One year later: digitalized higher education in pandemic times. An international study of higher education faculty's response

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Abstract

The paper describes the international research conducted in collaboration between the University of Padova, University of North Texas, and Windesheim University of Applied Sciences. The study explores how higher education faculty involved in professionalizing courses for the educational area perceive the pandemic-induced transition to digitalized education (DE), after one year of experience with it.

This paper introduces the second phase of a research study that began as early as spring 2020, with an online survey distributed worldwide. It seeks to investigate possible changes after one year of digitalized education related to (1) perceptions of institutional support and professional training offered; (2) potential and challenges of DE; and (3) professional intentions for future uses of DE. Details on the instrument's reliability and structure will also be provided.

We are exploring how the DE is changing teachers' routines and whether these changes are paving the way for collaborative, reflective, and student-centred approaches that could have long-term consequences. This is to help focus future training pathways to better support teachers in teaching effectively and efficiently for learning, both in times of crisis and in times of normalcy.

Keywords: higher education; university faculty; information and communication technology; distance learning.

Introduction

In the past two years, the world of education has undergone dramatic changes due to the COVID-19 pandemic. A report from the European Union estimated that approximately 220 million students globally have been affected by this disruption (Farnell et al., 2021).

In the face of vague and changing (inter)national policies (Crawford et al., 2020; Farnell et al., 2021; UNESCO IESALC, 2020), most higher education institutions worldwide have tried to mitigate learning losses using remote learning and leveraging the ICT for emergency remote teaching (Hodges et al., 2020; Kara, 2021; Safi et al., 2020). Up to April 2020, 85% of higher education institutions in Europe switched to online teaching, according to the International Association of Universities (IAU) (Marinoni et al., 2020). These same figures are true globally, as reported by the QS survey in 2020 and the survey conducted by the Institute of International Education (Martel, 2020).

In spite of the fact that most European universities offered e-learning options as early as 2013 (Gaebel et al., 2014), the sudden surge in demand caused by the transition to emergency remote teaching (ERT) had unexpected effects on both educators and learners. Faculty felt obligated to invest their time and efforts into the implementation of digital-based remote teaching, often with an adverse impact on work-life balance (Farnell et al., 2021; Gatti et al., 2020). As a result, faculty faced altered work patterns, higher performance demands, role ambiguities, and subsequent role overload, on top of a health crisis, which led them to be overexposed to the risk of technostress on a regular basis (Boyer-Davis, 2020). Moreover, serious challenges in students' learning arose. A report by the European Union showed that a considerable portion of all students believed that their academic performance was negatively affected due to access issues, challenges with digital skills, and psychological and emotional issues (Farnell et al., 2021).

For the transition from traditional face-to-face to online learning, many educators have not been adequately prepared (Crawford et al., 2020). Over the past two decades, several studies in the field of educational technology have carefully

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(re)defined online/blended instructional models, teaching methodologies, and formats (Moore & Diehl, 2018; Trevisan et al., 2021). Despite this, and even though e-learning options were already available in higher education worldwide (Gaebel et al., 2014), many academics were ill-equipped to make use of online resources in the age of the pandemic (Toquero, 2020; Zhang et al., 2020). As a result of lack of skills and training in this area and in some cases limited access to online learning materials, they were not prepared to make the transition to ERT (Kara, 2021). Numerous concerns have been raised in the past year about educators' pedagogical and digital literacy, and their attitude towards the mass implementation of ERT to the point of arguing that the current provision of ERT can barely pass the test of online pedagogy (Kara, 2021).

A new educational context is emerging that offers an opportunity to rethink assumptions about education, especially in higher education (Ashour et al., 2021; Farnell et al., 2020; Rapanta et al., 2021); educators need to reconsider their roles, the ways they support their students' learning tasks, as well as the idea of students as self-organising, active citizens and autonomous social agents. According to Kalantzis and Cope (2020), the unprecedented shift to online learning should lead to the questioning of the conventional wisdom that traditional face-to-face learning is the gold standard (p.51). Rizvi (2020) agrees arguing that online pedagogy has the potential to radically change the nature of student-teacher relationships, as well as the processes of knowledge creation, ownership, and distribution (p. 1315). While caution is advised against assuming online education to be the panacea for education, it could be argued that the post-Covid period may result in fundamentally rethinking our approaches to higher education teaching and learning and may provide an opportunity to develop new visions for how higher education can serve societal needs (Farnell et al., 2020). However, in order to accomplish this, educators must possess a specific skillset acquired through rapid training pathways (European Commission, 2020; Hodges et al., 2020), considering the potential impact on the quality of learning (Gaebel & Zhang, 2018; Perry et al., 2019). The design of effective online learning requires careful planning, which requires training. Among the various factors that strongly influence teacher preparation for DE are infrastructure and support from the employing institution; instructional focus on student-centredness and student learning beyond the mere transmission of knowledge (Safi et al., 2020); and the ability to use technology for learning (De Rossi & Ferranti, 2017).

