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ORIGINAL PAPER

Blended practical learning in compliance with COVID-19 social distancing

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Abstract

COVID-19 pandemic has imposed great changes in everyday life. Starting from January 2020, Humanitas University proposed to students digital instruction for continuing medical education, in particular, concerning practical activities. The latter, defined as Professionalizing activities, were transformed into complete online learning. From September 2020, in accordance to the imposed rules of social distancing, we modified the approach to Professionalizing activities. Despite following the new constrains, we came up with a blend online and face-to-face education program. The Kirkpatrick's evaluation model has been followed for validation of the project. Two ad hoc satisfaction questionnaires have been proposed to evaluate the project. Different approaches to blended learning have been described in literature; however, we propose a new method application, which fits to the post-pandemic era, with the purpose of sharing our experience in the field. Advantages and limitations are described. According to students, the overall satisfaction was rated 6.8, while tutors evaluated it with 7.4. The qualitative analysis of data confirms the advantage of the blended learning activities in order to guarantee a continuation of the clinical curriculum. Although it highlighted the necessity for, an increased technical support and an improvement in organization of the meetings. Blended learning is becoming more accepted among academic communities because it combines "the best of both worlds." However, its effectiveness depends on several factors. With our approach, we propose a method, specifically designed to make effective this kind of teaching, which can be considered essential in the pandemic era we are facing.

Keywords Blended learning · Medical training · Professionalizing activities · COVID-19 pandemic · e-Learning

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Introduction

COVID-19 pandemic has imposed great changes in everyday life worldwide. As well as other sectors, also education has been strongly affected. In order to cope with the situation, a growing number of Universities, including Humanitas University, implemented a conversion: from traditional learning strategies carried out in classroom to online teaching methods.

Starting from January 2020, we proposed to our students digital instruction for continuing medical education as planned, in particular concerning practical activities. For practical activities, we mean: clerkship in the hospital, clinical case discussion, and simulation activities. The latter, defined by our University as Professionalizing activities, were transformed into complete online learning due to the level 4 lockdown imposed in the previous months. Based on feedbacks collected from our students, online material and some aspects of Professionalizing activities were appreciated, although, in the meantime, the need for an increased interaction and face-to-face skills learning emerged.

Starting from September 2020, in accordance with the new rules imposed by the Government (including: social distancing, the possibility of meeting in small groups, etc.), we decided to modify the approach to Professionalizing activities making the practical part feasible in person, as suggested. To strengthen the learning process, following the new imposed constrains concerning social distancing, we came up with a blend online and face-to-face education program in which students learned from e-learning platforms prior to an in-person session on the same topic. (Rose 2020; Chen et al. 2017; Darras et al. 2020).

The precise definition of "blended learning" is debated; however, we intend it for the systematic integration of face-to-face and online learning. (Naaj et al. 2012) This method has been also applied by other Institutions with a more or less contribution of the two core components, for both undergraduate and post-graduate medical students. (Darras et al. 2020; Osguthorpe and Graham 2003; Rajab et al. 2020a, b; Shah et al. 2020; Ota et al. 2018) The integration of technology into pedagogy has the potential to facilitate flexible and learner-centered teaching, encourage interaction among students and staff, and enable them to collaborate and communicate. (Ellaway and Masters 2008).

Different approaches to blended learning have been described in the literature (Darras et al. 2020; Osguthorpe and Graham 2003; Rajab et al. 2020a, b; Shah et al. 2020; Ota et al. 2018); however, we propose a new method application, which adapts to the post-pandemic era, with the purpose of sharing our experience in the field. We would like to report the conversion of an Educational Model, in which active engagement is at the center of the learning process, following the principles presented by Schon in "The Reflective Practitioner" (Schön 1987), into an effective blended learning format. We present the challenge we faced in enhancing the learning process, to train medical doctors characterized by the propensity for lifelong learning, clinical and decision-making skills, the ability to work in a team and relate to the patient, and his family members effectively. The educational transformation we propose aims to make students reach

the general learning objectives, built on the basis of the Framework R.I.M.E. (Pangaro 1999), and competencies, which are active in the fields of history taking, physical examination, clinical reasoning, and team work; to fulfill the clinical skills required by the undergraduate curriculum.

