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Postgraduate oncology educational shifts during the COVID-19 pandemic: results of faculty and medical student surveys

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Abstract

Background: The COVID-19 pandemic has disrupted clinical practice, research and teaching. During peaks, virtual courses were implemented but these changes are poorly described, especially for oncology postgraduate students and faculty teachers.

Methods: We conducted two surveys from 06/2021 to 10/2021 in students and faculty teachers (250 and 80 responses, respectively) who registered at Gustave Roussy School of Cancer Sciences (Paris Saclay University) during three consecutive university years (10/2018-10/2021), where a major shift to e-learning was associated with COVID-19 pandemic.

Results: Most students were female (53%), attending physicians (50%), of 30-39 years old (54%), and 2020-2021 (66.4%) was the main year of training. Most faculty teachers were male (58%), of 40-50 years old (44%) and had participated in training for at least three years (83%). More than half students received 100% virtual training (55% vs 45% face-to-face/mixed teaching modalities; online [84%] vs remote teaching [16%]). Only 34% of students declared >80% "active listening" and only 16% of teachers considered e-learning to be more suitable (compared to face-to-face) for postgraduate education. Virtual teaching decreased student-teacher interactions as compared with mixed/face-to-face (lessons were sufficiently interactive for 54% students if virtual only teaching vs for 71% if other teaching modalities; $p=0.009$). Teachers stated that virtual learning did not lead to any improvements in terms of attendance (68%), interaction (74%) and quality of teaching (68%). However, most faculty (76%) acknowledged that partial e-learning training should be maintained outside the pandemic, if it represents $\leq 50\%$ of the whole teaching (teachers: 79% vs student: 66%; $p=0.04$).

Conclusion: COVID accelerated the transition toward novel practices. Students and faculty teachers agreed on the need for future mixed ($\leq 50\%$ e-learning) teaching modalities. Adequate formation and the use of codified best newer virtual practices are required.

Keywords: pedagogy, internet, web, education, cancer

Highlights

- Two surveys on (student: $n=250$; faculty teacher= 80) covid19-induced educational changes
- Virtual teaching decreased student-teacher interactions and active listening
- Partial e-learning training should represents $\leq 50\%$ of the whole teaching
- Adequate formation/use of codified best newer virtual practices are required.

Introduction

The 2019 coronavirus disease pandemic (COVID-19) is disrupting our societies and the medical world, in clinical practice, as well as in research and teaching.^{1,2} The rapid spread of COVID-19 is having a substantial impact on higher education, almost all institutions have closed their doors for face-to-face activities, replacing them for a certain period of time with virtual online courses. Many teleconferencing tools (skype®, zoom®, microsoft teams®...) are used. Various reports have partly evaluated such changes, mainly focusing on medical students/residents from various countries.³⁻⁹ E-learning has generally been considered flexible and efficient by students. However, the impact of these recent changes is still poorly described, especially for oncology postgraduate students and faculty teachers.

Within the University of Paris Saclay (UPS), since the 1st wave of the pandemic 03/2020, the passage in exclusive virtual distance e-learning has been recommended and applied for postgraduate courses. The Gustave Roussy School of Cancer Sciences (ESC), in close collaboration with UPS, runs many national and university oncology courses, with several hundred students involved each year. To better understand the upheavals caused by COVID-19 on higher education in oncology, we conducted two surveys that were sent to students and faculty teachers registered at ESC during their three last university years.

Methods

Study design and population

Two distinct online (Google® form) surveys were distributed on 07/06/2021 to all students and faculty teachers listed at ESC for 3rd cycle educational programs for the university period

of 09/2018 to 09/2021, as a major shift to e-learning (mainly online virtual course: 83.8%, above pre-recorded videos: 16.2%) took place within the three years (**Figure S1**). Responses were collected until 15/10/2021. A total of 250 students (1166 sent invitations, response rate: 21.4%) and 80 faculty teachers (415 sent invitations, response rate: 19.2%) responses were collected and analyzed. Among 13 different teaching programs involved covering a large panel of oncology fields (basic science, innovative therapies, technical specialized teachings...), main responses were obtained from a general clinical oncology course (student: n=68/250 [27.2%], faculty educators: n=14/80 [17.5%])

