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Co-learning and co-teaching in a newly introduced research learning community

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Abstract

Background: Research clerkships are usually designed as individual learning projects focusing on research skills training, such as research design, data analysis and reporting. When the COVID-19 pandemic triggered an urgent need for digital education, we redesigned a research clerkship with the challenging aim to maintain original quality for more students than usual with limited teaching staff.

Approach: We introduced the concept of a research learning community (RLC) with co-teaching and co-learning to a group of 14 students and seven teaching faculty using digital platforms. Small groups of students participated in the RLC, which was supervised weekly by the teachers. Research experts were continuously involved and led workshops.

Evaluation: Using a qualitative design, we analysed experiences from the perspectives of students and faculty. We performed an inductive thematic content analysis of three focus group interviews and used 14 student reports for triangulation. The results indicate that apart from developing research skills, students valued peer assistance, attention to uncertainty and learning beyond individual research projects. The teachers/research experts reported that co-teaching and co-learning had contributed to their professional development. In terms of organisation, students and faculty recognised that the RLC model allowed for interdisciplinary learning, facilitated by a digital platform.

Implications: To develop students' research skills, embedding a clerkship in an RLC is an attractive alternative to individual research clerkships. The obligatory learning goals are met. Co-learning and co-teaching foster faculty's and students' professional development. When translating to other curricula, we recommend stating common goals in addition to individual objectives.

1 | BACKGROUND

The development of research knowledge and skills to become critically reflective practitioners is vital to the core medical curriculum. Therefore, in Dutch medical curricula, a research clerkship of 3-

6 months is mandatory for the master's degree, wherein students participate in the research empirical cycle in an authentic learning environment. This clerkship is the first or the last clerkship for students. In contrast to clinical clerkships, organised as workplace-based and peerassisted learning,² research clerkships have an individual character:

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one research project, one student and one supervising researcher on an individual learning journey with a final individual assessment comprising a draft paper of the research conducted and a reflective report on the learning process. The COVID-19 pandemic forced a break in all clinical clerkships, challenging us to immediately redesign traditional individual research clerkships to accommodate more students than usual in a digital environment, with only a few teachers to supervise, while maintaining quality as before.

Redesign of a traditional individual research clerkships to accommodate more students than usual in a digital environment, with only a few teachers to supervise, while maintaining auality as before.

Existing research shows several advantages of group learning. Collaborative learning in an authentic research setting is feasible when students become part of a research community.³⁻⁵ In addition to developing research skills and deep learning stimulated by learner interactions, it enables co-teaching.^{6,7} The benefits of co-teaching can be extended by introducing interdisciplinary team teaching.⁸ Coteaching can improve teachers' professional development, provide ample opportunities for perspective transformation and help students and teachers navigate educational changes. 9-11 The interaction of students and teachers in a learning environment stimulates co-learning. Within the co-learning concept, learning occurs in all directions as teachers become learners themselves, positively affecting the learning outcomes of all participants and improving the learning environment.¹¹ However, it is unclear from the literature what educational or organisational strategies might be implemented to foster co-learning and co-teaching in developing research skills.

Co-teaching can improve teachers' professional development, provide ample opportunities for perspective transformation and help students and teachers navigate educational changes.

Within the co-learning concept, learning occurs in all directions as teachers become learners themselves. positively affecting the learning outcomes of all participants and improving the learning environment.

Based on the concepts of co-teaching and co-learning clarified in Table 1, we transformed an individual clerkship into a research learning community (RLC) constituting students as well as teachers and research experts, where we explored (1) students' learning processes in terms of research competencies and (2) the value of interdisciplinary co-learning and co-teaching. Our guiding principles for the RLC are presented in Table 1.

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APPROACH

Design of a new RLC

We designed an RLC for students (n = 14), teachers and research experts (n = 7). Figure 1 shows the traditional research clerkship compared to the RLC concept.

The overall, common goal of this learning community was research skills training including the use of qualitative research methods. In small groups, students focused on a joint research topic, but each had a specific research question (Figure 1).



TABLE 1 Overview of guiding principles for the research learning community (RLC) and clarifications of various concepts of learning.

