



Universiteit
Leiden
The Netherlands

Internal medicine clerks' motivation in an online course: a mixed-methods study

Hamoen, E.C.; Blankenstein, F.M. van; Jong, P.G.M. de; Langeveld, K.; Reinders, M.E.J.

Citation

Hamoen, E. C., Blankenstein, F. M. van, Jong, P. G. M. de, Langeveld, K., & Reinders, M. E. J. (2025). Internal medicine clerks' motivation in an online course: a mixed-methods study. *Medical Education Online*, 30(1). doi:10.1080/10872981.2024.2445915

Version: Publisher's Version

License: [Creative Commons CC BY-NC 4.0 license](https://creativecommons.org/licenses/by-nc/4.0/)

Downloaded from: <https://hdl.handle.net/1887/4247571>

Note: To cite this publication please use the final published version (if applicable).



Internal medicine clerks' motivation in an online course: a mixed-methods study

Esther C. Hamoen, Floris M. van Blankenstein, Peter G.M. de Jong, Kirsten Langeveld & Marlies E.J. Reinders

To cite this article: Esther C. Hamoen, Floris M. van Blankenstein, Peter G.M. de Jong, Kirsten Langeveld & Marlies E.J. Reinders (2025) Internal medicine clerks' motivation in an online course: a mixed-methods study, *Medical Education Online*, 30:1, 2445915, DOI: [10.1080/10872981.2024.2445915](https://doi.org/10.1080/10872981.2024.2445915)

To link to this article: <https://doi.org/10.1080/10872981.2024.2445915>



© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



View supplementary material [↗](#)



Published online: 01 Jan 2025.



Submit your article to this journal [↗](#)



Article views: 893



View related articles [↗](#)



View Crossmark data [↗](#)

RESEARCH ARTICLE

 OPEN ACCESS

Internal medicine clerks' motivation in an online course: a mixed-methods study

Esther C. Hamoen^a, Floris M. van Blankenstein^b, Peter G.M. de Jong^b, Kirsten Langeveld^c and Marlies E.J. Reinders^a

^aDepartment of Internal Medicine, Leiden University Medical Center, Leiden, The Netherlands; ^bCenter for Innovation in Medical Education, Leiden University Medical Center, Leiden, The Netherlands; ^cPublic Health and Primary Care, Leiden University Medical Center, Leiden, The Netherlands

ABSTRACT

Purpose: At LUMC, a Small Private Online Course (SPOC) was developed complementary to the clinical learning environment of the internal medicine clerkship. The developers used the self-determination theory in the design of the SPOC's assignments aiming to improve learners' intrinsic motivation. This study investigates the impact of the SPOC and its specific assignments on student motivation.

Methods: The study uses a mixed-methods approach. The authors describe a quantitative analysis of students' responses on an intrinsic motivation inventory (IMI), and a qualitative thematic analysis of semi-structured group interviews, respectively.

Results: Seventy-eight students (response rate 42%) filled out the IMI. Their scores were (7-point Likert scale): interest/enjoyment 3.76, competence 4.02, choice 3.53, value/usefulness 4.20, relatedness 3.85. Thematic analysis of the interviews (14 students) revealed seven themes: collaboration with peers, usefulness, SPOC-related factors, workload, motivation, and performance.

Conclusions: Motivation could be optimized creating useful, authentic cases that train skills that are directly transferrable to clinical practice. Challenging, interesting and student-generated assignments positively influenced students' autonomy and motivation. Lack of awareness of online performance negatively affected the feeling of competence. Perceptions of online collaboration were suboptimal. The study can be helpful for other teachers to enhance motivation while developing online courses.

ARTICLE HISTORY

Received 14 June 2023
Revised 17 December 2024
Accepted 18 December 2024

KEYWORDS

Clinical learning; clerkships;
online course; motivation;
thematic analysis

Introduction

Clinical clerkships are characterized by learning in an environment that involves direct patient care, which is often located at an inpatient ward. This ward is a dynamic, challenging and complex learning environment. The ward has a primary aim to provide patient care, however students (nurses and physicians) also need to learn, which can be a difficult combination. Clinical workplace learning (WPL) may face several challenges that lead to suboptimal training. For example, time pressure leads to suboptimal support, observation and assessment of learners by supervising clinicians, while the diagnostic process tends to become more complex over time [1–4]. Also, students, teachers and patients may experience a lack of sustained relationships in clinical training [5–7]. In a previous study, we described the implementation of a Small Private Online Course (SPOC) in a blended curriculum in our clerkship internal medicine that aimed to train clinical skills and competencies [8]. Blended learning refers to a deliberate

blending of face-to-face and online learning, with the goal of stimulating and supporting learning, which can improve learning and learner satisfaction when thoughtfully designed [9–14]. A SPOC is a distinct form of an online course, that only allows a limited number of eligible students, mostly used locally with on-campus students [15]. Besides their feasibility and potential to improve clinical skills, SPOCs also permit flexible learning, online collaboration and social interaction, and might therefore be a helpful addition to the clinical learning environment and its challenges [8,11,12,16–19].