Description of the surveys

The surveys were strictly confidential and anonymous. The questionnaires were pragmatically set up to cover 4 main themes: demographic data and type of formation, teachers/student interactions, e-learning (vs face-to-face) and final exam changes. The questionnaires consisted of 21-23 questions, of which more than half were 'tick boxes' type questions. The surveys were developed by the authors and reviewed by the ESC representatives. The questionnaires were designed to be completed in approximately 5 minutes. A copy of the full survey is available in the **Supporting Information**.

Statistical analysis

The Chi-squared or Fisher exact tests were used for dichotomous variables comparison (type of teaching: virtual only vs others [mixed or face-to-face only]; students versus teachers' replies). A two-sided P-value <0.05 was considered significant. All analyses were performed using software SPSS version 19.0 (SPSS Inc., Chicago, Illinois).

Results

Demographics and training types

Main characteristics are described in **Table 1**. Most students were female (n=133; 53.2%), attending physicians (n=124; 49.6%), 30-39 years old (n=136; 54.4%; n=66 [26.4%] <30 years and n=48 [19.2%] ≥40 years) and 2020-2021 (166; 66.4%) was the main year of training. Other respondents had not yet completed their residency (resident [n=102, 40.8%] or fellow [n=24; 9.6%]). The main objective of the training was to acquire knowledge (over to get a diploma [8%], reach a professional project [11.6%] or formation required in the daily practice [10%]), and most student considered that this goal was achieved (209; 84%). Overall, the general satisfaction was good, as 83% (n=208) students would recommend the training to other colleagues (no difference if 100% virtual vs others teaching modalities)

Most faculty teachers were male (n=47, 57.5%), 40 to 50 years old (n=35, 43.5%). In their corresponding training program, most teachers gave lessons of ≥2 hours (n=56, 70.1%) and had participated in the training for at least three years (n=66; 82.5%), suggesting they had been confronted to the “sudden” switch of paradigm from “face-to-face” to “virtual” in a short period (from 2018-19 to 2020-21; **Figure S1**).

Virtual only versus mixed/face-to-face teaching

More than half of students received 100% virtual (e-learning: 55.2% [n=138] vs 100% face-to-face: 9.2% [n=23] vs mixed: 35.6% [n=89]) teaching. Despite the fact that long sessions of e-learning may be difficult to follow, 73.2% (n=183) of students felt that the daily duration of the lessons was appropriate and that all offered courses were e-learning compatible (62.4%, n=156). The quality of the e-learning internet connection was considered sufficient 70%

(n=175), with easy (71.2%; n=178) access (physically or at a connection point) to the course. However, only 85 (34%) students declared that >80% of courses were followed with “active listening” (no difference if 100% virtual vs other teaching modalities) and less than half respondents (48.4%, n=121; no difference if 100% virtual vs other teaching modalities) declared the education easy to follow at the same time as their professional activity. Overall, one third of students stated that e-learning should represent <50% (34%; n=85), 50% (32.4%; n=81), and >50% (33.6%; n=84) of the whole teaching (no difference according to professional situation).

Only 16.2% (n=13) teachers considered e-learning to be more suitable (as compared to face-to-face) for postgraduate education. However, most (76.3%, n=61) acknowledged that partial e-learning training should be maintained outside the pandemic but that it should represent $\leq 50\%$ (78.8% [n=63] vs 66% [n=188] for students; $p=0.04$; **Figure 1**) of the whole teaching course. According to the teachers, the main advantage (62.5%; n=50) of e-learning was that there was no need to move (20% [n=16] reported better agenda flexibility and 11.3% [n=9] described no main advantage, **Figure 2**). Most (42.5%; n=34) teachers declared to be equally comfortable (less comfortable 32.5% [n=26], more comfortable: 25% [n=20]) with e-learning as compared to face-to-face. The main disadvantages (**Figure 2**) were: the absence of feedback on audience attention (37.5%, n=30) and the lack of interaction (32.5%, n=26) or friendliness (25%, n=20). Significant technical issues with e-learning were noted only by 23.8% (n=19). Switching to an e-learning educational program could theoretically require an adaptation in course and duration materials. However, most teachers reported none/few modifications of the course’s material 66.6% (n=53) or duration (in 85% (n=68) of cases, suggesting no teaching update from the prior year.