Guiding principles for RLC

Aim

- · Meet the leading learning goals as defined by the examiner originally
- Facilitate the learning process
- Give attention to well-being of all participants during the pandemic isolation
- · Facilitate efficiency: maintenance of original teaching quality for more students than usual and with limited teaching staff resources
- Guarantee continuity: taking over duties between teachers in the event of unexpected downtime, due to the pandemic

Conditions for community co-learning and co-teaching

- An environment promoting safety, openness and trust, encouraging the sharing of experiences and critical reflection
- · Activities facilitating the exploration of divergent perspectives, problem solving and critical thinking
- A community promoting each member's academic engagement, sense of autonomy and collaboration
- Use of feedback, reflection and self-assessment to assist the learning process of all participants

Activities to facilitate co-learning and co-teaching:

- Students explore and discuss their roles in the RLC and small groups, being part of a research team.
- · Weekly attention for small talk and emotions, well-being of the students and faculty
- Teachers' effort to downsize hierarchy and enable learning
- Formal and informal feedback sessions on research as well as personal development
- · Availability on demand of individual expertise to all members of RLC
- Digital platforms for formal (weekly) and informal discussions
- · A growing digital library with contribution of all RLC members
- Thematic workshops and (supervised) group working sessions

Clarification of educational concepts

Co-learning is a specific type of learning in which the hierarchy between teachers and students is breached, and all are considered learners. Together, they work on building knowledge around a topic, bringing their expertise and experience.

Co-teaching is a concept of active complementary collaboration based on different expertise, ongoing professional learning and shared leadership in the teacher role pursuing the best student outcomes; co-teaching allows for a mutual understanding of each member's role and responsibilities in the curriculum as part of faculty team development.

Collaborative learning is an overarching concept based on social constructivism. It entails that learners encourage, support and empower each other by interaction in a learning process under supervision of teacher. Learners share knowledge and practice skills in a common activity aimed at improving each other's competencies and boost performances. Peer-assisted learning is a type of collaborative learning, with a monodisciplinary character. Colleague-students from similar groupings, who are not professional teachers in the topic, interact with each other to learn and learn by teaching. Peer-assisted learning has the advantage of easy approachability.

Teachers and research experts were represented in the two teaching levels (Figures 1 and 2). Teachers have a background in medicine and research experience and are trained in guiding students' professional and personal development. Research experts have a science background and are trained in qualitative analyses. Every small group had at least two dedicated teachers to facilitate co-teaching. Students were guided on both content and process; the activities are presented in Table 1. Teachers discussed the expected and observed development of students' research skills, and the progression of individual research projects, in weekly meetings with students in a small group setting. Research experts conducted targeted workshops and lectures for all students and teachers to provide scientific knowledge and skills. We used an interactive digital platform for ongoing discussions, tips and tricks and an advisory board (Figure 2). Co-teaching was also reflected in regular teachers' meetings organised to share experiences and learning needs.

The examiner and examination at the end of the research clerkship were similar to before. Assessment involved applying research skills in a draft research article and a reflective process report.

3 | EVALUATION

3.1 | Methodology

Several months after finishing their research clerkships, the 14 students and seven teachers/research experts of the RLC were invited to participate in semi-structured focus groups. RC and MG, independent researchers not affiliated with the RLC community, conducted three focus interviews with four students and six teachers/research experts via video calls through a virtual classroom.* Teachers and students were not mixed in the focus groups to ensure a comfortable and open atmosphere for discussions. RC and MG made a concept interview guide using questions mirrored for students and teachers/research experts that was finalised after a discussion with all authors. Interviews were audio-recorded, transcribed and inductively coded and finally thematically coded using ATLAS.ti 8.† The transcription of the first focus group was coded independently by RC and MG. In an iterative process, overlapping codes were transferred to a universal

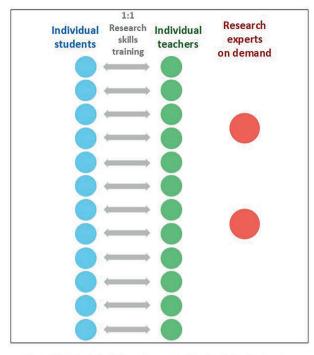
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[†]Version ATLAS.ti 8.4.20 (2019)

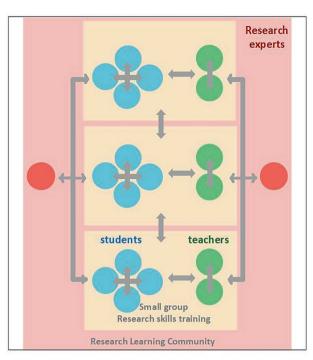
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Traditional research clerkship: a linear teaching-learning interaction (grey). Individual students supervised by individual teachers-researchers and research experts on demand.



Experimental research clerkship in a learning community: multidimensional learning and teaching interactions (grey) representing peer assisted learning, co-teaching and co-learning.