This abstract introduces international research jointly coordinated by the University of Padua, the University of North Texas (USA), and Windesheim University of Applied Sciences (NL) to explore how higher education faculty involved in professional development courses for the area of education (DCPE) perceive the current transition to DE. This research builds on a previous investigation of the phenomenon in its early stages (Spring 2020), now seeking to investigate possible changes after one year of DE in relation to (1) perceptions of institutional support and professional training offered; (2) potential and challenges of the DE; and (3) professional intentions for future uses of the ED. The overall goal is to monitor whether the (forced) transition to distance learning is stimulating faculty to innovate teaching practices within their higher education. The research explores how DE is changing faculty routines and whether these changes are paving the way for collaborative, reflective, and student-centred approaches that could have long-term consequences. The findings could help understand how DCPEs are coping with the abrupt change in teaching caused by the pandemic. This could in turn inform future strategies to best support an effective and efficient DE for learning, both in times of crisis and in times of normalcy.

1. Present study

The overall goal of this international study is to monitor whether the (forced) transition to distance learning is stimulating faculty to innovate teaching practices within their university. The research explores if/how distance education (DE) is changing faculty routines and whether these changes are paving the way for collaborative, reflective, and student-centred approaches that could have long-term consequences. The study comprises a survey administration to higher education institutions worldwide. An early version of such *Higher Education Technology Survey* circulated worldwide in the spring of 2020 (see Trevisan et al., 2020, 2021), while a second administration circulated between July and November 2021. This paper addresses the second administration of the survey, considering the following research questions: did faculty perceptions on remote teaching change, after one year of distance education (DE), in relation to: (1) perceptions of institutional support and professional training offered; (2) potentialities and challenges of DE; and (3) professional intentions for future uses of DE?

This study aims to help understand how higher education faculty is coping with the abrupt change in teaching caused by the pandemic. This could in turn inform institutional strategies to best support an effective and efficient DE for learning, both in times of crisis and of normalcy.

As anticipated, the early version of such *Higher Education Technology Survey* circulated worldwide in the spring of 2020 (Time1, T1), collecting responses from 120 faculty involved in professionalizing courses for the educational area, on several continents (Trevisan et al., 2020, 2021). In a second time (Time2, T2), the instrument circulated between July and November 2021, collecting answers from 54 faculty members involved in professionalizing courses for the educational area. The sampling of respondents, in both online administrations, followed a snowballing strategy in an attempt to include as many participants as possible worldwide, starting with the dissemination by the sponsoring universities, i.e., University of Padova, North Texas University, and Windesheim University. In both times, participants were fully informed about the aims of the research and provided consent through accepting the terms and conditions in the survey. All data were anonymized before the analyses.

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Considering T2 survey administration, the demographics of the 54 respondents were 57% females and 43% males. As per their seniority in teaching, a large group of experienced faculty responded to the survey: 35% of the respondents had over 20 years of teaching experience, while only 13% were in their first five years of teaching. Other background information gathered through the survey included (a) respondents' habits regarding keeping up with educational technologies; (b) respondents' possible training in distance education within the last 5 years; and (c) any experience with DE previous to 2020 (see Table 1).

As per the first issue, most participants reported to keep up with educational technologies *occasionally* (37% on a 4-point scale, 1 = never to 4 = always), followed closely by 33% *always* doing it. Almost half of the participants (48%) indicated having *never* attended formal training sessions in DE in the last two years, i.e., during the pandemic (4-point scale, 1 = never to 4 = always), although up to 33% reported *occasionally* having completed any training versus 17% reporting they were *frequently* involved in such professional development. Previous practices of DE engaged *occasionally* 45% of the surveyed population (4-point scale, 1 = never to 4 = always), while 9-13% respectively *never* and *always* used this type of instruction in their routines, prior to the pandemic.