Student/teacher interactions

Full virtual teaching decreased student-teacher interactions as compared with mixed/face-to-face modalities (**Figure 3**). Among students, 65.6% (n=165; 58% [n=80/138] if 100% virtual vs 76% [n=85/112] if other teaching modalities; p=0.003) considered satisfactory interactions with stakeholders, and 61.2% (n=153; 54% [n=74/138] if only virtual vs 71% [n=79/112] for other teaching modalities; p=0.009) found the lessons to be sufficiently interactive.

From the teacher's point of view, their main interactions with students were oral discussions (n=40 [50%] vs "instant chat" [n=25, 31.3%] or e-mails [n=4, 5%]) and 9 (11.3%) teachers replied that there was no interaction. The teachers stated that virtual learning did not lead to any improvements in terms of attendance (n=54; 67.5%), interaction (n=59; 73.8%) and quality of teaching (n=54; 67.5%).

Exam

Given that some (33.6%, n=84; however, no difference if 100% virtual vs others teaching modalities) students may have felt dissatisfied by the teaching format changes (virtual vs. face-to-face), we wanted to assess if this could have had a consequence on exam collaboration. An acknowledged active collaboration during the exam was reported by few students (16.4%; n=41) but this number was less important in the virtual only group (12% [n=16/138] vs 22.3% [n=25/112] if other teachings modalities; p=0.03). Some students 13.6% (n=34) also felt that the grade obtained did not reflect their level of knowledge.

Teachers reported that face-to-face evaluations were maintained in half of (n=40) of cases (with an oral exam in 26%), and a change in the exam modalities was reported in only 26% (n=21).

Discussion

Our survey highlights how the COVID-19 pandemic acted as a catalyst for a digital transition. The main advantages of this work included a combination of both student/teacher surveys, experimented teachers that maintained their activity on the whole studied period (83%) and a large field (fundamental, innovative therapies, technical specialized teachings...etc.) of involved teaching. A substantial shift in e-learning postgraduate oncology teaching programs, allowed educational programs to be maintained. At the same time, the COVID-19 pandemic has provided an opportunity to reflect on how higher education is organized and delivered, and to formulate creative solutions and alternative possibilities for future directions in higher education, especially with online learning. E-learning offers the advantage to reduce travel time (cf. **Figure 2**), gaining time and possibly energy, and is then valued by many students, as shown by many experience.³⁻⁹ In our work, most (73.2%) students considered that the daily duration of their lessons was appropriate and that all offered courses were e-learning compatible (62.4%).

However, only 85 (34%) students declared that >80% of courses were followed with “active listening”. Large international surveys from the International Association of Universities and the European Commission^{10,11} highlighted how managing at a distance is possible to some extent, but might result negatively on the quality of the activities and increase inequality (mainly due to technical issues/internet connection [even if a surprisingly low, 24% of technical issues during online courses, were reported in our work], no proper equipment to attend online classes and/or isolation) of learning opportunities. Our survey also highlights students/teachers interactions deterioration (**Figure 3**). Fifty-four percent of students declared satisfactory interactions if only virtual vs 71% for other teaching

modalities, $p=0.009$; and 74% teachers stated that virtual learning did not lead to any improvements in terms of interaction.