FIGURE 1 Structure of the traditional research clerkship (panel on the left) and the newly introduced research clerkship, embedded in a multi-professional learning community (panel on the right). The grey arrows represent the one-dimensional learning interaction in the traditional research internship on the left and the multidimensional learning interaction in the RLC on the right.

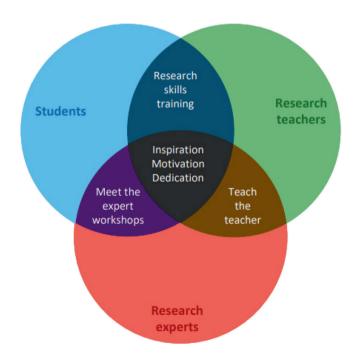


FIGURE 2 Scheme of participants in the learning community related to co-learning and co-teaching activities.

codebook with clustered codes in themes. The themes were discussed with a qualitative research expert (TW) and finally in the whole research group. The reflective reports of all 14 students were used for triangulation, 12,13 mainly to look for additional data, check whether relevant topics were missing and compare relevant topics in interviews to those mentioned in the reports. The risk of bias was minimised by using reflective report data from all RLC students and not just the data from focus group members. We avoided bias by interpreting data repeatedly and transparently for the research group and recurrently reflecting to correct for own values and views.

3.2 **Ethics approval**

The Research Medical Ethics Committee (CMO) of Radboud University Medical Centre (case number 2020 6518) approved the study. Informed consent was obtained from all participants. Interviews were analysed anonymously.

3.3 **Results**

All students met the obligatory clerkship learning goals concerning research competencies and cleared their final assessment. Next, we present an overview of the perceived advantages and disadvantages of the RLC (Figure 3) and discuss the results from different perspectives. Illustrative quotations reflect students' (Box 1) and teachers' experiences (Box 2).

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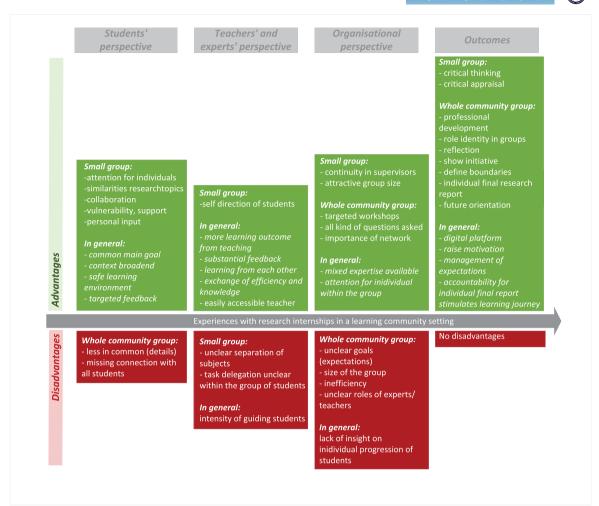


FIGURE 3 Overview of the thematic analysis results of the research clerkship experiences of students, teachers and research experts in the learning community setting. Results are divided based on advantages (green) and disadvantages (red).

Student: 'These meetings were very helpful and really put our research in a bigger perspective'.

Student: 'The big advantage of being part of the whole community was the possibility to get more targeted education, fulfilling the needs of all individuals in the community'.

Teacher: 'Students really learned more, not only from their teachers but also from their peer students'.

3.3.1 Students' perspectives

All students had positive opinions about this clerkship. They specifically mentioned the collaboration with peers as helpful in providing new insights on their data or scientific output, positively stimulating each other's individual learning processes [I1-9]. In the RLC, students provided each other with constructive feedback that helped them in their learning process [18]. Furthermore, they shared uncertainties, received (emotional) support throughout their learning process and were aware of each other's well-being [12].

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BOX 1 Quotes illustrating students' experiences with the RLC. These quotes are derived from the learning process report that every student had to write, and the semi-structured focus group interviews with four students, all of whom are presented in the interview quotes. I: quote interview. R: quote learning process report.

Interviews

I1: 'And for me personally, creating a network was convenient. Whenever I needed someone for an interview, I asked my peers; or by having a network because of everybody participating in this clerkship. Not specifically for your part, bit more like a surrounding network'.

12: 'What worked for me in a group is the ability to more easily share my thoughts, and it's easier to say some things that are otherwise difficult to covey'.

13: 'At this point, you can support each other and you are having a common goal, apart from your individual goals'.

14: 'Besides guidance from your teacher, colleagues can be consulted in an accessible way. From other students, in a one-on-one teaching setting, I sometimes heard that their teacher was difficult to reach resulting in unanswered questions for weeks. I did not experience this; weekly meetings with my teachers were planned and using a digital platform, I could easily discuss things with my peers. I really liked this and I consider this to be a large addition to the learning community'.

