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Postgraduate education in radiation oncology during the COVID-19 pandemic – What did we learn?

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ABSTRACT

Introduction: During the COVID-19 pandemic the ESTRO School who provides international non-profit postgraduate education in Radiation Oncology and related disciplines, including Medical Physics and Radiation Technology, had to close down all live educational activities and turn online, although having only limited experience. The paper describes the experience, discusses the limitations and benefits of online education and suggests directions for the future.

Materials and methods: Data about format and feedback from attendees and faculty members from the course activities held in 2019, 2020 and 2021 were made available from the ESTRO School.

Results: In 2020, all but two out of thirty live courses that happened before the lockdown were canceled. Among the 18 courses scheduled in the second half of the year, seven went online with a short notice. Each course planned their activities quite differently, from compressed courses with consecutive full days online program to courses over several weeks with a few hours online a week. Both numbers of participants and different nationalities were higher than live courses in 2019 for the seven courses happening online, and courses were well evaluated by participants and faculties. Roughly-one-third of participants would prefer online courses in the future.

Discussion: Although online education was well received by the majority, pros and cons exist and especially the personal discussions and networking were missed. Online education and live education are not comparable but can complement each other. Careful balancing these activities in the future is important and strategies for online andragogy are needed.

Introduction

The European Society for Radiation Oncology (ESTRO) is a non-profit organization with more than 8000 members in the field of Radiation Oncology in Europe and beyond. The mission of ESTRO is to foster radiotherapy in the broadest sense by (1) Promoting and disseminating research and development of guidelines; (2) Offering continuous medical education and development of core curricula and (3) Strengthening the outreach to professionals, patients and stakeholders [1].

Since the first ESTRO teaching course in Leuven in 1985, there has been an ever-growing development in courses, topics addressed and numbers of participants attending the ESTRO School. This development especially took place after the creation of the ESTRO School in 2005. Thus, by 2019 the School portfolio contained 42 different courses and 35 courses were delivered that year – with six courses outside Europe. More than 2800 persons participated in the activities and roughly-one-third were international participants from outside Europe. Thirteen online delineation workshops were held, attracting 285 participants from all over the world.

An even more ambitious program was planned for 2020 but in February, when the COVID-19 pandemic was a reality, the ESTRO School needed to take drastic measures. All live activities were put on hold, canceled or postponed and only the two live courses that took place in February were delivered as planned. When it was realized at the end of spring 2020 that the pandemic was not a temporary catastrophe, plans to adapt were developed.

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In May and June 2020 all the faculties of the courses planned in the second half of the year were asked if they preferred to switch to an online format. The faculties were encouraged to adapt to online teaching, but the option to cancel was also acceptable. The degrees of freedom in adapting the courses' programs to the online setting were quite wide, and in principle all proposed formats were up for discussion.

The ESTRO School has since 2012 gained experience with online teaching from interactive online delineation workshops [2,3] but those have limited duration – typically-two hours per workshop in a series of two or three. Additionally, two other courses in the School portfolio were blended in nature using a mix of online interactive lectures and tutorials, recorded lectures as well as live activities onsite. However, the School had never hosted full online courses, that in their live versions had a duration of three to five days. Thus, turning live courses to online format was a new challenge.

Transforming from live postgraduate education to online postgraduate education is not a trivial process and both pros and cons exist [4]. It might be a way to reach out to a broader community at an affordable price and can be both synchronous (online interactive in real-time) and asynchronous (recorded) in its structure. Among the risks are loss of interactivity and disadvantage for human relations, especially there was concern that participants may not learn as much.

The paper describes the experience with the first seven fully online ESTRO School postgraduate courses in radiation oncology and discusses the implications for the future.

Materials and methods

Twenty-one courses were planned for the quarter three and four of 2020: eighteen courses in Europe and three courses outside Europe. The international courses, in agreement with our regional partners, were cancelled. Among the 18 European courses, the faculties were asked if they wanted to go online. For some faculties, online did not seem to be a possibility due to the nature of the course (for example practical treatment planning on site), other courses found it more reasonable to postpone to 2021.

