Thus, we asked the respondents to express their opinion on the following statements: from #1 to #6 using a 5-point Likert scale (Table 3). For these statements, Cronbach's alpha is 0.736, which indicates a high internal consistency and reliability. What is more, the removal of some items would not improve the internal consistency among items on the scale (it varies from 0.702 to 0.738).

The results presented in Table 3 show that in T0, academics did not use communication apps, e-learning platforms, and social media in their teaching (#1 - #3). The mode values are 1, the median values are 2, and the average values vary from 1.9869 to 2.4110. That means that the responses that academics chose the most frequently answered the questions regarding *tools* were never and seldom. Interestingly, the results show that in T1, communication apps and e-learning platforms were used often or very often (the median and mode values are 5, and the average values are higher than four and oscillate around 4.5). At the same time, social media were still not employed in teaching practices. The median is 2, the mode is 1, and the average value is 2.5262 for social media. The respondents assume that in T2, the use of communication apps and e-learning platforms will be higher than it was in T0. The mode and median values are 4. At the same time, they presume that social media use will be similar compared to T1. Mode, median, and average values for social media for T1-T2 periods are very close.

As to *the objects* (#4 - #6), i.e., the overall teaching process, the quality of teaching, and the instructional tools, the results show that in T1, the mode and median values were most often 2, which means that the situation was somewhat worse in comparison to T0. What is interesting, the respondents assume that in T2, the overall teaching process (#4) will be relatively better (the median and mode values are 4). Nevertheless, they cannot predict what it could be as the quality of teaching (#5) and the instructional tools (#6) because the majority of them chose "3", representing the "it is neither worse, not better" option.

Table 3.

Descriptive statistics of statements referring to tools and objects

Time	N	Min	Max	Median	SD	Mode	Average
<i>Tools</i>							
#1: How do you assess the frequency of usage of any communication apps in your teaching? (e.g., Skype, WhatsApp, Google Meet)							
T0	382	1	5	2	0.9814	1	1.9869
T1	382	1	5	5	0.9467	5	4.4948
T2	382	1	5	4	0.9313	4	3.6152
#2: How do you assess the frequency of usage of any e-learning platforms in your teaching? (e.g., Moodle; Google Classroom; Docebo; Wiz IQ; ATutor)							
T0	382	1	5	2	1.3206	1	2.411
T1	382	1	5	5	0.8724	5	4.563
T2	382	1	5	4	0.9580	4	3.861

Cont. table 3.

#3: How do you assess the frequency of usage of any social media in your teaching? (e.g., Facebook, Twitter, LinkedIn, Youtube, Instagram, blog sites)							
T0	382	1	5	1	1.0143	1	1.838
T1	382	1	5	2	1.4301	1	2.526
T2	382	1	5	2	1.3102	1	2.437
Object							
#4: In your opinion, how does the overall teaching process look like?							
T0	382	3	3	3	0.0000	3	3.000
T1	382	1	5	2	0.9954	3	2.500
T2	382	1	5	4	0.8156	4	3.489
#5: In your opinion, how does the quality of teaching (i.e., knowledge and skills gained by students) look like?							
T0	382	3	3	3	0.0000	3	3.000
T1	382	1	5	2	0.9228	2	2.448
T2	382	1	5	3	0.7994	3	3.374
#6: In your opinion, how do the instructional tools (i.e., materials, platforms, teaching, and assessment methods) look like?							
T0	382	3	3	3	0.0000	3	3.000
T1	382	1	5	2	1.0700	2	2.382
T2	382	1	5	3	1.0486	2	2.948

Source: own work.

To fully answer the main research question **RQ** and test the hypotheses **H1** and **H2**, the non-parametric analysis of variance was conducted, the Friedman's ANOVA test for repeated samples to compare respondents' opinions regarding the T0, T1, and T2 timespans. We tested both hypotheses at a significance level of $\alpha=0.05$. The results in Table 4 show that we statistically confirmed the significant differences in the tools and objects in academic teaching practices in all statements' timespans (T0, T1, and T2).