Although the effectiveness of online learning has been extensively investigated, teachers often experience difficulties in student motivation in online courses [10,20]. Motivation can be either extrinsic or intrinsic, while intrinsic motivation is preferred as it refers to doing something because it is inherently interesting or enjoyable [21,22]. Research has shown that intrinsic reasons for behavior can improve learning, achievement and well-being of the learner

CONTACT Esther C. Hamoen  E.C.hamoen@lumc.nl  Department of Internal Medicine, Leiden University Medical Center, Post Office Box 9600, 2300 RC Leiden, The Netherlands

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/10872981.2024.2445915>

© 2025 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

[21,23–25]. Extrinsic motivation According to Self-Determination Theory, three basic psychological needs can stimulate intrinsic motivation: the need for autonomy, competence and relatedness [21,26].

With the intention to increase student motivation in our SPOC, its design was based on the self-determination theory [8]. In summary, relatedness is stimulated in the SPOC with integration of peer-feedback sessions, peer-graded assignments with rubrics, group assignments and discussion forums within the SPOC. Besides mandatory contents, the SPOC has optional assignments and resources that aim to enhance students' autonomy and just-in-time learning. Peer-feedback, self-assessment and tracking and ranking of course activity are integrated to train and assess the students' competencies. The SPOC includes virtual patients and virtual reality ward rounds simulation to enhance learning in an authentic clinical context. Thus, the SPOC holds online learning activities that not only focus on extensive clinical training but also aim to make learners feel autonomous and more competent, and increase feelings of social cohesion.

Up to now, it remains unclear how these learning activities affect intrinsic motivation, in which context that may be and which factors underlie this process. The aim of the current study was to investigate if the distinct learning activities within the SPOC influence clerks' intrinsic motivation, and in which context.

Materials and methods

Context

Our SPOC was offered as a blended learning course, combining on-campus education with extensive, online content. Clerks participation in the SPOC was mandatory during the full twelve weeks of their clerkships at the internal medicine departments. The learning activities in the SPOC were based on SDT principles and focused on promoting autonomy, competence and relatedness amongst clerks and their clinical teachers through flexible and substantially optional lessons, authentic assignments and collaborative learning activities. Each learning activity was constructively aligned with its own learning outcomes and assessment. The weekly learning activities included authentic virtual patient cases, online (group) assignments, videos, discussion fora with peer-feedback, quizzes, and innovative ways of education, like virtual reality and augmented reality. Whereas the clerks were geographically distributed, they all participated in the SPOC program parallel to their peers. Every month, they had to complete four learning activities, of which some were mandatory (for example the group assignments) for creating an optimal setting for collaboration, while optional lessons aimed to individualize the SPOC to the distinct clerks' needs. The SPOC

included an online peer-feedback instruction video that was mandatory to all clerks. A clinical teacher logged into the online environment to show teacher presence in the course and randomly evaluate peer-feedback contents.

Study population

The study focused on first year Master students in Medicine who had just started their clinical clerkship Internal Medicine. Every month, 20–25 clerks start their clerkship at LUMC or other teaching hospitals in the area. Clerks work in different departments over a period of twelve weeks. Data collection took place over this period.

Design

This article represents a mixed-methods study to examine the effect of the SPOC's learning activities on intrinsic motivation, by means of a questionnaire with quantitative analysis, and semi-structured small-group interviews with an in-depth qualitative analysis.

For the quantitative analysis, the validated Intrinsic Motivation Inventory (IMI) by Deci and Ryan [27] has been adapted to measure the students motivation in the online learning environment. It had five subscales: 1. interest/enjoyment (which is considered the self-report measure of intrinsic motivation) 2. perceived choice, 3. perceived competence (which are the same as the SDT principles), 4. perceived value/usefulness (which helps people to internalize and become self-regulating with respect to activities, e.g. [28]), and 5. Relatedness [21,26,28]. This questionnaire is presented in Appendix I.