Seven courses agreed to go online (one-third of the planned courses) and were given the flexibility to plan the course as they thought most relevant, considering the specific content. However, not everything was possible as budget constraints as well as staff available to manage the courses were rather tight due to the economic impact of the COVID-19 pandemic.

Data on participants related to age, sex, professional status and geography are not fully available due to the EU GDPR (General Data Protection Regulation) protection of the course participants. All participants received at the end of the course an electronic feedback form and data related to the course evaluation are available for this review. Answers to the questions could be given as "Poor-Sufficient-Average-Good-Excellent" or similar phrasing. Questions were adapted to the individual course but some were general for all courses. Only general feed-back is reported here. An example of the general feed-back qustions can be found in Supplementary A. Data on faculty satisfaction were collected and reported informally either by the e-mail or as oral information by the course directors for the individual course.

For the online sessions, the Zoom videoconferencing system platform (Zoom Video Communications, Inc. CA) was chosen based on preferences from the faculties going online and for being easy to use. All synchronous live webinars were recorded and together with the prerecorded asynchronous sessions made available to the registered participants on ESTRO Moodle (an open-source learning management system) for two months from the end day of the course. Access to all other supporting material (like papers, programs, exercises etc.) on Moodle lasted for four months from the end day of the course. Some courses used polling and typically the polling system built in the Zoom platform or TurningPoint (Turning technologies Inc, OH). TurningPoint can be used to create polls, quizzes and surveys, then deliver them online or in person, live or scheduled. Support and management of online platforms, software and troubleshooting were handled by the ESTRO School staff.

Results

Seven ESTRO faculties converted their live course to an online course. The seven courses were: Physics for Modern Radiotherapy (Physics for modern RT), Basic Clinical Radiobiology, Image-Guided and Adaptive Radiotherapy in Clinical Practice (IGRT), Image-Guided Radiotherapy and Chemotherapy in Gynecological Cancer: Focus on MRI Based Adaptive Brachytherapy for Cervical Cancer (Gynae RT) [5], In-Room MRI-Guided Radiotherapy (In-room MRI), Research Course in Translational Radiation Biology and Clinical practice (Research course Biology) and Implementation of image-guided stereotactic body radiotherapy (SBRT).

The seven courses are very different in content, target group and number of years that the faculties had worked together. The data on the different courses are presented in Table 1. A brief description of every course and the course program can be found in Supplementary B. For the five courses with comparable data on participants and countries of origin from both 2019 and 2020 (Table 1), an overall increase in number of participants and countries of origin was seen, when 2020 was compared with 2019. In fact, an increase in participants was noted from 475 in 2019 to 695 in 2020, corresponding to an increase of 46% (Table 1).

Looking at the origin of countries for all the courses in 2020 (live and online), 1108 participants came from 75 different countries around the world compared to 94 different countries in 2019 (live only), with a total of 1943 participants (Fig. 1). Overall, no clear patterns in countries of attendance were seen.

The overall participant feedback to the online format was very positive (Table 2). Overall, 95% rated the seven online courses as useful or extremely useful and the participant's expected outcomes were rated somewhat to very much met in 93% of the cases. However, 17% were not happy with the overall quality of the courses and 12% found that there was not sufficient amount of time for questions. From the qualitative free-text remarks there were requests for more interactive sessions using polling or discussion and more supporting material to be uploaded in Moodle. The networking and informal discussions with teachers and among participants that during live events more naturally takes place in coffee breaks, in the evenings etc. was generally missed by the participants. Despite these impressions, 30–47% of the participants (depending on the course), preferred the course to be online. For one course, Basic Clinical Radiobiology, having the 43rd edition, the evaluations were the best ever received.