Methods

Professionalizing activities—background

During clinical years of undergraduate medical education, mandatory Professionalizing activities start. Our traditional educational principle follows the R.I.M.E. Framework by Pangaro (1999): professionalism, interpersonal skills, ability to analyze and prioritize patients' problems, ownership of developing an action plan for the patient, and ownership of evidence for action and sharing, represent the core components. According to the R.I.M.E. framework, students performance is described as a progression of developmental steps: Reporter (3rd year), Interpreter (4th year), Manager (5th year), and Educator (post-graduate). The Professionalizing activities that we propose to each year, have been tailored on this developmental pathway, to do so that the student acquires the expected knowledge, which corresponds to a specific role. For example, through the activities of history taking, simulation, and clinical case discussion, the undergraduate practices and develops his ability to observe, collect, and describe the main clinical phenomena detected by the patient.

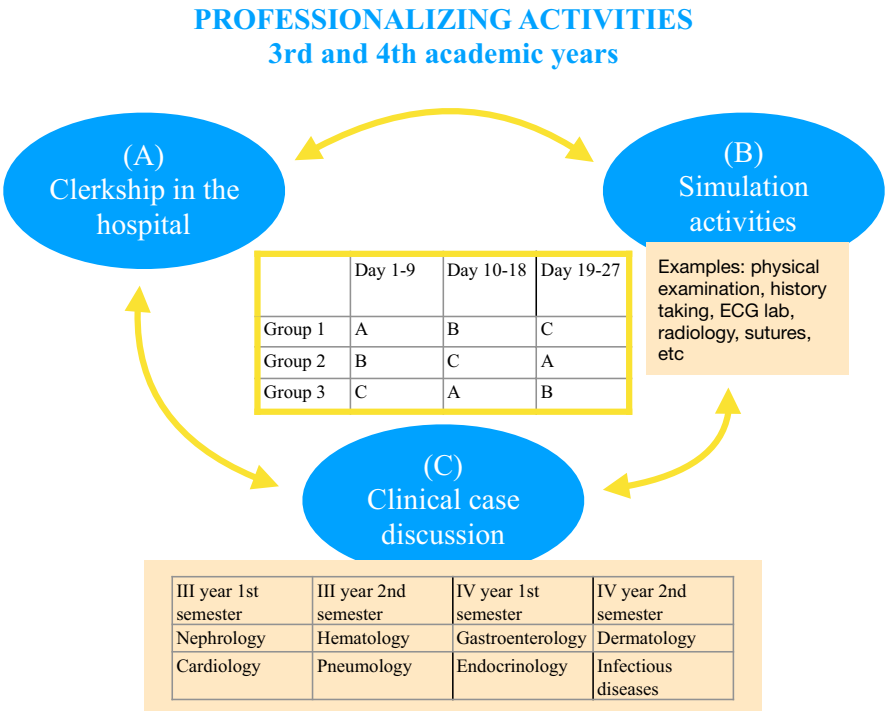
Humanitas University's Professionalizing activities involve third, fourth, and fifth academic years. They are subdivided into 3 parts: clerkship in the hospital, simulation activities (of different kind according to the year), and clinical case discussions (only for the 3rd and 4th years).

For the third and fourth year, students are subdivided into 3 major groups, among which undergraduates rotate and alternate through the different aforementioned activities (clerkship, clinical case discussion and simulation). Each activity lasts for a period of 9 days. The organization is summarized in Fig. 1.

For the fifth year instead, students are subdivided into 2 groups. One group participates to the hospital clerkship, while, during the same period, the other group is further subdivided into smaller groups who participate in simulation and neurology lab activities. Successively, after a period of 1 months, the 2 groups switch. The organization is summarized in Fig. 2.