Table 4.

The Friedman's ANOVA test with repeated measures

	N	Average ranks	Chi-square	df	p
Tools					
#1: How do you assess the frequency of usage of any communication apps in your teaching? (e.g., Skype, WhatsApp, Google Meet)					
T0	382	1.12	618.291	2	<005
T1	382	2.78			
T2	382	2.10			
#2: How do you assess the frequency of usage of any e-learning platforms in your teaching? (e.g., Moodle; Google Classroom; Docebo; Wiz IQ; ATutor)					
T0	382	1.22	538.191	2	<005
T1	382	2.67			
T2	382	2.11			
#3: How do you assess the frequency of usage of any social media in your teaching? (e.g., Facebook, Twitter, LinkedIn, Youtube, Instagram, blog sites)					
T0	382	1.58	249.741	2	<005
T1	382	2.26			
T2	382	2.16			

Cont. table 4.

<i>Objects</i>					
#4: In your opinion, how does the overall teaching process look like?					
T0	382	1.97	288.308	2	<005
T1	382	1.49			
T2	382	2.54			
#5: In your opinion, how does the quality of teaching (i.e., knowledge and skills gained by students) look like?					
T0	382	2.06	270.285	2	<005
T1	382	1.48			
T2	382	2.46			
#6: In your opinion, how does the instructional tools (i.e., materials, platforms, teaching and assessment methods) look like?					
T0	382	2.23	122.542	2	<005
T1	382	1.61			
T2	382	2.16			

Source: own work.

To provide a detailed answer to the main research question and test the hypotheses **H1** and **H2**, we used the post-hoc Wilcoxon test to explore differences in ICT use (*tools*) as well as the teaching activities design (*object*) in academic teaching practices in the particular timespans, i.e., T0-T1, T1-T2, and T0-T2. The results are presented in Table 5. They show that the respondents declared more frequent use of all three types of *tools* (#1, #2, #3) in the T0-T1 and T0-T2 timespans comparison. The above is also valid for all three statements #4, #5, and #6, showing that respondents predict that *objects* will look better after this COVID pandemic despite worse usage of *objects* during the pandemic (timespan T0-T1).

Table 5.

Related samples Wilcoxon signed-rank test for statements #1 - #6

Time	N	Z	Asymp.Sig. (2-tailed)	Negative ranks	Positive ranks
<i>Tools</i>					
#1: How do you assess the frequency of usage of any communication apps in your teaching? (e.g., Skype, WhatsApp, Google Meet)					
-T0-T1	382	-16.395	<005	2	350
-T1-T2	382	-13.349	<005	262	14
-T0-T2	382	-15.687	<005	1	322
#2: How do you assess the frequency of usage of any e-learning platforms in your teaching? (e.g., Moodle; Google Classroom; Docebo; Wiz IQ; ATutor)					
-T0-T1	382	-15.587	<005	2	320
-T1-T2	382	-11.812	<005	216	20
-T0-T2	382	-14.761	<005	1	282
#3: How do you assess the frequency of usage of any social media in your teaching? (e.g., Facebook, Twitter, LinkedIn, Youtube, Instagram, blog sites)					
-T0-T1	382	-11.243	<005	4	172
-T1-T2	382	-2.667	0.008	63	34
-T0-T2	382	-10.736	<005	4	156

Cont. table 5.

<i>Objects</i>					
#4: In your opinion, how does the overall teaching process look like?					
-T0-T1	382	-8.689	<005	203	63
-T1-T2	382	-13.463	<005	18	268
-T0-T2	382	-9.916	<005	36	198
#5: In your opinion, how does the quality of teaching (i.e., knowledge and skills gained by students) look like?					
-T0-T1	382	-9.866	<005	209	46
-T1-T2	382	-12.568	<005	16	247
-T0-T2	382	-8.250	<005	45	165
#6: In your opinion, how does the instructional tools (i.e., materials, platforms, teaching and assessment methods) look like?					
-T0-T1	382	-9.673	<005	238	71
-T1-T2	382	-9.615	<005	22	152
-T0-T2	382	-1.025	<005	146	136

Source: own work.