The informal feedback from faculty side also showed a generally positive attitude towards the online format. However, the teachers favored online courses with sessions spread over a longer period of time instead of having all lectures delivered sequentially over a few days. Also, a concern for the balance between synchronous and asynchronous online sessions was expressed, with too many recorded sessions risking to take away the value of the ESTRO educational activities. There was also a wish for split class-room options and a need for pedagogical support in how to deliver online teaching and how to engage participants in a better way. Furthermore, it was recommended that future courses should be alternating every second year between online and live format. Just like the participants, the teachers missed the enhanced opportunities for direct informal discussions with participants during coffee breaks etc. as well as the networking opportunities. As teachers come from many different countries in Europe and beyond, the live courses are also the place to discuss the development of the course and align the teaching. This opportunity was also missed with the online courses.

For some of the courses pre- and immediate post-course multiple choice testing took place. Overall, the net results were similar to previous live courses.

Table 1
Characteristics of the seven courses in 2019 and 2020.

Course title	Live course days	Target groups	Participants 2019	Countries 2019	Participants 2020	Countries 2020	Online course structure
Physics for Modern RT	5	RO, MP, RTT	63	22	117	48	Asynchronous and 4 days synchronous online
Basic Clinical Radiobiology	5	RO, MP, RB, RTT	73	27	135	26	5 days synchronous online
IGRT	5	RO, MP, RTT	61	17	124	39	Asynchronous and 3 days synchronous online
Gynae RT	5	RO, MP, RTT and others	116	35	85	24	Synchronous and asynchronous over 5 wks
In-Room MRI	4	RO, MP, RB, RTT and others	NA	NA	87	23	Synchronous and asynchronous over 6 wks
Research course Biology	4	RO, MP, RB	NA	NA	71	20	4 days synchronous online
SBRT	4	RO, MP, RTT	162	37	234	43	Synchronous and asynchronous over 9 wks

RT = Radiotherapy; RO = Radiation Oncologist; MP = Medical Physicist; RB = Radiobiologist; RTT = Radiotherapist/RTT; Other = Other professions; NA = course not held in 2019.

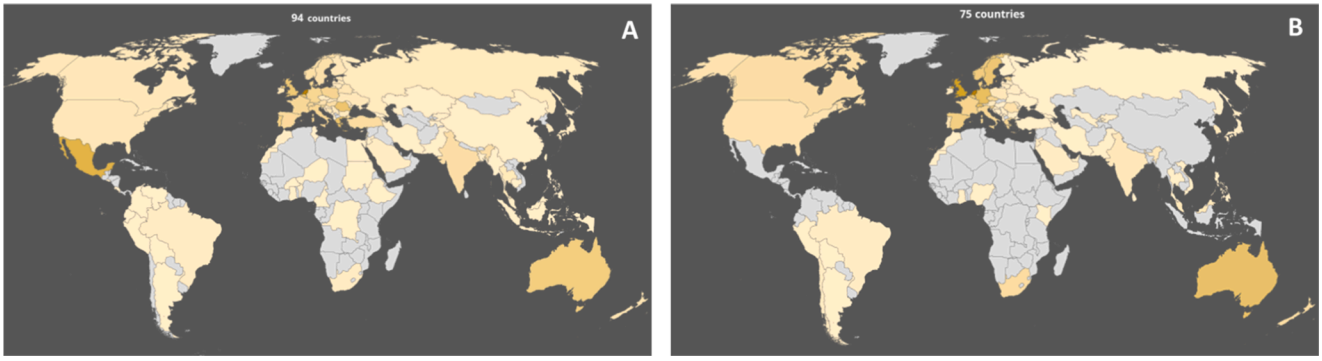

Fig. 1. Countries with ESTRO School participation in (A) 2019 (live only) and (B) 2020 (both live and online). The grey color represents no participants from that country whereas the darker the colors the more participants from the country in question.