Table 1. Participants' background variables (T2 administration, N=54).

Items (Likert scale 1-4)	Mean (st. d.)	% Never	% Occasionally	% Frequently	% Always
Habit to keep up with educational technologies	2.96 (.85)	0%	37%	30%	33%
Recent Training in DE (last two years)	1.72 (.81)	48%	33%	17%	2%
Previous experiences with DE	2.5 (.84)	9%	45%	33%	13%

In a comparative perspective with the first batch of participants, ANOVA measures were carried out on the respondents' habits to keep up with educational technologies, their training in the last two years, and previous experiences with DE. The two samples of faculty surveyed showed similar measures for DE experiences before the pandemic (both with a mean of 2.5 on a scale 1-4, st. d.$_{T1}$= .87; st. d.$_{T2}$=.84). To the contrary, there was a significant difference between the two groups of faculty when it comes to *keeping up with educational technologies* (p<.001, Cohen's d = 1.25). Respondents to the survey at T1 had a significant lower mean (mean$_{T1}$=1.98, st.d. = .75) than the faculty answering year later (mean$_{T2}$ =2.96, st.d.==.85). On the same line, participants in the T2 administration showed a significantly higher engagement in *training for DE*, in the last two years (mean$_{T2}$=1.72, st.d. == .81, p<.001, Cohen's d =.64), when compared with the respondents to the T1 survey administration (mean$_{T1}$ =1.16, st.d. = .91)—although still very low on the scale.

2. Higher Education Faculty survey

In this section, a description of the Higher Education Technology Survey's structure and characteristics will be presented. Moreover, indications about reliability of the instrument and factor analysis will be described, then further examined through a hierarchical cluster analysis.

The Higher Education Technology Survey includes (see also Trevisan et al., 2020, 2021):

• ten demographic items with binary, open-ended, or 4-point Likert scale questions: gender; location of affiliation; years of teaching and scientific area; access to institutional platforms for DE; habits to keep up with educational technology; recent professional training for DE; teaching approaches before the pandemic; previous experiences with DE.

• Twenty-one items on a 6-point Likert scale investigate different constructs as the perceived institutional support in the DE; positive and negative perceptions of DE use; realization of DE modalities; and intentions to implement the DE in the future.

• Nine multiple-choice follow-up questions paired with the Likert-6 items aimed at exploring the reasons for responding to the reference item through option hierarchy.

• The described structure mirrors what already disseminated through the T1 administration of the survey (see Trevisan et al., 2020, 2021). Additionally, two new scales were included in T2:

• on attitudes for in-service education and training, 7 items on a 6-point Likert scale based on the Isakson Survey of Academic Reading Attitudes—ISARA (Isakson et al., 2016).

• on technology affordances for learning, 13 items on a 4-point Likert scale based on the Interactive Constructive Active Passive framework—ICAP scale (Chi & Wylie, 2014).

Internal consistency reliability of the instrument was calculated using the SPSS procedure Reliability Analysis and Confirmatory Factor Analysis (CFA) was carried out to investigate the survey's structure. Table 2 shows the goodness-of-fit of the different factor models in the CFA carried out, considering Eigenvalue > 1 and a maximum likelihood method of extraction.

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Table 2. Goodness-of-fit of different factor models.

Model	Variance explained	Goodness of fit X^2	df	p.
Two factors	63%	118.19	64	.000
Three factors	71%	47.21	52	.662
Four factors	79%	41.84	41	.434
Five factors	84%	25.64	31	.738

Considering the findings in Table 2, the factor model chosen was the one with four factors, whose reliability proved more than acceptable (see Table 3), and composition resembles closely the factors emerging from the T1 administration (see Trevisan et al., 2020). The ISARA scale proved reliable and highly internally correlated: its overall Cronbach's alpha is .83 and the variance explained is 39.93%. The ICAP scale proved reliable and highly internally correlated, with an overall T1 of .85 and variance explained 47.35%.

Table 3. Factors' compositions and reliability.