Based on Friedman's ANOVA and Wilcoxon's signed-rank tests (Table 5), we confirmed statistically significant differences in ICT use (*tools*) in academic teaching practices between the time spans before, during, and prediction after the COVID pandemic. Thus, **H1** regarding *tools* is confirmed. Moreover, it should be noted that the predicted usage of *tools* after this COVID pandemic is expected to be less frequent when compared to the time during this pandemic (T1-T2).

Further, we confirmed statistically significant differences in teaching activities design (*object*) in academic teaching practices between the time spans before, during, and prediction after the COVID-19 pandemic. Thus, **H2** regarding *objects* is confirmed as well.

In addition, we found that the perceived frequency of use of ICT *tools* in the form of social media in T2 depends on the geographical region. For example, respondents located in Europe were more prone to state that social media (statement #3) will be used never or seldom in T2 ($\chi^2(4, N = 382) = 41.317, p < 0.05$). Further, European respondents were more convinced that instructional tools (statement #6) would be relatively worse in T2, while those were declaring locations other than Europe most often indicated that instructional tools would be relatively better in T2 ($\chi^2(4, N = 382) = 14.565, p = 0.006$).

No other significant differences regarding T2 prediction were identified.

6. Discussion and conclusion

Activity theory being a theoretical background in this study, provides a broad, conceptual framework for analysing human activity as a system of multiple elements and their relations (Georg et al., 2015). This paper contributes to prior literature by showing that introduction of a new *tool* (ICT) and modified *object* (teaching activity design) resulted in a serious alteration of the *outcome* (teaching practice of social sciences' academics). Thus, we can infer that activity

system has been disrupted in line with Engeström's theory (Engeström, 2001). Our findings did not confirm that this disruption was expansive enough to permanently transform teaching activities of social sciences academics, hence suggesting that obstacles to successful incorporation of ICT use in teaching practices are still present as pointed in prior literature (Liu et al., 2020). We showed that ICT as a *tool* is predicted to be used more frequently rather than before (when it was only utilised as a platform to transfer traditional material) and will not modify the well-established practices referring to instructional tools (*object*). It suggests that the relation between *subject* (teacher) and *object* (teaching activity design) is not mediated by ICT *tools*, which may result in resistance from the *subject* as suggested by Blin and Munro (2008).

6.1. Challenges for future enhanced ICT use by social sciences academic teachers

Based on our findings, we argue that this coronavirus pandemic acted as a disruptive factor and has already changed academics' teaching practices which broke two main barriers restraining academic teachers from using ICT. Not only did the pandemic result in forcing academic teachers to use ICT (*tools*) for the time being, but it has also given them time to convince them about their usefulness in academic teaching practices, thus giving a high hope that the use of ICT tools in academic teaching practices will persist after the pandemic. For the future it seems important that the change of the teaching practices activity described by the lens of activity theory in this paper would be applied by academic teachers even after pandemic, which can move teachers to blended learning with enhanced use of ICT. If teachers perceive their professional activities through the lens of relations between *tools* (used by *subjects*) and *objects*, it will enable them to develop teaching practice (*outcome*) overcoming the obstacles described below.

In the past, two main obstacles were presented in the literature due to which academics do not use e-learning platforms broadly. One of them was presented by Guillén-Gámez and Mayorga-Fernández (2020) who highlighted the need to improve the digital competence of academics to meet the demands of the qualified professions in the future and, therefore, prepare students for that. It was also suggested by Blin and Munro (2008). Our results partially support that thesis as social sciences academic teachers were, on the one hand, forced to implement e-learning and other ICT rapidly. However, on the other, most universities facilitate training modules for the academic staff. The second blockbuster presented in the literature was the lack of willingness to use ICT (Blin, Munro, 2008; Kirkwood, 2009; Liu et al., 2020). As the pandemic forced academic teachers to use technologies for an extended amount of time, they noticed which tools were worth using and felt the advantages of using specific e-learning methods. This gives a chance that academic resistance to change their teaching practices broken down during the pandemic, will not reappear after the pandemic, and –with dedicated training and IT competences – social sciences academic teachers will adopt ICT tools more broadly for their teaching tasks.