Discussion

The ESTRO School experience with online teaching from the first year of the pandemic overall turned out well. There were no real technical issues, participants mostly rated it well and teachers did so too. Nevertheless, concerns were raised on the lack of opportunities for direct informal discussions between participants and teachers both on topics included in the course as well as related issues. For the participants, the live courses are also an important place for creation of new professional relationships. The 2021 ESTRO community survey with 704 respondents [unpublished data from ESTRO] confirmed that in times of limited resources, it is better to keep a full curriculum of courses by having both live and online activities (76% of respondents) instead of a fewer number of courses and keeping a live program only (24% of respondents). Furthermore, 14% of the respondents would never attend an online course whereas the rest were equally divided between preferring online activities delivered in modules as close to each other as possible (42%) or preferring courses lasting several weeks, with few online lectures per week (44%). A tendency was seen for the younger respondents to favour the online activities, probably due to being native digital and maybe also due to the lesser economic burden from not travelling and accommodation. The impression from the 2020 experience was also confirmed by the outcome of the 2021 program, showing that despite 21 of 23 courses took place online, still 1988 participants were registered for the courses, corresponding to almost 75% of the number of participants annually before the pandemic [ESTRO annual report 2021, https://www.estro.org/About/Newsroom/Publications].

Being almost back to normal in 2022, some important questions are raised. Was the online success of 2020 and 2021 just based on no available live alternatives? Can online postgraduate education replace live courses in the international radiation oncology community? What are the pros and cons of both ways of teaching and how (if at all) should it be best balanced for the future? At least it is clear that there still is a high demand for non-commercial postgraduate education in radiation oncology both in Europe [6] and internationally – especially in low- and middle income countries [7,8].

Online courses have given the opportunity to reach out to countries where participation in ESTRO courses usually is not possible or very difficult – thus the online format has for example given the opportunity in 2021 to reach out to Zambia, Zimbabwe or Iran – countries where international travel to a course can be both expensive and challenging. ESTRO has always had a mission to reach out to LMIC and online course delivery has created new opportunities we never had before, when courses traveled physically to international destinations. Thus, in 2021 26% of all course participants were from outside Europe, well reflecting the 28% non-European membership of ESTRO. This has not overall changed that much from before the pandemic but underlines that even during a pandemic it is possible to serve also the international community.

Time zones might pose a problem, but with the option of asynchronous lectures this can be overcome to some degree, restricting the live interactive real-time sessions to a minimum. This allows for participation from an even bigger part of the world.

Online courses also give new opportunities that were not possible before with traditional live education. For example, in 2021 one of the courses delivered online saw the attendance of almost all radiation oncologists from one East European country as a kind of national general update. This was only possible because the course chosen was delivered

Table 2
Selected general questions from the seven online courses in 2020.

Question	Available Responders/all participants	Not useful/ fairly useful	Useful/ extremely useful
How useful for your professional activity did you find this event?	481/853 (56% responded)	39/481 (8%)	442/481 (92%)
Question	**Available Responders/all participants**	**Poor/ sufficient/ average**	**Good/ excellent**
How would you rate the quality of the education/program of this event?	479/853 (56% responded)	83/479 (17%)	396/479 (83%)
How would you rate the online course?	477/853 (56% responded)	22/477 (5%)	455/477 (95%)
Question	**Available Responders/all participants**	**Not at all/ not much**	**Somewhat/ very much**
Did the event fulfil your educational goals and expected learning outcomes?	479/853 (56% responded)	14/479 (7%)	465/479 (93%)
Question	**Available Responders/all participants**	**Never/only rarely**	**Sometimes/ almost always**
Did the program allow adequate time for discussion & questions?	485/853 (57% responded)	60/485 (12%)	425/485 (88%)

during the late afternoon with a few lectures a week over several weeks.