Factor	Reliability (Cronbach's alpha)	Variance explained	Item example(s)
Factor 1. Enthusiasm: 6 items.	.90	57.22%	1. I find DE to be easy 2. Using DE improves my teaching
Factor 2. Resolutions for the future: 5 items.	.89	30.64%	19. I will use blended learning 20. I will integrate DE in F2F
Factor 3. Perceived support in DE: 3 items.	.76	11.76%	16. The organization of my institution encourages/supports me in DE 17. When I need help with DE, I find it in my institution
Factor 4[a]. Difficulties in DE: 7 items.	.70	38.17%	4. Difficulties arise in DE, due to lack of infrastructure 6. Difficulties arise in DE, in relation to the interaction with the students
Factor 5[a]. In-service training: 7 items (ISARA scale).	.83	39.93%	ISARA1_Importance to read materials on disciplinary content. ISARA2_Use of professional literature to solve content related teaching problems.
Factor 6[a]. Technological affordances in DE: 13 items (ICAP scale).	.85	47.35%	Passive: (I ask my students to) listen to lessons/podcasts without taking notes. Interactive: (I ask my students to) elaborate answers building on someone else's contributions, online.

Note: [a]= factor emerging in T2 administration, not present in T1 administration (due to added items).

For the final versions of F1-F6 scales, reliabilities fell in the range of respectable to excellent according to guidelines by DeVellis (1991). Cronbach's alpha for the total scale of 41 items was .84.

3. Major Findings based on Six Factors

In this section, the major findings from the T2 administration will be described, considering the six-factor model. Whenever possible (i.e., on factors 1-3), a comparison between the T1 and T2 administrations' findings will be provided, obtained through unpaired sample t-test measures.

3.1 Higher education faculty experiencing DE

In the second half of 2021, higher education faculty involved in professionalizing courses for the educational area was asked to express their perceptions on potentialities and difficulties in DE. They were also asked about the modalities in which they were using technological affordances to shape instructional tasks.

Considering a 6-point Likert scale for Factor 1 (F1) *Enthusiasm,* where 1 = strongly disagree and 6 = strongly agree, respondents scored quite appreciative of DE (mean=3.47, st.d.= 1.26). Within F1, particularly high was the average response to item one ("*I find DE to be easy*"), with a mean of 3.86 over 6 (st.d. =1.5). The most reported reason for the perception of ease in DE was "*it makes it possible to adapt to my course resources already available on the web*", chosen as main reason by 20.4% of the respondents. Also appreciated was the *availability of resources on the web,* chosen as main reason for ease in DE by 18.4% of the surveyed faculty.

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They also perceived quite clearly the difficulties. Within Factor four (F4), *Difficulties* (mean = 3.88, st. d. = .91) and issues related to the "*pervasiveness of work time in personal life*" were seen as most challenging, with a mean of 4.29 over 6 points (st.d.==1.6), followed closely by *infrastructural barriers* to DE (mean=4.19, st.d.==1.5).

As per the technological affordances mostly used in DE, i.e., the *ICAP* scale (Factor 6 – F6), the respondents scored as follows. Using ICT to engage passively the students, e.g., asking them to "*listen to/watch lessons without taking notes*" or "*reading digital material*", was *occasionally* to *frequently* chosen by the respondents: mean of 2.43 out of 4[1] (st.d.==.60). Using ICT to engage students actively, e.g., asking them to "*summarize digital content by copy-and-delete*" or "*answer online multiple-choice questions*", was *rarely* chosen as a modality (mean = 1.65, st.d.==.60).

Also *occasional* to *frequent* choices of ICT uses were the ones engaging students constructively (e.g., asking to "*draw digital concept maps*" or "*compare different online contents critically*"), with a mean of 2.12 (st.d.==.75). Finally, ICT uses for interactive tasks like "*collaborating online with peers*" or "*elaborating answers building on someone else's contributions*" scored a mean of 2.49 (st.d.==.80), hence being chosen *occasionally* to *frequently* by the respondents.

3.2 Perceptions of support and training

Higher education faculty was also asked to express their perceptions on the support offered by their employing institution to carry out DE as well as on the training experienced for this teaching modality.

Factor three (F3): *Support* by the institution scored a mean of 4.61 out of 6 (st. d.=1.14), showing very good appreciation of institutional strategies and efforts to support faculty in DE endeavours. Within F3, particularly appreciated was the ease of use of *the institutional provided platform* (item 15), scoring a mean of 4.91 out of 6 (st. d.=1.4).