In addition, an interview protocol in Dutch was developed to answer the research question. The questions in this protocol focused on which learning activities motivate clerks for clinical workplace learning in the SPOC (see Appendix II for English translation of the interview protocol). Data were derived from semi-structured small group interviews, which were conducted by a trained interviewer (FvB). The study protocol has been reviewed and approved by the Educational Research Review Board of the Leiden University Medical Center in the meeting on 12 March 2019 (file number: OEC/ERRB/20190312). Participation was voluntary and based on informed consent (see Appendix III for informed consent form). We analyzed the interview data by means of thematic analysis [29]. We did not define a priori themes.

Data collection

Student enrolment started in September 2019 and ended by December 2020. Enrollment was interrupted January 2020–August 2020 due to the Covid pandemic which resulted in significant adaptations to the clerkship during that period. All

clerks entering the clinical clerkship Internal Medicine were eligible for enrollment.

The students received an online questionnaire during their clerkship (which they could fill out in the 11th week at the latest) or received a hardcopy in week 11, after which the interviews were planned. They rated each question/statement from 1 to 7 on a 7-point Likert scale, where 1 indicated the total disagreement and 7 full agreement with the particular statement. The statements were transformed into five measure scales: interest/enjoyment (Q1–6), perceived competence (Q7–12), perceived choice (Q13–18), value/usefulness (Q19–23), and relatedness (Q24–30).

FvB conducted the small group interviews in week 12 of the clerkship (the first author is directly involved in student-assessment). The authors used maximum variation sampling, which is a form of purposeful sampling, aiming to include the greatest variety of opinions [30]. Therefore, the students with the highest and lowest scores on the IMI were invited to be interviewed. The interviews were audio-recorded and transcribed verbatim.

Data analysis

Quantitative data from the IMI questionnaire were exported, reversed where applicable (see items in italics in Appendix I) and analyzed using SPSS (version 25) for descriptive and reliability analysis. Data were checked for normality, and Cronbach's alpha was calculated for all subgroups.

We performed an inductive thematic analysis on the qualitative data from the interviews [29]. Data were exported into a coding template by using qualitative data analysis software (ATLAS.ti Scientific Software Development GmbH, Germany, version 22.0.11.0). EH and FvB subsequently read through the data and independently carried out a first coding and subcoding cycle (in vivo) followed by second cycle coding into themes [31]. They individually developed an initial version of the code book based on a subset of interview data, which they discussed with each other until consensus was reached on the initial codes. The code book was then modified iteratively with the remainder of the data subsequently. Emerging subthemes in the code groups were organized in six main themes that were related to the students' experiences of the SPOC (e.g., collaboration and utility) and SPOC system-related factors. Thereafter a final coding code book was defined.

Results

Intrinsic motivation inventory

Seventy eight out of 184 eligible clerks filled out the IMI questionnaire (response rate 42%), and 76 finished all

sub-questions. All categories' scores showed a normal distribution. The questionnaire yielded good internal consistency with a Cronbach's alpha of >0.8 for the items except for perceived relatedness, which did not improve on recalculation with items deleted. Table 1 reports an overview of the mean scores, the standard deviation, Cronbach's alpha and number of respondents. The average score was 3.87 (range 3.53–4.20) on a 7-point Likert scale. The scores for perceived competence and value/usefulness scored best for the course (4.02 and 4.20 respectively). The lower scores were found in the perceived interest/enjoyment, perceived choice and perceived relatedness items.

Group interviews

Four group interviews were conducted, involving 14 clerks in total, after which no new themes were identified from the data. Data analysis of the interview transcripts revealed six distinct themes; A. Collaboration with peers, B. Perceived usefulness, C. SPOC-related factors, D. Workload, E. Motivation and F. Performance. Figure 1 represents the themes and sub-themes. We believe themes A, B, E and F are directly related to the IMI questionnaire and intrinsic motivation and will be highlighted in the following section more extensively.

Theme A: collaboration with peers

Although collaborative learning by group assignments and online peer-feedback were important subjects during the development of the SPOC, the peer-feedback and group-assignments did not work well for the students. Peer-feedback was often short and low quality, and the students did not prefer to be dependent on their peers for feedback instead of direct, automatically provided feedback. They did not feel (the need for) relatedness in the SPOC's assignments.

Well, I had the feeling we were doing [the assignment] in a group, however in my opinion it did not really add anything.

In my case, I knew it was [a group assignment], however in the end, I was the only one to admit the patient, so I wrote the patient case and added another student's name on it.

In the third month, we had to make a treatment plan for diabetes, and then all peers just answered "yes, I agree".

Table 1. Outcomes of the IMI questionnaire.