The online format also allows for course duration over a longer period of time and can potentially be used to have participants to perform practical tasks learnt at the courses in their own clinic between sessions. The acquired skills can then be presented for discussion in a subsequent live interactive session. Examples of this might be to perform fixation of patients using a different approach or a new way to shield normal tissue in surface radiotherapy of skin cancers, treatment planning or maybe to test new ways to record side-effects during treatment. The increased acquisition of skills were already noted in the online Gynae RT course in 2020, where submissions of contouring and dose planning homework was higher that seen on previous live editions of the course [5]. Probably due to the possibility to better plan and perform the homework during the five weeks of the course compared to the pressure of delivering the home work a few days before the start of a live course. For postgraduate education like the one offered by ESTRO, the teaching of knowledge has always been on a high level whereas the teaching of skills (and hopefully in the end, competences) has been more challenging. The online format might be one of many ways to change that.

A few of the courses had pre- and immediate post-course tests showing an immediate increase in number of correct answers. We need better and different evaluations in order to be able to conclude how much is learnt from online teaching and if it is comparable or maybe better than live. The potential for gaining both knowledge and skills in online teaching is however promising, both in terms of teaching knowledge [9] and skills [10].

Online education keeps prices low and makes education more affordable as travel and accommodation can be saved. This is valid also for the organizers, as the cost of the venues and logistic is usually lower. However, for a non-profit organization like ESTRO, the economic aspects alone cannot be the incentive to go online except for keeping sustainability and for securing easy access to education to the various RT communities. Adding to this, it might also be a way to keep a full curriculum and hosting courses with content that only attracts smaller audiences.

Finally, but not less important, the carbon footprint of international courses with many participants is not to be neglected and online courses seems to be an obvious contribution for reducing carbon emissions in the future.

Thus, the benefits of going online are many but there are also quite important caveats that should not be neglected. In non-profit organizations where teaching is done voluntarily and without economical compensation, a big part of the reward from teaching is the networking with fellow teachers and the personal interaction with the participants. This is especially valid at courses in ESTRO School where teachers are present – not just for their own lectures – but throughout the entire course. The networking and the discussions and teaching opportunities taking place informally between lectures are not to be neglected. This is important, both for the teachers and the participants. Feedback from the two years of the pandemic from both teachers and participants also confirm this.

Furthermore, as the faculties are international in nature and as the teachers do not see each other regularly, it is important for development of the course content that they have the opportunity to meet live. Of course, this might vary from topic to topic and from faculty to faculty. Just as there are many ways of learning as a student, there are also many approaches to develop education, which is very much related to personal experiences, temper and content. Another important issue is that being away from own institution, the teachers do more easily dedicate themselves to the course as when home at the department other obligations might be expected from them in parallel to teaching on the course.

Pros and cons for postgraduate online education is to be taken seriously and it is fair to conclude that live and online teaching have different strengths and weaknesses and one is not superior to the other. Rather they can complement each other.

For continuation of online activities for the reasons mentioned above, ESTRO School needs to prepare for the future educational challenges of the post-pandemic era. The pedagogical approaches to online education are different from live education. Most teachers are well experienced in live education but for online, a strategy for developing and supporting the online andragogic competences need to be developed. It is realised that this requires new educational activities for teachers in the School. This also includes the optimal use and further development of the available technical solutions. This also includes more dynamic recording of lectures which we have started on in 2021 with faculties being recorded by a professional camera crew while teaching, using whiteboards, split classrooms and other methods to increase the participant activity like polling systems, discussion fora, online group work, online delineation and planning tools etc. Furthermore, there is a need to focus on and support the development of skills acquisition online.

These educational challenges will be taken up by the ESTRO School in the near future with the goal of balancing the benefits of both online and live education, and careful planning of alternating live and online events is taking place in order to benefit from the best of both worlds.

Conclusion

The transition from live to online international postgraduate education in ESTRO School turned out to be a success during the pandemic. Live and online adult education cannot be compared but have different strengths and limitations, that can be complementary. The future of ESTRO School should include both activities in a balanced way and should be accompanied by focused developments of the online component for making the experience better and more interactive.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

Supplementary material to this article can be found online at https://doi.org/10.1016/j.tipsro.2022.09.008.

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