Professionalizing activities—blended learning model

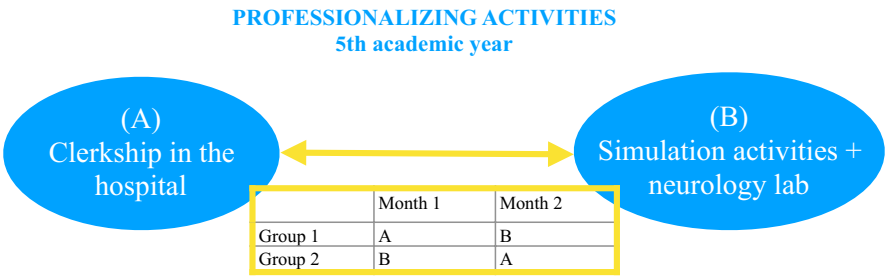
In the period in which COVID-19 pandemic has imposed a strict lockdown, all the aforementioned activities have been converted online, with advantages and limitations of the case. Starting from September 2020, a new educational model has been applied, organized, and supervised by the OME (Office for Medical Education), which is the office that supports teaching in our medical school, by developing and proposing pedagogical methods based on national and international literature on



	Day 1-9	Day 10-18	Day 19-27
Group 1	A	B	C
Group 2	B	C	A
Group 3	C	A	B

III year 1st semester	III year 2nd semester	IV year 1st semester	IV year 2nd semester
Nephrology	Hematology	Gastroenterology	Dermatology
Cardiology	Pneumology	Endocrinology	Infectious diseases

Fig. 1 Professionalizing activities—3rd and 4th academic years



	Month 1	Month 2
Group 1	A	B
Group 2	B	A

Fig. 2 Professionalizing activities—5th academic year

Medical Education. The necessity for this new approach was mainly linked to the fact that practical activities need a face-to-face learning; e-learning approach cannot be completely satisfactory in this field since not all students equally benefitted from remote education. For this reason, online learning may complement in-person education under certain conditions, e.g., practical learning. (Carretero et al. 2021).

Maintaining the traditional educational principle (R.I.M.E. Framework by Pangaro (1999)) and the usual subdivision of the activities, we organized a systematic integration of face-to-face and online learning to improve the quality of teaching concerning Professionalizing activities.

With the exception of the group devoted to the clerkship, for all the other activities, the other macro groups were evenly split into further smaller groups which alternated online and in-presence learning. This subdivision was meant to reduce at minimum the number of participants for each activity so to reduce the possibility of spreading the virus respecting the imposed social distancing.

For each academic year, 150 students were present.

Blended learning is highly context dependent and generalization of concepts across different domains is challenging. (Harris et al. 2009; Rowe et al. 2012) Thus, a successful implementation of our learning model has been organized differently according to the different activities. We maintained all throughout a high degree of flexibility considering how the pedagogical methodology can be adapted to different activities. The different activities have been modified as follows:

Clerkship (3rd, 4th, and 5th academic years)

The clerkship is an essential part of the medical curriculum. It is the moment in which students learn the real interaction with patients and the setting in which they can apply what they have learned in the pre-clinical years. Owing to this, we decided to maintain the clerkship completely in the presence. We were able to guarantee hospital activities, even in this difficult time, maximizing the safety of our students, by providing them all the Personal Protective Equipment (PPE) needed and by performing regular nasal swabs. In particular, the clerkship was organized as follows: concerning students who were able to come to the Humanitas Hospital, without problems imposed by the pandemic, the activity has been carried out in hospital wards as planned, with one student assigned to one tutor.

On the other hand, for students who might have difficulties in reaching our hospital, other university hospitals were identified (in exceptional cases non-university structures were identified), as well as local tutors, with whom they could carry out the internship. Local tutors were trained in order to share: the objectives of the semester, the activities to be carried out, the assessment methods, and the access to the university platform (LMS) for evaluation of the students. In this way, the same training was guaranteed between the two groups of students; regardless, the different types of experiences that students can live, the tutor (specifically trained for this), has to evaluate simple parameters which do not change radically in different settings/hospitals since they are linked to the student himself. Among the parameters which are evaluated at the end of the clerkship we find: the student's ability to interact with the patient and his family members, the student's ability to perform a physical examination and collect the patient's medical history, student's empathy, etc.

Clinical cases discussion (3rd and 4th academic years)

For clinical case discussions, a proper blended model has been applied, implementing the interaction between the online and the in-presence groups. The activity of clinical case discussion consists in the meeting of a real patient to whom students are supposed to take the history, analyze it and discuss together the patient's condition.