	MEAN (SD)	α	n
Interest/Enjoyment	3,76 (1,06)	0,912	78
Perceived Competence	4,02 (0,79)	0,817	76
Perceived Choice	3,53 (1,08)	0,838	76
Perceived Value/Usefulness	4,20 (1,26)	0,938	76
Perceived Relatedness	3,85 (0,80)	0,661	76

Likert Scale response (1 = not at all true, 4 = somewhat true, 7 = very true). SD = standard deviation. α = Cronbach's alpha.

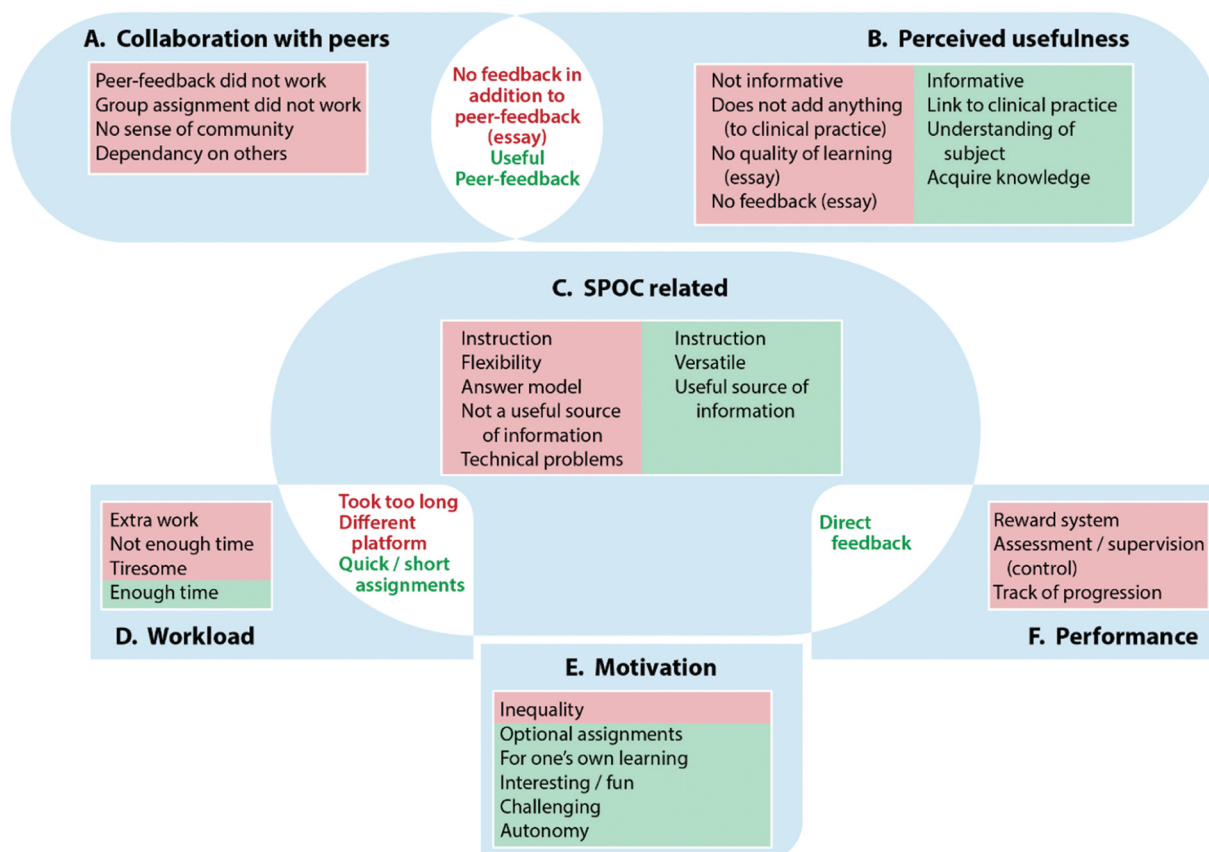


Figure 1. Themes and sub-themes of the qualitative analysis of the interview study. Red indicates negative perceptions, whereas positive perceptions are exposed in green. Overlapping sub-themes are illustrated in the white wedges.

Theme B. Perceived usefulness

The students appreciated learning activities that they found informative, meaning it had learning value to them, and particularly when it had additional value to clinical practice and they felt they acquired relevant knowledge from it. From the interview we learn that the online patient cases, videos and the group assignment to prepare and solve a clinical problem were valued most (although the format of making the case together was often problematic). The students thought the essays were less useful, due to lack of feedback and no quality of learning from it in their opinion. The 3D virtual ward tour was perceived to be fun, but not so informative.

Yeah, I think most valuable is when you first practice with a [virtual] patient case, and you think, ah, I might see this in the Emergency Room when I am a future physician, and that you will make you, let's say, delve into a case, so that added value is mostly motivating for me. [...]