The combination of both student/teacher surveys is of interest because it shows possible agreements on future teaching modality for higher education. In the survey's results, all participants acknowledged partial e-learning training should be maintained beyond the pandemic ($\leq 50\%$ (78.8% [n=63] for faculty teachers' vs 66% [n=188] for students; $p=0.04$; **Figure 1**). To the best of our knowledge, only one other work similarly used a combination of two surveys. Smith et al. developed and sent two surveys to Alliance of Medical Student Educators in Radiology (AMSER) faculty (n=25) and enrolled medical students (n=31). A total of 64% of the faculty enjoyed online teaching, although 82% (69%, for students) preferred on-site courses whereas 62% of students felt an online radiology course was an excellent alternative to an on-site rotation.¹²

Our study is limited by the low response rates, of approximately 20% for both surveys, limiting generalizability. Possible explanations of the low response rate are the increasing number of online surveys, inherent pandemic challenges and that some students followed training some years ago. The majority of students responses were from the present year (66%), also suggesting a possible memory bias. Although the response rate was not as high as expected, our cohort of respondents remained multidisciplinary and reflected the general repartition and characteristics of the targeted study population. Faculty teachers education was also not assessed. Internet-based continuing medical education (CME) has been considered as effective as live;¹³ accreditation of websites for CME being now classic.^{14,15} The assessment of the impact of COVID-19 on higher education also remains incomplete, especially in terms of learning losses (including technical skills), financial/ecological impact (travel savings vs storage costs) and impact on stress/educational

inequalities. Workload and psychological impact have also been substantial in healthcare professionals¹⁶ and may have affected educational programs, as highlighted by the CNA-CORE study performed on more than 10 000 medical students.¹⁷ In another national survey in France among oncology and radiation therapy residents focusing on psychological impact and professional difficulties during the first peak of the COVID-19 pandemic, training activity decreased for 89%.¹⁸

In conclusion, our study highlights that COVID accelerated the transition toward novel practices, constituting a shift rather than just a crisis. Pedagogical changes will include new habits, cooperative production and work (cloud computing, remote teaching...¹⁹). Efforts are needed to improve e-learning teaching quality and access (here, most teachers reported none/few modifications of the course's material [67%] or duration [85%]). Virtual teaching should theoretically result in changes to the format of lessons, such as splitting up lessons, asking intermediate questions and forcing interaction (**Figure 4**). This would require training and commitment on the part of teachers. In a SWOT analysis (strengths, weaknesses, opportunities, and threats) associated with the coronavirus pandemic in health care that focuses on the implications for education, Stoller highlighted a checklist of specific actions that might comprise an optimal educational response to the pandemic.²⁰ In particular, adequate formation and the invitation to codify best virtual practices remain needed for using e-learning/distance learning as an additional tool in the future, both for educators and students.

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Conflict of interest

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Figure legends

Figure 1: What percentage of virtual teaching would you like?