6.2. The teaching activities design – investigated and expected changes

Our research indicates that this coronavirus pandemic acted as a disruptive factor that forced changes in overall teaching practices (*outcome*). As the pandemic's duration exceeded one academic semester, the disruptive factors influenced all three phases of the teaching process: planning (pre-active), conduct and management (active), and follow-up (post-active). Combining this result with the above-described findings regarding *tools*, it may suggest that academic teachers have noticed the prevalence of ICT (*tools*) implemented into the academics' teaching practice and plan to take advantage of them in their overall teaching process even after this coronavirus pandemic ends.

Our results also indicate that the quality of social sciences teaching has worsened during the pandemic and most of the respondents do not predict significant changes in the quality of teaching after the pandemic compared to the quality of teaching before the pandemic. This confirms many reports and the past literature stating that teaching quality requires teacher development support (Darling-Hammond, Berry, 2006; Berry, 2011; Global Partnership for Education, 2019), including certification and accreditation for teachers, ongoing support, coaching from headteachers and other administrative staff. Weak subject content, lack of pedagogical knowledge and classroom skills, inadequate standards, and other quality of teaching challenges that academic teachers may face can probably not be removed with the enhanced ICT use. Changing teachers' practice regarding scripted lesson plans, structured teaching content, or assessment methods also requires institutional teaching improvement programs in the form of training and teachers' guides (Felder, Brent, 1999; Global Partnership for Education, 2019). Our findings also suggest that changes introduced with enhanced ICT use will concern teachers only, with no amendments to teaching content or assessment methods. Thus, it may not lead to a permanent change in instructional tools and further social sciences teaching practices confirming prior studies about teachers and their constraints (Karasavvidis, 2009; Liu et al., 2020).

The decision about the degree of use and the number of tools and ICT may differ depending on the geographical region and other situational factors (Adnan, Anwar, 2020; Mishra et al., 2020; Parolin, Lee, 2021). This finding is in accordance with previous research (Lin et al., 2010; Lawrence, Lentle-Keenan, 2012; Ashrafzadeh, Sayadian, 2015; Kidd et al., 2016; Zdonek, Mularczyk, 2020), acknowledging that academic teachers consider technology as relatively advantageous but also indicating the diversified use of social science academic teaching practices.

7. Limitations and further research

Although this paper has contributed to our understanding of academic teachers' practice through the lens of activity theory, it is bounded by several limitations. Eliminating them would enhance the results presented in this paper and is an excellent proposal for future research.

The first limitation is connected to the sample size and internationality of the survey. While we have collected views from different countries, we believe that the number of respondents and the representation of different nationalities could be expanded. Furthermore, the representation concerns non-Europe countries in particular, as our research had only a collection of 77 responses from outside of Europe. It is worth noticing that the problem of limited generalizability of the online surveys during COVID was in detail described by Singh, Sagar (2021).

The second limitation derives from the choice of the way of data analysis. We applied a general approach in our research for ICT (*tools*) analyses. It means that we divided them into three categories, i.e. communication apps, e-learning platforms, and social media. Thus, we did not ask respondents about each particular tool in detail. That detailed approach would be very interesting and would open further research possibilities. Moreover, we have focused on quantitative data. However, to deepen the results presented in this paper, a qualitative approach could be adapted to perform a series of interviews, enhancing insight into social science academics' perspectives.

The third limitation is linked to the fact that the COVID is a phenomenon that evolves continuously. Nevertheless, the above allows further in-depth, pandemic-related research in the scope of ICT use among social sciences and other disciplines' academics.

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