Yes, you know, it adds something, if you have seen a patient and report the case to another student as a [clinical] problem, it is a different way to look at a patient case. So I like the assignment, however the way it was implemented is not convenient.

Theme C and D: workload and SPOC related

Workload and lack of time to finish the assignments were mentioned by the students. As a result, they had to make the assignments at home. However, the SPOC was valued as an attractive substitute for clinical work in case the students had spare time on the wards. Time constraints were a major theme in the interviews. As a result, amongst other reasons, the students appreciated shorter and fast-forward through assignments (virtual patient cases, quizzes) with direct feedback over longer assignments like essays.

Theme E: motivation

This theme includes motivation aspects that directly influence one's own learning process. Assignments that were marked as interesting or challenging were finalized because the students wanted to, and this particularly was the case for the optional learning activities. They indicated that feelings of autonomy, finding challenge and interest in the assignments are important contributors that stimulate working in the SPOC and doing optional assignments. Inequality was felt by the first group enrolled in the SPOC (their senior peers did not have to make it yet) and this resulted in a negative motivational state for participating in the SPOC.

Ehm, there was a whole list of [the optional lessons], so anyone could find something that would be interesting to them, and it was optional so I liked it more, so you could just do the parts that you liked, any time, without [deadlines], so ehm yeah, in the end I did more of that compared to the [mandatory] SPOC assignment.

[...] I think now we are Master students, you just do it for yourself, so at this point, for me it is complementary, so I take it seriously and consider it as a learning experience, and for me that is really motivating.

Theme F: performance

Direct feedback, for example found in short quizzes, was appreciated. However, it appeared that the current system of tracking the interns' progression and performance in the SPOC was not sufficient. They had a need for more assessment of their competency, either automatically or from the clinical teacher. The students indicated that for some activities, they could get some rewards (badges and points) by just clicking the buttons, which was not a motivation to put much effort in it.

'[...] there is no added value to commit more time and effort [in answering the question], you can just type, let's say "smurf", to put it bluntly.'

Ehm, yeah I don't know, it might be just a bit 'childish' between brackets to get those badges and points, and I did not really understand when you get more or less points, it might be clearer when you just see the checkboxes ticked for lessons you already made [...] it was unclear to me to see what you had finished, because sometimes you already got this badge or points, while only clicking the activity to see what you have to do.

Discussion

This study explores the impact of the SPOC's assignments on students' intrinsic motivation. It shows that their perception of value/usefulness was fair, and this seemed to depend on whether or not the knowledge obtained from the course is complementary to their experiences in clinical practice. We argue that the assignments with the highest perception of utility (virtual patient cases, videos and preparing and solving a clinical problem in a group) are situated in a more authentic clinical context, than the assignments considered less useful (writing an essay for example). This perception may be explained by the fact that knowledge transfer across the online environment to the clinical workplace, may be enhanced by these authentic and contextual learning characteristics [32,33]. Although online learning is not equivalent to real patients and cannot replace clinical workplace learning, other studies demonstrate that virtual patients for example, in

the right situation, can effectively improve knowledge and skills, such as clinical reasoning [34–37]. Perception of the utility of a task directly stimulates motivation [38]. The expectancy-value theory argues that achievement motivation can be explained by the learners' beliefs about how well they will do on the activity and the extent to which they value the activity [39].

The item competence also scored fair in the questionnaire. From the interviews we learn that providing more insight in one's performance may improve the feeling of competence. Direct feedback, such as obtained in the quizzes with grades, seems to obviously meet the student needs more than peer-feedback. The first question is if the SPOC invites the students sufficiently to desire for task mastery, competence and setting their own objectives instead of getting grades. Besides, the current curriculum's focus on grades and achievement could be culprit to priming the students towards this attitude. Both factors could affect the quality of learner motivation [40,41].

Peer-feedback, and collaboration with peers in general, was suboptimal and this is also reflected the lower score in the IMI item relatedness. The interview shows that the lack of feeling related in the SPOC may be caused by the fact that the peer feedback and feelings of coherence in the online learning environment were not ideal. Optimisation of peer feedback in online environments is a more general challenge, also found in other studies. Peer feedback is considered inadequate when students lack knowledge or are not critical, and they may prefer teacher feedback [42–45]. They may also perceive peer feedback as a mandatory task merely, while not understanding its importance in their own learning process and that of their peers. It might seem an attractive option to remove all peer-feedback sessions in the SPOC. However, in the right situation, online interaction, discussion and feedback may be associated with better learning outcomes [46,47]. The question is how this can be optimally organized in the SPOC. Other studies describe that student's guidance in giving peer feedback, their awareness of the requirements of assessment feedback, and training and clarification of the role the student takes in the feedback process are key principles of effective feedback [48,49]. Although the provision and reception of peer feedback was a prespecified learning objective in our SPOC, and students receive an online training, it may be valuable to guide the students better in their task, and give a clearer explanation of its purpose [50].