For the third year, clinical cases of cardiology and nephrology are discussed, since these subjects are part of the exams of the third year; in the same way for the fourth year, endocrinological and gastroenterological cases are discussed.

The group of students devoted to clinical case discussion is further subdivided into 9 subgroups of about 10–13 students each. Each day there is a different subgroup and the remote connection of the other subgroups.

A student in-presence modality, or on video, collects the anamnesis for the attention of all subgroups. Subsequently, a short debriefing is performed within the subgroups on: what was collected (content) and how it was collected (conduction). In this phase, the remote students, while remaining in a single virtual classroom, will work in subgroups interacting with their classmates through the chat. Each subgroup, both face-to-face and virtual, will identify its reporter, who will report the group's work in plenary. Within each subgroup, all students must produce a written document to evaluate the medical history carried out.

At the end, the tutor chooses 2 documents from two different groups and he will correct them in plenary in order to provide a collective feedback. In addition, the reports produced by all students will be evaluated so that everyone can receive a personal evaluation of their work.

Finally, the tutor presents a physiopathological study of the patient's disease, then he will evaluate 8 students, in the presence mode and/or remotely, by means of questions about the in-depth study.

Simulation laboratories (3rd, 4th, and 5th academic years)

Also in this case, for the simulation activity, a pure blended learning has been adopted. Simulation labs have the aim of improving and teaching procedural and communication skills to students. They include different activities, according to the academic year involved: for the third year, the simulation labs for history taking, radiology, ECG, and physical examination are present. Concerning the fourth year: history taking, sutures, orthopedic examination, radiology, intravenous cannula, abdomen, and chest simulation laboratories.

Regarding the fifth year, the simulation lab consists in the neurology lab and in the management of a full-scale clinical scenario in a shock room.

Before starting the simulation lab activity, a lecture is uploaded on the online university platform (LMS). In the video, the tutor explains the checklists of the different activities. Also, a video recording of a correctly performed simulation (history taking, physical examination, and so on according to the year) is uploaded. All students have to study this material before participating in the lab. In addition, a forum is opened on the LMS, where students can discuss with their peers and tutors eventual clarifications on the uploaded material. This combination of asynchronous and synchronous delivery allows for both independent and guided learning experiences. (Darras et al. 2020).

The group of students involved in the simulation lab is further subdivided into subgroups so that a rotation is established between sessions in-presence and online.

The history taking laboratory, as well as the other simulation activities, consists in the preparatory material uploaded online, on the University online platform, and successively, a subdivision into three groups is performed for the proper activity. This to allow the development of relational skills, both in the real and virtual environments.

The neurology lab, reserved for the fifth year, is organized in a period of 5 days for each group, the latter composed of 15 students. Day 1 is in-presence modality, and it consists in the presentation of the activity by the specifically trained tutor and sharing of a video about general objective neurological examination and the related check list. Students are provided with an observation grid and a debriefing grid. Days 2 to 4 are blended: in the first part of the activity (online), students are invited to watch a video containing the presentation and the objective pathological examination of neurological syndromes receiving the relevant check list. The second part (in-presence modality), consists in the interaction with the tutor to deepen the examination, and to perform, in the presence of the students themselves, the objective neurological sub-specialist examination of the day. The last day is in the presence and consists in the students' evaluation: the group is divided into couples that rotate to access the Unit of Neurology at Humanitas Hospital, in order to perform an objective neurological examination on real patients under the supervision of the tutors who are going to evaluate them.

The full-scale clinical scenario in the shock room is performed with fully equipped mannequins, with which an emergency situation is simulated. With this experience, the undergraduate has to manage an acute situation, in which he must acquire the knowledge and skills necessary to play the role of manager of the patient's active problems. This implies: the ability to carry out a differential diagnosis and establish a specific therapeutic program, also starting to evaluate its follow-up. The team work abilities as well as the decision-making skills are trained, helped by specialized tutors.

A summary of the comparison between the different activities and between the traditional and new method is shown in Table 1.

Each Professionalizing activity provided for a final assessment of each student through a proper and specific evaluation form, in order to assess clinical skills and professional behavior.