15: 'At the beginning, we really had to find our way. With the three of us, in the small group, there was a strict schedule. But in the whole community, we had to find our way; sometimes it was really messy: how are things going? What are we doing? Gradually this improved [...], and the digital platform provided a way to communicate [....]. That was of added value'.

16: 'With research meetings we helped each other to find relevant information for different phases of the study, like literature, but also workshops for writing and interviews. I asked for a lot of feedback from my supervisors to reach these learning goals [...] I understood the importance of qualitative research'.

17: 'For me personally, the big advantage of being part of the whole community was the possibility to get more targeted education, fulfilling the needs of all individuals in the community, for instance, about academic writing'.

18: 'The problems and questions, which rose during the working progress, could be discussed with the group. This led to valuable feedback. [...] Nevertheless, you also could help your fellow students with their problems. This gave insight in my progression and was a nice way of working together.' [...] 'In this way, I could develop myself in this learning objective'.

19: 'These meetings were very helpful and really put our research in a bigger perspective. [...] by giving and receiving peer feedback, our projects definitely improved'.

Reports

R1: 'When I look back, I had a very informative and instructive research clerkship. This article is completely written by me [...]. I thought about every step and discussed this with my supervisors and colleagues to make this article[...], I think I reached all my learning goals. I feel free to write in (scientific) English, I learned qualitative research methods, and I have experience with qualitative data analysis and interpretation'.

R2: 'During weekly meetings, we rotated leadership. Stepping into the role of a leader, this being one of my learning goals, this set up really helped me to grow and feel more comfortable in this role'.

Students recognised common goals [R1] and personal and individual goals [13, R2].

Students shared uncertainties, received (emotional) support throughout their learning process and were aware of each other's well-being.

Teachers' and research experts' perspectives 3.3.2

All the teachers recognised the positive effects of collaboration among students. Guidance from more than one teacher resembled working in a real-life research group in terms of collaboration, peer assisted learning and co-learning [T1,2].

Being part of the RLC encouraged self-directed and peer-assisted learning by providing students the opportunity to seek answers or by consulting their peers first, instead of teachers [T1,2]. Co-teaching led to a more critical appraisal of subjects, use of different research methods and more in-depth discussions between students and faculty, resulting in a learning curve for both [T3-5]. The teachers/ research experts said digital collaboration was well established in the circumstances; they emphasised the need for physical meetings, as did students.

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BOX 2 Quotes illustrating teachers' and research experts' experiences with the RLC. These are derived from the semi-structured focus group interviews with six teachers/research experts, all of whom are represented in the interview quotes. T: auote interview.

T1: 'Students also learned specific aspects. For instance, teachers not being omniscient, needing each other for answers, seeing them discuss to reach the best results; aspects students won't experience when guided individually. How a research group works and what it means in terms of collaboration, peer learning, lifelong learning; that was more prominent, compared to individual guidance'.

T2: 'When it comes to providing peer feedback, helping each other, it is convenient when the students know each other's projects, the fact they know they are working on a similar subject. This provides trust to give their peers feedback, that is a big advantage of working in smaller groups. The courage to help each other, to have the feeling: "we can do this, we can really help each other".

T3: 'In individual guidance, you have to explain it step by step, but because of one question to respond to at a time, you can't answer all questions. There is no good way to assess, you provide suggestions to read, and the next time you come back to it. Putting all this together, and providing this in one joint workshop, would be very efficient, and better content wise, when it is provided in a workshop'.

T4: 'It helped me a lot. I have the least experience with educational/qualitative research [...], so this was new for me $[...].\ I$ learned along with the students [...]. The things I learned from a teacher in one session, I was able to use in the next session. I did not think about that beforehand, but it was something that just occurred'.

T5: 'Observing other teachers on how to deal with things, in terms of speech, way of communication, points of interest, and how to provide feedback in different ways."

T6: 'In individual guidance, you are the expert yourself, no one is supervising you or asking a critical question. The student may ask a question, but will soon be pleased. Critically asking ourselves, the other teacher will ask: "there can be another point of view, is that really true or how does it precisely work"; guidance by several teachers will evoke

T7: 'I think that specific skills provided in workshops, which are certainly not a part of individual guidance, but also looking at each other's product to help each other [...]; that in itself is also a sort of skill not provided in individual guidance. I really think, looking at skills, they really learned more, not only from their teachers but also from their peer students'.