The group assignments to prepare and solve a patient case consistently received good ratings, despite organizational issues. Students could generate and solve their own patient case in this assignment, which was challenging and interesting to them.

Research shows that students value assignments that involve generating their own questions in an online course. Such an assignment can also stimulate active participation and relatedness between students [20,51]. Therefore, generating assignments for other students might be a motivating task for students, and this might explain the positive appreciation of this specific learning activity in the SPOC.

Our study shows that students were especially motivated to be involved in the SPOC's by activities that were challenging, interesting and optional (i.e., not mandatory). The latter increased their feelings of autonomy. From literature we learn that feeling autonomy, challenge and interest in learning assignments are directly related to motivation [41,52–54]. However, the questionnaire results demonstrate that perceptions of interest/enjoyment and perceived choice were low in the SPOC. This finding may call for a shift towards assignments that students enjoy (short assignments/quizzes, virtual patient cases, video's and solving patient cases, instead of essays) and more course flexibility.

The finding imply that perceived usefulness, competence and autonomy could be improved by adjusting the flexibility of deadlines and improve just-in-time learning. So should we strive for solely optional assignments, without any deadlines? The problem is that totally self-paced courses have the fewest assessment options and typically require automated grading with less or no options for peer-feedback, which is not desired as described in one of the paragraphs above [55]. Moreover, exclusively optional assignments may lead to loss of the blended curriculum, from which we know it can have a positive impact on mastery of core material [56].

To our knowledge, this is the first study evaluating student motivation in a medical SPOC, and the first study using the IMI for addressing intrinsic motivation in the context of an online course.

Limitations

Due to COVID regulations, there might have been a difference or change in student 'characteristics' during the study inclusion. There has been a considerable variety within the groups pre-, during, and post-COVID, because the students have been exposed to COVID restrictions to a greater or lesser extent. It was not possible to make and compare equivalent groups to compare the study data, so this may have had unknown effects on our outcomes. Furthermore, feelings of inequality existed among the students in the first group that was interviewed, since they were the first group to be enrolled in the SPOC, while their peers were not required to participate. These feelings might have influenced their motivational state and thus their motivational intensity

[41]. We did not find any relevant deviations in the quantitative IMI data, however we noticed more negative perceptions in the first group interview.

At last, the authors cannot exclude a non-responder bias, possibly influencing the study data due to questionnaire completion by students with the highest levels of motivation. However, small group interviews included students with high as well as low levels of motivation, showing that both groups were represented in the IMI.

Conclusion

Our study may give tools for other teachers to develop online assignments with positive outcomes with regard to student motivation. It implies that motivation can be optimized by creating useful, authentic cases that aid students obtaining clinical skills that can be directly transferred into clinical practice. The study confirms that students can be motivated by feelings of autonomy, challenging assignments that they find interesting, and student-generated assignments. It also showed the need for tracking the students' online performance being required for their feelings of competence. Although carefully designed for giving and perceiving peer feedback, our SPOC did not overcome the known challenges of online collaboration.

Acknowledgments

The author's thank Franka Luk, Mandy Segers and Manon Zuurmond for their support in this study.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

References

- [1] Miettinen OS. The modern scientific physician: 3. Scientific diagnosis. *Can Med Assoc J.* 2001;165(6):781–782.
- [2] Daelmans HEM, Hoogenboom RJ, Donker AJM, et al. Effectiveness of clinical rotations as a learning environment for achieving competences. *Med Teach.* 2004;26(4):305–312.
- [3] Dyrbye LN, Thomas MR, Shanafelt TD. Medical student distress: causes, consequences, and proposed solutions. *Mayo Clin Proc.* 2005;80(12):1613–1622.
- [4] Reilly BM. Inconvenient truths about effective clinical teaching. *Lancet.* 2007;370(9588):705–711.