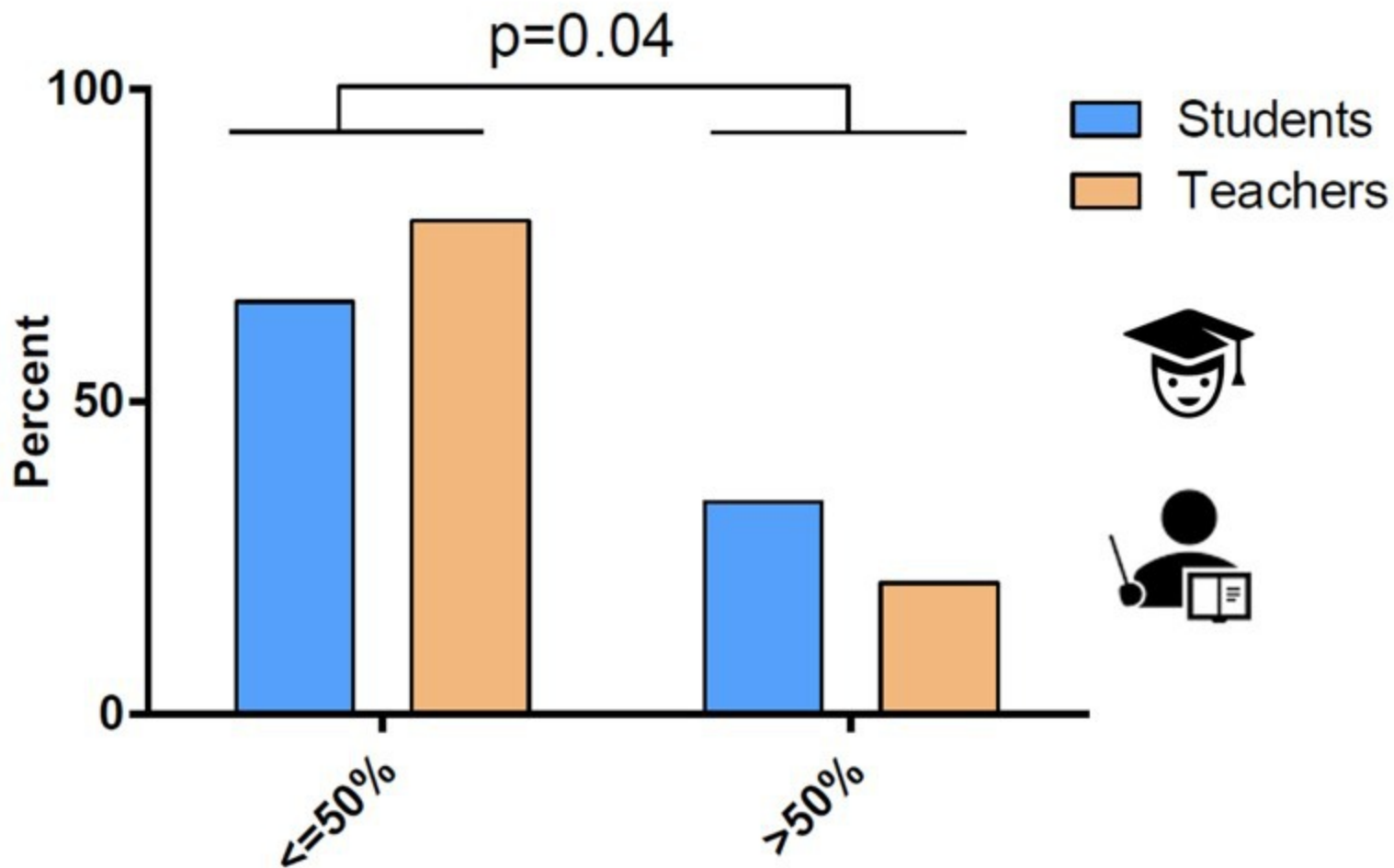
Figure 2: Main virtual teaching advantages and disadvantages (teachers' replies)

Figure 3: Influence of e-learning on student/teacher interactions.