Factor five (F5), the *ISARA* scale on faculty's training, shows a mean at 4.72 out of 6 (st. d.=.86). Within F6, IS-ARA-item 7 ("*I find online reading about teaching an important way to develop as a teacher*") particularly relevant to in-service educators, with a mean of 5.13 over 6 (st. d.=1.01), followed by ISARA-item 1 ("*It is important for me to read professional journals about disciplinary teaching*") with a mean of 5.06 (st.d.=1.05).

3.3 Intentions for the future

Higher education faculty was also asked about intentions to carry out DE-related activities or strategies in the future. Factor two (F2): *Resolutions for the future* accounts for this issue. Respondents scored a mean of 4.38 out of 6 (st.d.=1.10). Within this factor, the highest agreement was with item 18: "*Having experienced DE will be useful to my future practices*" (mean at 4.91, st.d.=1.03), followed by item 21 "*I think that when the COVID19 emergency is over, it would be useful to integrate elements of DE into my teaching*" (mean at 4.74, st.d.==1.36). Among the modalities mostly chosen by the respondents to realize such intentions,[2] we can find a 29.6% indicating the use of "*technological tools to improve the face-to-face interaction*" followed by 18.5% willing to use "*resources of DE to encourage collaborative activities*".

3.4 Changes in a year

As anticipated, we will now draw a comparison between the two samples of higher education faculty answering the survey at T1 and T2. This will help understand the (dis)similarities in faculty's perceptions on DE over time. Unpaired sample T-tests (p<.05) were carried out between the two groups of respondents, with these outcomes:

- On F1 *Enthusiasm,* T2 respondents (mean= 3.47, st.d.=1.26) demonstrated significantly lower positive perceptions of DE than T1 respondents (mean=3.90, st.d.=.99). Cohen's *d* for effect size on this difference was small, at .40, although still in the zone of desired effects according to Hattie's (2009) interpretation for educators.
- On F2 *Resolutions for the future*, T2 participants (mean=4.38, st.d.=1.11) did not answer significantly different from T1 participants (mean=4.40, st.d.=.90).
- On F3 *Perceived Support* by the institution, T2 respondents (mean= 4.61, st.d.=1.14) demonstrated significantly higher positive perceptions than T1 respondents (mean=4.60, st.d.=.93). The effect size on this difference was small, *d*=.35, although still in the zone of desired effects (Hattie, 2009).

Moreover, the item "*I find that difficulties arise in DE*" was a constant in both T1 and T2 and was thus considered. The scores of the two groups of participants were not significantly different on an unpaired-sample T-test, *p*<.05.

Finally, item 12 ("*In distance education, I change my way of evaluating student learning*"), common to the two administrations in time, was also analysed (unpaired T-test, p<.05). Faculty responding to the T2 survey administration (mean= 3.43, st.d.=1.56) agreed with this statement significantly less than the T1 respondents (mean= 4.09, st.d.=1.12). The effect size on this difference was intermediate, *d*=.52, and well within the zone of desired effects (Hattie, 2009).

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[1] This scale was on a 4-point Likert scale where 1=never used; 2=occasionally used; 3=frequently used; 4=always used.
[2] These data refer to follow-up multiple choice items paired to the Likert-scale ones.

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Discussion and conclusions

This international study investigated how higher education faculty involved in professional development courses for the educational area around the world perceived the transition to DE, focusing on the possible modifications in perceptions after a year. Data collection was conducted with the higher education faculty survey (Trevisan et al., 2020), which confirmed its original three dimensions of enthusiasm for DE, institutional support, and resolutions to use DE in the future. There are also three additional and reliable factors identified in the updated version of the survey (T2): one describing difficulties related to DE, one describing technological affordances used during DE, and finally, the attitude of faculty towards in-service training.

Generally, the faculty sample at T2 demonstrated higher values in keeping up with educational technologies as well as in taking advantage of institutionally offered DE-training courses (although only occasionally at best). Over a year's experience with DE, the enthusiasm decreased, possibly as a result of (techno)stress in these still uncertain times (Boyer-Davis, 2020; Moralista & Oducado, 2020). Specifically, infrastructure issues and the intrusion of work hours into personal lives were among the main challenges reported. Since T2 faculty only had slightly above-average experience with DE before the pandemic hit, it could be that the tendency to perform DE with ease is a reflection of a moderate level of readiness (Rapanta et al., 2021), which is showing now in the medium term.