Method validation

We based the validation of our new approach on the Kirkpatrick's model. (Alliger and Janak 1989) Level I of the aforementioned method has been assessed with a self-administered online questionnaire, to be completed by both students and tutors. It was developed in-house, by the research team, and we incorporated existing questions, used in previous questionnaires, from Student Satisfaction Survey form developed by Naaj et al. (2012).

Following the Kirkpatrick's model, we also evaluated level II, which should assess the learning and increase in knowledge and skills of the students as a result of this new teaching method. Learning was evaluated on the basis of a final assessment

Table 1 Summary of the activities per year and comparison between old and new approach

Professionalizing activity	Academic year	Old traditional practices	New blended learning practices
Clerkship	3rd, 4th, 5th	-Clerkship performed in Humanitas Research Hospital -One tutor: 2/3 students	-Possibility of performing clerkship in other hospitals -One tutor: one student
Simulation labs	3rd, 4th, 5th	-Bigger groups of people in class -Few "theoretical" notions before practice	-Smaller groups for the practical activity—> increased learning possibility -Online preparatory lessons before the practical session
Clinical case discussion	3rd, 4th	-Bigger groups of people in class (only 1 group in presence)	-Smaller groups of people in class -More organized conduction of the activity (coordination of the groups in the presence and in class)

that we proposed at the end of each activity. Level III and level IV, which are included in Kirkpatrick's model, will be evaluated in the immediate future observing the change in behavior of our students in the daily hospital activity and organization.

Evaluation questionnaire

The survey included an introduction paragraph that informed participants of the aim of the questionnaire and of the anonymous form of it. The suggestions and indications collected are fundamental for monitoring and continuously improve the activities. Especially in this particular period, and in the light of this innovative experience, we provided two ad hoc satisfaction questionnaires, one for students, and one for tutors, with both open and closed questions. The closed questions are based on a Likert scale, from 1 to 10 (1 = not satisfied at all, 10 = extremely satisfied), including "not applicable" (N/A), to quantitatively evaluate the impact of this project. The open questions, on the other hand, leave an empty space where students and tutors could leave a comment to perform a qualitative analysis, obtaining further suggestions or criticisms. Different items have been evaluated: the questionnaires are reported in Figs. 3 and 4. The questionnaire was sent via an introductory email to both students and faculty members at the end of the activities. Successively, follow-up emails have been sent as reminders.

Results

The satisfaction questionnaire for tutors have been completed by 13 teachers over 20 (65%), while regarding the one addressed to students, it has been completed by 135 undergraduates over 450 (30%).

The results of the quantitative analysis are reported in Fig. 5. The interaction between teachers and students, as well as among students themselves, was rated more

Evaluation questionnaire - Students

	1	2	3	4	5	6	7	8	9	10
Methods and organization of the activity were clearly explained at the beginning of the course										
Class assignments communication were clearly communicated to me										
Online theoretical lecture before face-to-face practical activities improved my understanding of the subject										
The use of the blended learning technology in this course helped me to achieve the learning outcomes										
There was a good balance between online and face-to-face material in the course										
Tutors were available to discuss the provided materials										
The interaction with teachers and peers were effective also through the blended delivery mode										
Overall, I am satisfied with the course										
Did you noticed any technical difficulties? Which ones?										
Comments and Suggestions										

Fig. 3 Evaluation questionnaire for students

Evaluation questionnaire - Tutors

	1	2	3	4	5	6	7	8	9	10
Online theoretical lecture before face-to-face practical activities improved the students' understanding of the subject										
The use of the blended learning technology in this course helped the students to achieve the learning outcomes										
There was a good balance between online and face-to-face material in the course										
I would like to use the blended delivery mode also in the future										
The interaction with students were effective also through the blended delivery mode										
Overall, I am satisfied with the course										
Did you noticed any technical difficulties? Which ones?										
Comments and Suggestions										

Fig. 4 Evaluation questionnaire for tutors

Students' results:

	Methods and organization of the activity were clearly explained at the beginning of the course	Class assignments communication were clearly communicated to me	Online theoretical lecture before face-to-face practical activities improved my	The use of the blended learning technology in this course helped me to achieve the	There was a good balance between online and face-to-face material in the course	Tutors were available to discuss the provided materials	The interaction with teachers and peers were effective also through the blended delivery mode	Overall, I am satisfied with the course
Mean	5,6	5,5	6,6	6,5	6,3	8,2	7,1	6,8