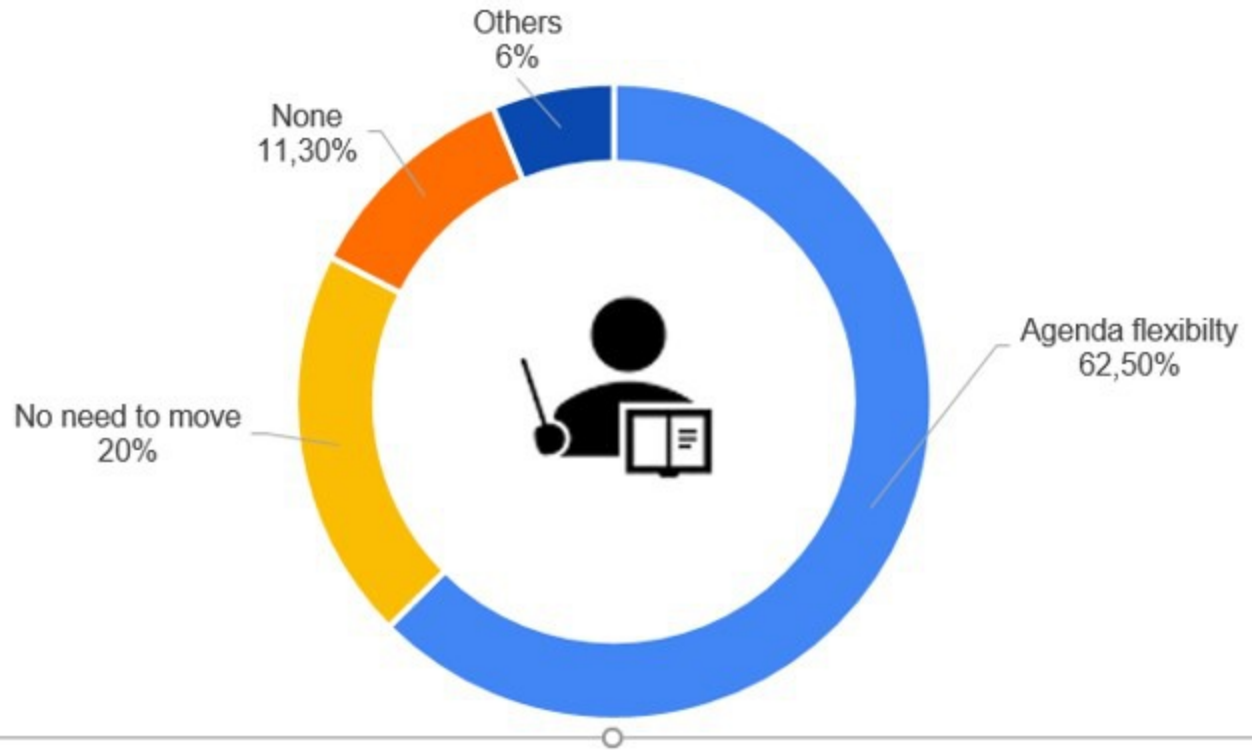
Top (student): were lessons sufficiently interactive?

Bottom (teachers): was interactivity better during virtual teaching?

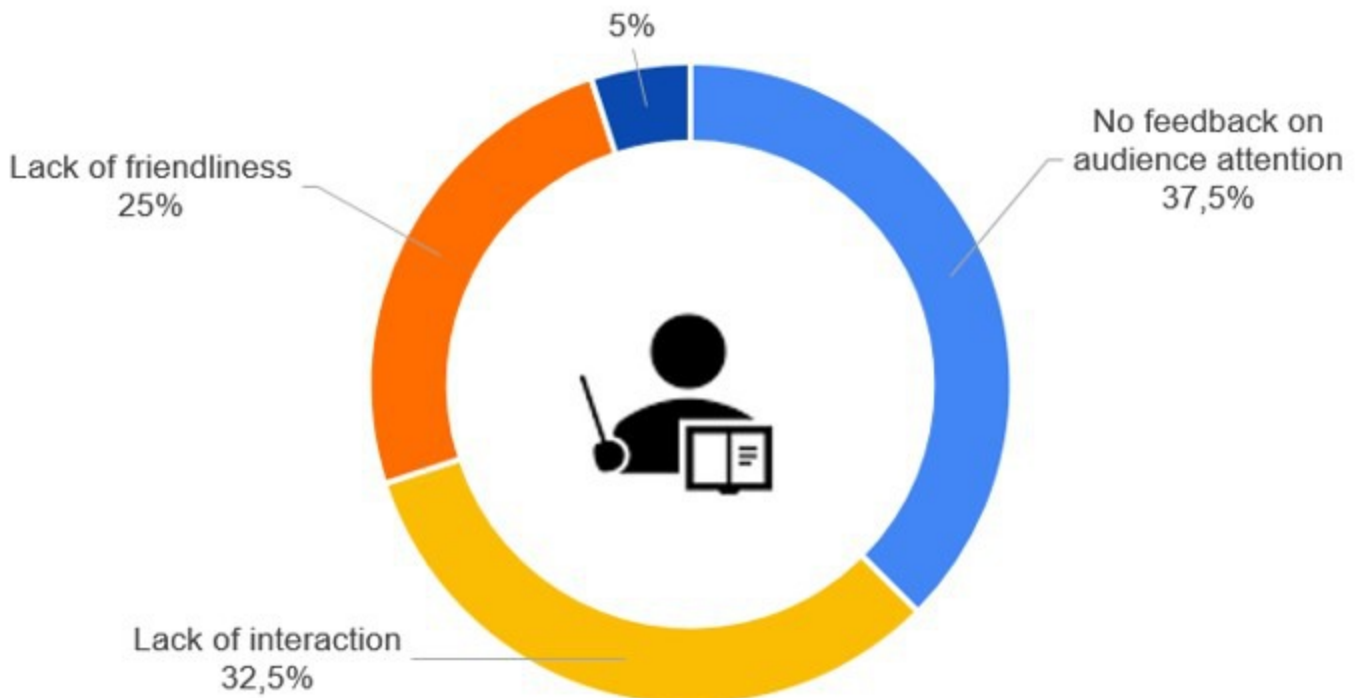
Figure 4: Postgraduate oncology educational shifts overview