- [5] Dorsey JK, Beason AM, Verhulst SJ. Relationships matter: enhancing trainee development with a (simple) clerkship curriculum Reform. *Teach Learn Med.* **2019**;31(1):76–86.
- [6] Hirsh DA, Ogur B, Thibault GE, et al. “Continuity” as an organizing principle for clinical education reform. *N Engl J Med.* **2007**;356(8):858–866.
- [7] Irby DM. Educational continuity in clinical clerkships. *N Engl J Med.* **2007**;356(8):856–857.
- [8] Hamoen EC, De Jong PGM, Van Blankenstein FM, et al. Design and first impressions of a small Private online course in clinical workplace learning: questionnaire and interview study. *JMIR Med Educ.* **2022**;8(2):e29624.
- [9] Boelens R, De Wever B, Voet M. Four key challenges to the design of blended learning: a systematic literature review. *Educ Res Rev.* **2017**;22:1–18.
- [10] Means B, Toyama Y, Murphy R, et al. The effectiveness of online and blended learning: a meta-analysis of the empirical literature. *Teachers Coll Rec.* **2013**;115(3):1–47.
- [11] Ruiz-Palmero J, Fernandez-Lacorte JM, Sanchez-Rivas E, et al. The implementation of small Private online courses (SPOC) as a new approach to education. *Int J Educ Technol In Higher Educ.* **2020**;17(1):1–12.
- [12] Ruiz JG, Mintzer MJ, Leipzig RM. The impact of E-learning in medical education. *Acad Med.* **2006**;81(3):207–212.
- [13] Spanjers IAE, Konings KD, Leppink J, et al. The promised land of blended learning: quizzes as a moderator. *Educ Res Rev.* **2015**;15:59–74.
- [14] Szulewski A, Davidson LK. Enriching the clerkship curriculum with blended e-learning. *Med Educ.* **2008**;42(11):1114.
- [15] Kaplan AM, Haenlein M. Higher education and the digital revolution: about MOOCs, SPOCs, social media, and the cookie monster. *Bus Horiz.* **2016**;59(4):441–450.
- [16] Erbe D, Eichert HC, Riper H, et al. Blending face-to-face and internet-based interventions for the treatment of mental disorders in adults: systematic review. *J Med Internet Res.* **2017**;19(9):e306.
- [17] Pickering JD, Henningsohn L, DeRuiter MC, et al. Twelve tips for developing and delivering a massive open online course in medical education. *Med Teach.* **2017**;39(7):691–696.
- [18] Uijl SG, Filius RM, Ten Cate TJ. Student interaction in small Private online courses. *Med Sci Educator.* **2017**;27:237–242.
- [19] Vaysse C, Fize AL, Despas F, et al. Small Private online course in teaching oncology-feedback after 1 year: what lessons? *J Cancer Educ.* **2021**;36(1):65–71.
- [20] Keller J, K S. Learner motivation and e-learning design: a multinationally validated process. *J Educ Media.* **2004**;29(3):229–239. doi: [10.1080/1358165042000283084](https://doi.org/10.1080/1358165042000283084)
- [21] Ryan RM, Deci EL. Intrinsic and extrinsic motivations: classic definitions and new directions. *Contemp Educ Psychol.* **2000**;25(1):54–67.
- [22] Vansteenkiste M, Sierens E, Soenens B, et al. Motivational profiles from a self-determination perspective: the quality of motivation matters. *J Educ Psychol.* **2009**;101(3):671–688.
- [23] Orsini C, Binnie VI, Wilson SL. Determinants and outcomes of motivation in health professions education: a systematic review based on self-determination theory. *J Educ Eval Health Prof.* **2016**;13:19.
- [24] Orsini C, Evans P, Jerez O. How to encourage intrinsic motivation in the clinical teaching environment?: a systematic review from the self-determination theory. *J Educ Eval Health Prof.* **2015**;12:8.
- [25] Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychologist.* **2000**;55(1):68–78.
- [26] Deci EL, Egharri H, Patrick BC, et al. Facilitating internalization - the self-determination theory perspective. *J Pers.* **1994**;62(1):119–142.
- [27] Ryan RM, Mims V, Koestner R. Relation of reward contingency and interpersonal context to intrinsic motivation - a review and test using cognitive evaluation theory. *J Pers Soc Psychol.* **1983**;45(4):736–750.
- [28] McAuley E, Duncan T, Tammen VV. Psychometric properties of the intrinsic motivation inventory in a competitive sport setting: a confirmatory factor analysis. *Res Q Exerc Sport.* **1989**;60(1):48–58.
- [29] Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Res In Psychol.* **2006**;3:77–101.
- [30] Thompson I. Qualitative evaluation and research methods, 2nd Edition - Patton, Mq.” *J Technical Writ Commun.* **1992**;22(1):115–116.
- [31] Miles MB, Huberman AM, Saldana J. Qualitative data analysis: a methods sourcebook. London: Sage; **2014**.
- [32] Billet S. Situated learning: bridging sociocultural and cognitive theorising. *Learn Instruct.* **1996**;6(3):265–280.
- [33] Dolmans D, De Grave W, Wolhagen IH, et al. Problem-based learning: future challenges for educational practice and research. *Med Educ.* **2005**;39(7):732–741.
- [34] Combs CD, Combs PF. Emerging roles of virtual patients in the age of AI. *AMA J Ethics.* **2019**;21(2):E153–159.
- [35] Foster A, Chaudhary N, Murphy J, et al. The use of simulation to teach suicide risk assessment to health profession trainees-rationale, methodology, and a proof of concept demonstration with a virtual patient. *Acad Psychiatry.* **2015**;39(6):620–629.
- [36] Kononowicz AA, Woodham LA, Edelbring S, et al. Virtual patient simulations in health professions education: systematic review and meta-analysis by the digital health education collaboration. *J Med Internet Res.* **2019**;21(7).
- [37] Pantziaras I, Fors U, Ekblad S. Training with virtual patients in transcultural psychiatry: do the learners actually learn? *J Med Internet Res.* **2015**;17(2):e46.
- [38] Vansteenkiste M, Soenens B, Verstuyf J, et al. ‘What is the usefulness of your schoolwork?’ The differential effects of intrinsic and extrinsic goal framing on optimal learning. *Theory Res In Educ.* **2009**;7(2):155–163.
- [39] Wigfield A, Eccles JS. Expectancy-value theory of achievement motivation. *Contemp Educ Psychol.* **2000**;25(1):68–81.
- [40] Lau KH. Computer-based teaching module design: principles derived from learning theories. *Med Educ.* **2014**;48(3):247–254.
- [41] Lyons KM, Cain JJ, Haines ST, et al. The clinical educator’s guide to fostering learner motivation: AMEE Guide No. 137. *Med Teach.* **2021**;43(5):492–500.