Tutors' results:

	Online theoretical lecture before face-to-face practical activities improved the students' understanding	The use of the blended learning technology in this course helped the students to achieve the learning	There was a good balance between online and face-to-face material in the course	I would like to use the blended delivery mode also in the future	The interaction with students were effective also through the blended delivery mode	Overall, I am satisfied with the course
Mean	6,8	7,2	7,2	5,8	6,2	7,4

Fig. 5 Quantitative results

than sufficient, 7.1 and 6.2, respectively. The strongest point, which was evaluated with the highest score, is the availability of tutors to discuss the provided material, with a 8.2.

The qualitative analysis of data, a sample of which is presented in Fig. 6, derived from comments and suggestions proposed by our undergraduates and faculty, confirms the advantage of the blended learning activities in order to guarantee a continuation of the clinical curriculum, although it highlighted the necessity for an increased technical support for connection problems and an improvement in organization of the meetings.

Qualitative results of ev. quest. STUDENTS	
Did you notice any technical difficulties?	Comments and suggestions
Obviously the online vocationals had a lot of limitations, now with a blended modality things are much better. I would suggest better videos for explaining the procedures, even without recording new videos, there are already many of them on YouTube. I would suggest to provide the links of these.	Practical skills are very difficult to acquire online, this semester it was much easier to learn and follow every activity.
I posted a question in the online forum and it has not been answered. I would suggest to check and use more the forum.	Even though the attempt to maintain the practicals during the pandemic was the best I could have been done, in order to do practice, physical presence is absolutely necessary. I was happy to receive again sessions in person.
Sometimes during the history taking activity and echo was present.	I truly appreciate the effort that has been done in comparison to the previous months. This time, it has been easier to study this practical part of the course from videos and slides and the fact that after the online explanation we had an in person meeting made me feel more confident with most of the procedures.
I think the history taking videos could have been louder and clearer. At times, it was very difficult to follow them, because of low volume.	The practice is helpful only if done in person, for this reason I appreciated the possibility of testing my skills.
Improve quality of videos and explanations	I understand the circumstances under which these activities were put into place. I felt like it wasn't enough for the skills that we would've learned in the simulation labs if we wouldn't have the possibility of going over these skills in presence.

Qualitative results of ev. quest. TUTORS	
Did you notice any technical difficulties?	Comments and suggestions
No technical difficulty	Considering the difficult time we are living I think this solution have worker very well. No comparison with the previous months in which students were not engaged at all in the activities being only online.
The recording of the lecture did not start by its own when entering the meeting so sometimes it was not done. Also I had problems with audio.	Personally I preferred the traditional way of teaching. Anyway this can be a good compromise.
Connecting the audio of the computer was not so easy, as well as, screen sharing when needed.	Students were really enthusiastic of coming back to the university and having the opportunity to confront again with their mates. This approach, which brought a sort of come back to real life, was beneficial not only from a psychological point of view but also from a didactical one.
Online it is much more difficult to engage students. All their webcams should be on.	Pros: online preparatory lectures before the practical meeting resulted in having students much more prepared on the topic and allowed us to work in group much better; prevention of the Covid spreading; recorded lectures could have been replayed. Cons: technical difficulties from teachers who are not so well skilled with computers; difficulty in engaging students from home

Fig. 6 Sample of qualitative analysis comments and suggestions

Discussion

The unprecedented academic crisis we are living changed profoundly the delivery of instruction. Challenges of online education have been reported in the literature, (Esani 2010; Rajab et al. 2020a, b; Carretero et al. 2021) making online teaching and learning not equitable in terms of access and quality. (Rajab et al. 2020a, b; Goldrick-Rab 2020) In particular, considering procedural and communication skills learned on the field, as an essential part of the medical undergraduate curriculum, online learning is not able to completely fulfill the training, due to obvious limitations.

Studies have reported that blended learning is becoming more accepted among academic communities because it combines "the best of both worlds." (Orlearns 2014) However, the effectiveness of blended learning depends on several factors, mainly adequate faculty training and institutional support. (Rajab et al. 2020a, b; Comas-Quinn 2011).