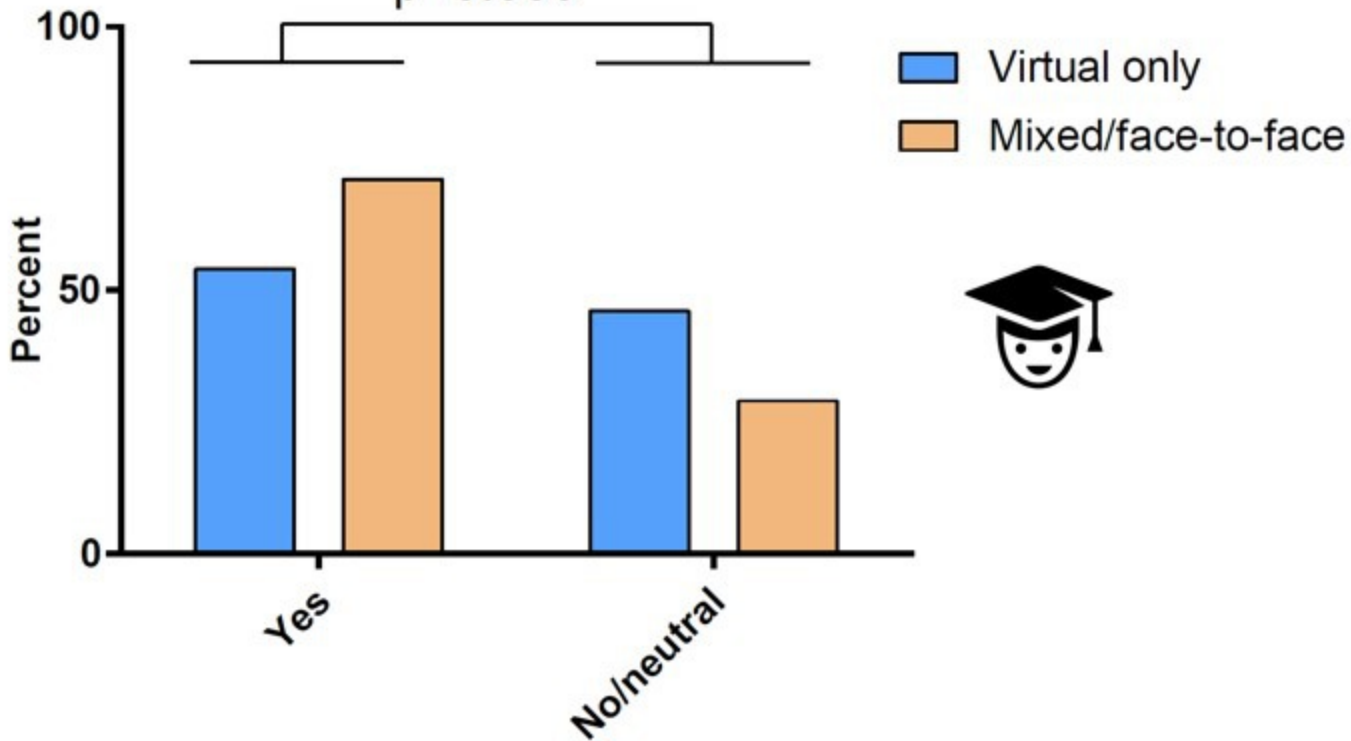
Advantages



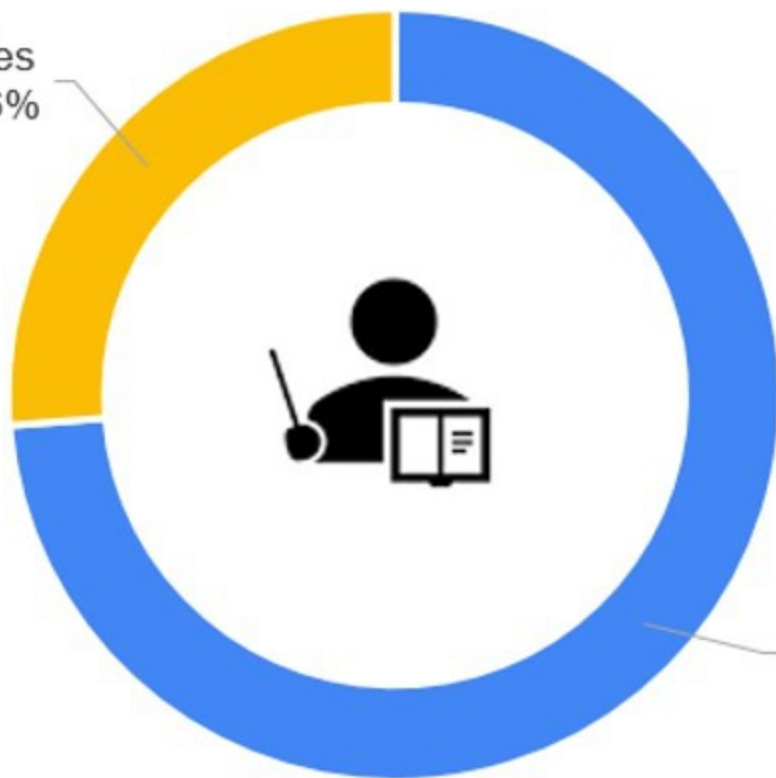
Disadvantages



p=0.009



Yes
26%



Not at all
74%

SHIFT INDUCED BY COVID-19



FACE-TO-FACE

E-LEARNING

**NEW TECHNICAL
TEACHING HABITS**

AUDIENCE FEEDBACK

COOPERATIVE PRODUCTION AND WORK
cloud computing, remote teaching...

NEW TOOLS

INTERACTIVITY

CODIFYING BEST VIRTUAL PRACTICES

AGENDA FLEXIBILITY

MOTIVATION

TAYLOR THE CONTENT
*splitting up lessons, intermediate
questions, impose interactions*

REDUCED COSTS

FRIENDLINESS

PARTIAL E-LEARNING (<50%)

REDUCED TRAVEL TIME

ACTIVE LISTENING

LEARNING CURVES
for teachers / students

ACCESSIBILITY

**POST-PANDEMIC
EDUCATION PROGRAMS**

Table 1: Main responders' characteristics

	Students (n=250)	Teachers (n=80)
Gender (n, %)		
Male	113 (45.2)	46 (57.5)
Female	133 (53.2)	33 (41.3)
Did not want to specify	4 (1.6)	1 (1.2)
Age (year-old; n, %)		
<30	66 (26.4)	-
< 40	136 (54.4)	23 (28.7)
<50	33 (13.2)	35 (43.8)
≥50	15 (6)	22 (27.5)
Professional situation (n, %)		-
Resident	102 (40.8)	
Fellow	24 (9.6)	
Physician ≤5 years of experience	61 (25.2)	
Physician >5 years of experience	63 (24.4)	
Cumulative lessons duration (n, %)	-	
< 2 hours		24 (29.9)
≥ 2 hours		56 (70.1)
Experience in the program (n, %)	-	
<3 years		14 (17.5)
≥ 3 years		66 (82.5)