Co-teaching led to a more critical appraisal of subjects and more in-depth discussions between students and faculty, resulting in a learning curve for both.

3.3.3 Organisational factors

Students valued the multidisciplinary nature of the team; they referred to both the knowledge gained from different perspectives and the opportunity to experience an academic research team setting. including outcomes that went beyond their individual learning goals and research project [11,6,7,9]. The digital platform helped students find their way and connect with other small groups to address common questions [14,5,8].

Teaching staff was not sure whether supervision was less timeconsuming than before; however, they were convinced about providing better quality education, with more time to deploy expertise for more students, a deepening of educational content and less time spent on general information across the RLC [T6,7].

Better quality education, with more time to deploy expertise for more students, a deepening of educational content and less time spent on general information across the RLC.

IMPLICATIONS

Although the redesign of this clerkship was a challenging journey for faculty, all students comfortably met the examination requirements of research competencies. By properly incorporating the pre-established guiding principles and especially the conditions (Table 1), our new model of research clerkship embedded in a learning community of

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students, teachers and research experts is beneficial for (1) developing research and professional skills, (2) the students' learning process, (3) interdisciplinary team teaching and (4) teacher professionalisation. These results exceeded our expectations. Teaching staff concluded that the model helped students to gain a broader perspective on research methodology and developed more diverse research skills without any loss of individual accountability for their own research project. The students were able to share their strengths and weaknesses and reflect on learning curves and professional identity, which empowered the group. Regardless of the basic level of research skills, by facilitating mutual contact in the community, students could help peers grow without taking over other work. Students still receive the quality of the individual research clerkship with the added benefit of a safe, encouraging and empowering learning community.

Our new model of research clerkship embedded in a learning community of students, teachers and research experts is beneficial for students and faculty.

The model helped students to gain a broader perspective on research without any loss of individual accountability for their own research project.

Students and faculty benefit from the safe, encouraging and empowering learning community.

The multidisciplinary character of the RLC and diversity in teaching methodologies resulted in engaging students in various perspectives on conducting research. Co-teaching worked well and encouraged teachers to become more skilled, efficient and reflective

about their teaching practice. ^{11,15–17} Teachers successfully supported each other in coping with the challenges by the ad hoc adaptation to an RLC.

The evaluation identified areas for improvement. Lack of clear goals and objectives is a known reason for failure in small-group settings. ^{15,18} In this specific learning community setting, we learned the importance of explication of both common goals—to achieve research knowledge and skills and personal objectives, that is, individual accountability and performing own research.

Based on the interaction, social responsibility and accountability, we expect that a hybrid RLC design can further promote learning and collaboration and facilitate prompt identification of students who might fall behind. Although feedback from participating students did not report a lack of full attention by teachers to their learning process, some students may thrive better under regular individual guidance and/or in person classroom activities.

The need to introduce students to research and encourage them to engage in it is cross-curricular. Current scientific research focuses on team performance. Although this is the first executed version of the RLC concept, evaluated with small number of students, our approach demonstrates the potential of embedding individual research clerkships into an RLC. Given the positive effects of peer learning, co-teaching and co-learning in RLC on acquiring research skills and professional development, we expect that this particular RLC setting with multiple students and teaching faculty can be translated to other educational settings too. For the next version, we would choose an RLC based on the guided values we defined earlier, keeping the benefits of digital activities and introducing on-campus learning meetings, to create an accessible and safe learning environment where all students can find, learn from and support each other.

Given the positive effects of peer learning, co-teaching and co-learning in RLC on acquiring research skills and professional development, we expect this RLC model can be translated to other educational settings too.

When designing an RLC concept, we recommend a strong emphasis on the explication of common goals and reflection on personal performance within the group to encourage co-learning and co-teaching.

AUTHOR CONTRIBUTIONS

Roy J. M. Claessen: Conceptualization; investigation; methodology; interviews; writing—original draft; writing—review and editing; validation; formal analysis; data curation; software. Annelies E. van Ede: Conceptualization; formal analysis; writing—review and editing; methodology; supervision; project administration. Merel van Gils: Investigation; methodology; interviews; writing—original draft; validation; formal analysis; data curation; software. Rob P. B. Reuzel: Conceptualization; methodology. Tamara E. T. van Woezik: Supervision; educational concept; formal analysis; writing—review and editing. Petra J. M. van Gurp: Conceptualization; methodology; formal analysis; supervision; writing—review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS APPROVAL

This study was approved by the Research Medical Ethics Committee (CMO) of the Radboud University Medical Centre (case number: 2020_6518).

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