With our approach to blended learning, we propose a method, specifically designed to make effective this kind of teaching which can be considered essential in the pandemic era we are facing.

To guarantee the effectiveness of this method, we validated it following the Kirkpatrick's pyramid. (Alliger and Janak 1989) Although, a limitation in our study can be identified by the lack of a control group for comparison, however, in this particular case, a control group, following the traditional approach to learning, was not feasible.

The evaluation questionnaires validated level I, while the final assessment of each activity validated level II. Concerning the evaluation questionnaire, students, as well as tutors, identified, in all courses, a good balance between online and face-to-face meetings and recognized the method to be helpful to reach the learning objectives. We believe that this blended method is beneficial for students rather than a purely online learning, especially concerning practical activities. This is in line with what educationalists already understand about the impact of blended learning. (Morton et al. 2016; Brame 2015).

Our undergraduates evaluated also very positively the interaction with peers and tutors, and the teachers' availability to discuss the learning material. In this sense, the tutor's training was of fundamental importance, and it was urgently applied in order to make every teacher digitally competent. (Carretero et al. 2021) We are convinced that, this point is essential for blended learning to be effective, indeed our courses are not simply lectures but they are more interactive. All our sessions are strongly student centered, since also the subgroups, remotely connected, are actively engaged in the process of sharing ideas and working together to contribute to the discussion in every activity. This method can be defined as a student response system (SRSs), as previously described by Kay and LeSage (2009) The aim is to boost students' attention and engagement in synchronous lectures, delivered in a virtual learning environment.

As noticeable, the results concerning some items of the evaluation questionnaire are insufficient, in particular: 2 items concerning the organization and

communication of the activities were evaluated 5,6 by students, while tutors rated 5,8, the possibility of using the blended delivery mode of teaching also in the future.

Despite being insufficient, these results can be easily improved; the rapid shift from a traditional learning method, to a blended one, brought to light different challenges, also in consideration of the number of students to which this new project has been applied. As already demonstrated by other studies, careful planning and organization change, as well as, support are needed when introducing blended learning on a large scale. (Morton et al. 2016; Sanchez-Mendiola et al. 2013).

Embracing change is never easy; in particular, in this case, both students and tutors had to face the difficulties linked to the use of technologies and to adapt, either the study or the teaching, according to this new modality. For those with little to no experience using online resources, in particular tutors, adjusting to a new mode, often creates more barriers to learning and teaching. (Ota et al. 2018; Iley et al. 2011).

Furthermore, as indicated in the results section, the evaluation questionnaire has been completed only partially by students and tutors; for this reason, a bias in the evaluation score we received should be taken into account.

With the thorough analysis of the qualitative data, it has been demonstrated the need for a more accurate organization of the meetings and the necessity for technical support since different problems have been reported, mainly with respect to connection, audio and video.

The evaluation received, as well as, comments and suggestions, will allow the University to improve these activities in the next semester. While these developments were forced into fruition by the COVID-19 pandemic, the likelihood is that many will persist for the foreseeable future. (Gordon et al. 2020).

Even if the pandemic is unpredictable, our aim is to strengthen the effectiveness of blended learning, as it is considered a successful transformation of the clinical curriculum in these difficult times.

Conclusions

In the era of COVID-19 pandemic, blended learning assumed a paramount role in medical education. The quick development of this approach was needed to meet the practical learning necessities of students. Our paper reveals the impact of our new method on the numerous challenges many Institutions have to face nowadays. The conventional medical education has to be replaced, at least momentarily, and we would like to share our experience hoping it contributes to increase the mastery of the blended learning method.

Author contributions AB: Wrote the paper. OS: Conceived and designed the analysis. LM: Collected the data. CF: Contributed data or analysis tools. CD: Performed the analysis. ML: Performed the analysis. VV: Conceived and designed the analysis.

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Data availability The authors confirm that the data supporting the findings of this study are available within the article.

Code availability Not applicable.

Declarations

Conflict of interest The authors have no conflicts of interest to declare. No financial support or benefits have been received by any author. We are not in a relationship with any commercial source which is related directly or indirectly to the work.

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