According to the most chosen technological affordances, in the second half of 2021, ICT was used primarily for passive and interactive student engagements. The use of prerecorded/live streamed lectures and asynchronous materials is one of the most commonly used DE strategies worldwide (Aristovnik et al., 2020; Gatti et al., 2020); however, it is encouraging that the faculty scored similarly high on an interactive modality that engaged students in collaborative and interdisciplinary knowledge construction. Collaboration in teaching and learning was also reported to be one of the main takeaways from this year's DE experience when it came to resolutions to use DE in a "normalized" future (see also Ashour et al., 2021; Gurukkal, 2020). The findings suggest that (forced) transition to distance learning is stimulating faculty to innovate teaching practices within higher education, in the direction of collaborative, reflective, and student-centred approaches that could have long-term implications.

For the shift to DE to be more sustainable for faculty, while fulfilling the imperative to "leave no one behind" (United Nations, 2020; see also Di Pietro et al., 2020), educators need specific training and support. Although the participants were found to value personal training through online resources (ISARA), the results are ambivalent when it comes to institutional training for DE, which was at best occasionally attended. Based on this finding, there may be a mismatch between the training offered by the institutions to their employers and the needs of the faculty, which may require further investigation and action (Moralista, & Oducado, 2020). Higher education institutions should ideate training courses tailored to the skills, educational needs, and opportunities for practice of their faculty staff; all aspects that a survey like the higher education technology helps to assess in the first place.

As suggested by the United Nations, "the Covid-19 crisis and the unparalleled education disruption is far from over" (2020, p.3). Reports from organizations like the European Commission (Di Pietro et al., 2020) or the United Nations (2020) illustrate the elevated risk of equity and access issues, as well as learning losses in students, with consequences for (non)cognitive skills acquisitions and later employment. Despite this, the post-Covid era may open the opportunity to fundamentally rethink our approaches to higher education teaching and learning (Ashour et al, 2021; Farnell et al., 2021; Rapanta et al., 2021), renewing the nature of teacher-student relationships and of learning overall (Kalantzis & Cope, 2020; Rizvi, 2020). In a future that looks more and more hybrid, higher education faculty needs to be prepared to provide flexible and adaptive learning environments (Moralista & Oducado, 2020), transforming their classes beyond just transferring content online (UNESCO IESALC, 2020; Hodges et al., 2020). They will need training sessions that are tailored to their needs and current capabilities, investigated through instruments like the one in the present study.

A third circulation of the survey is foreseen by the end of the 2021/22 academic year to further investigate how higher education faculty is coping with DE in the "new normalcy". Future analysis will also consider if/how some background variables (e.g. seniority, discipline taught, age) may predict higher education faculty's DE perceptions.

Acknowledgments

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A chi di competenza,	To whom it may concern,
Facendo seguito agli accordi intercorsi, i/le sottoscritti/e	As a result of the existing agreements, the undersigned
Ottavia Trevisan, Marina De Rossi	Ottavia Trevisan, Marina De Rossi
In qualità di autori dell'articolo dal titolo *One year later: digitalized higher education in pandemic times. An international study of higher education faculty's response* pubblicato da *Research on Education and Media* nel 2023 (15:1)	As authors of the article titled *One year later: digitalized higher education in pandemic times. An international study of higher education faculty's response* published by *Research on Education and Media* in 2023 (15:1)
Dichiarano di aver contribuito a pari titolo alla stesura di tutte le parti del testo. Dovendo attribuire le varie sezioni esclusivamente ad uno tra gli autori, concordano nella seguente suddivisione formale:	Declare that they contributed equally to the writing of all parts of the text. Having to attribute the various sections exclusively to either of the authors, they agree in the following distribution:
Ottavia Trevisan: par. 1; 2; 3.	Ottavia Trevisan: par. 1; 2; 3.
Marina De Rossi: Introduction; Discussion and conclusions	Marina De Rossi: Introduction; Discussion and conclusions
In Fede	Sincerely