- [42] Bryant D, Carless D. Peer assessment in a test-dominated setting: empowering, boring or facilitating examination preparation? *Educ Res For Policy And Pract.* 2010;9(1):3–15. doi: [10.1007/s10671-009-9077-2](https://doi.org/10.1007/s10671-009-9077-2)
- [43] Heeneman S, Oudkerk Pool A, Schuwirth LW, et al. The impact of programmatic assessment on student learning: theory versus practice. *Med Educ.* 2015;49(5):487–498.
- [44] Schut S, van Tartwijk J, Driessen E, et al. Understanding the influence of teacher-learner relationships on learners' assessment perception. *Adv Health Sci Educ Theory Pract.* 2020;25(2):441–456.
- [45] Strijbos JW, Sluijsmans D. Unravelling peer assessment: methodological, functional, and conceptual developments. *Learn Instruction.* 2010;20(4):265–269.
- [46] Anderson T, Rourke L. Using peer teams to lead online discussions. *J Interact Media In Educ.* 2002;1:1–21.
- [47] Cook DA, Levinson AJ, Garside S, et al. Instructional design variations in internet-based learning for health professions education: a systematic review and meta-analysis. *Acad Med.* 2010;85(5):909–922.
- [48] Evans C. Making sense of assessment feedback in higher education. *Rev Educ Res.* 2013;83(1):70–120.
- [49] Simonsmeier BA, Peiffer H, Flaig M, et al. Peer feedback improves students' academic self-concept in higher education. *Res In Higher Educ.* 2020;61(6):706–724.
- [50] Lerchenfeldt S, Mi M, Eng M. The utilization of peer feedback during collaborative learning in undergraduate medical education: a systematic review. *BMC Med Educ.* 2019;19(1).
- [51] Poot R, de Kleijn RA, van Rijen HV, et al. Students generate items for an online formative assessment: Is it motivating? *Med Teach.* 2017;39(3):315–320.
- [52] Csikszentmihalyi M. Play and intrinsic rewards. *J Humanistic Psychol.* 1975;15(3):41–63.
- [53] Deci E. *Intrinsic motivation.* (NY): Plenum; 1975.
- [54] Reeve J. The interest-enjoyment distinction in intrinsic motivation. *Motivation And Emotion.* 1989;13(2):83–103.
- [55] Chen BY, Kern DE, Kearns RM, et al. From modules to MOOCs: application of the six-step approach to online curriculum development for medical education. *Acad Med.* 2019;94(5):678–685.
- [56] Evans KH, Thompson AC, O'Brien C, et al. An innovative blended preclinical curriculum in clinical epidemiology and biostatistics: impact on Student satisfaction and performance. *Acad Med.* 2016;91(5):696–700.