



Coaching to improve self-directed learning

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Learners often fail to make LGs consistent with their learning needs and few are implemented when they are created

SUMMARY

Background: The continuously changing health care context necessitates that medical trainees develop self-directed learning skills. This study examined the effect of coaching on the self-directed learning process in pre-clerkship medical students.

Methods: We conducted a longitudinal educational intervention using standardised patient assessments to determine the effect of self-assessment, feedback, and coaching on the development and implementation of learning goals (LGs). Students

were sorted into control and intervention groups. Following each assessment, students received feedback on performance and created LGs. Students in the intervention group worked with a faculty member coach on their LGs. Students in the control group developed their LGs without a coach. Prior to the final assessment, students reported whether they had implemented their LGs.

Results: Of 171 students enrolled, 167 completed all four assessments and were included. All 167 developed an LG after each assessment. Overall, 79.0% of

students reported implementing an LG. Of students receiving coaching, 91.8% implemented an LG, whereas only 65.9% of students in the control group implemented an LG (odds ratio, OR 5.7; 95% confidence interval, CI 2.4–14.2). Students who received coaching were more likely to incorporate performance feedback into their LGs (90.2 versus 38.1%; $p < 0.05$). **Conclusions:** For students, faculty member coaching facilitated better LG development and more frequent implementation compared with students who did not receive coaching.

INTRODUCTION

Given the changing field of medicine, numerous studies and accreditation bodies have asserted the importance of developing medical students and physicians in training into self-directed learners who drive their continuous learning process.¹⁻³ Despite this imperative, trainees often demonstrate poor self-directed learning (SDL) skills and there are insufficient faculty members and programmatic support to foster SDL skill development.^{4,5} Central to the SDL process is the development and implementation of appropriate learning goals (LGs). Individual-level barriers to this process include difficulties with personal reflection and goal generation, and uncertainty about implementing behavioural change.⁴ Learners often fail to make LGs consistent with their learning needs and few are implemented when they are created.^{5,6} Programmatic factors, including limited curricular time, faculty members being inexperienced in reflection and goal setting, and limited external accountability also contribute to poor LG development and implementation.⁴

Coaching has been proposed as a potential solution to this complex challenge,² whereby the coach provides individualised timely feedback, after observing clinical performance, and partners with the learner to develop an action plan and to provide accountability to the learner.⁷ The increased emphasis on self-reflection, goal setting and accountability distinguishes coaching from traditional clinical teaching.⁷ Although there is growing evidence to support the use of coaching to facilitate an improvement in surgical skills, the use of coaching to develop SDL skills in pre-clerkship medical students has not yet been explored.⁷

In this study, we examined the effect of coaches on LG implementation. The primary aim

was to determine whether developing LGs with a faculty member coach increased the implementation of LGs; secondary aims were to determine whether learners developing LGs with a coach incorporated performance feedback into their LGs more frequently and had larger gains in performance over time.

METHODS

We performed a longitudinal educational intervention using a series of four standardised patient (SP) assessments as the basis for self-assessment, feedback and the development of LGs. Pre-clerkship medical students in 2017 at the University of Michigan Medical School were included in this study. The context was a year-long practice of medicine course. Students were sorted into control and intervention groups based on their assigned class day. Course faculty members worked with their regularly assigned students during this intervention; faculty members had either intervention or control students. The University of Michigan Institutional Review Board determined this study to be exempt from review.

Figure 1 outlines the student experience. All students received didactic instruction on the Master Adaptive Learner (MAL) framework as the model for self-directed adaptive learning to strive for as they developed lifelong learning habits. This is an iterative process with four phases: planning; learning; assessing; and adjusting.² Students and faculty members also received instruction on SMART (specific, measurable, attainable, relevant and timely) LGs, practised creating SMART LGs and received feedback regarding adherence to the SMART LG framework.⁸

Students subsequently participated in four formative SP assessments. The presenting symptoms for the cases were: chest pain, abdominal pain, leg weakness and dysuria. Each

assessment consisted of an interview, physical examination and oral presentation.

Following each encounter, students completed a self-assessment and then received the 'usual' feedback: written SP feedback and verbal individualised feedback from a faculty member. Using checklists, SPs assessed communication skills and faculty members assessed history taking, physical examinations and oral presentation skills. Students worked with the same faculty member for all four encounters. All faculty members were trained in the R2C2 feedback model: build the Relationship; explore Reactions; explore Content; and Coach for performance change.⁹ Following this, students created a SMART LG and action plan. Students recorded LGs, the action plan and LG source(s) (self-assessment, faculty member feedback, SP feedback or a combination of self-assessment and feedback) into an online learning system. After each subsequent SP, they reviewed their previous LG and revised it as needed.

For students in the intervention group, in addition to receiving the feedback described above, each student also received coaching on their LGs and action plan from the faculty member who had observed them. Faculty members paired with intervention students who received brief training regarding coaching and coaching skills (e.g. using questioning). Faculty members were instructed to provide feedback on LG concordance with performance (did the LGs address an area of weakness?), adherence to the SMART criteria and appropriateness of the action plan. Students could then revise their LGs and action plan, and, if revised, would receive additional input from the faculty member. Intervention students and faculty members repeated this process after each assessment.

Prior to the final SP encounter, all students completed a survey

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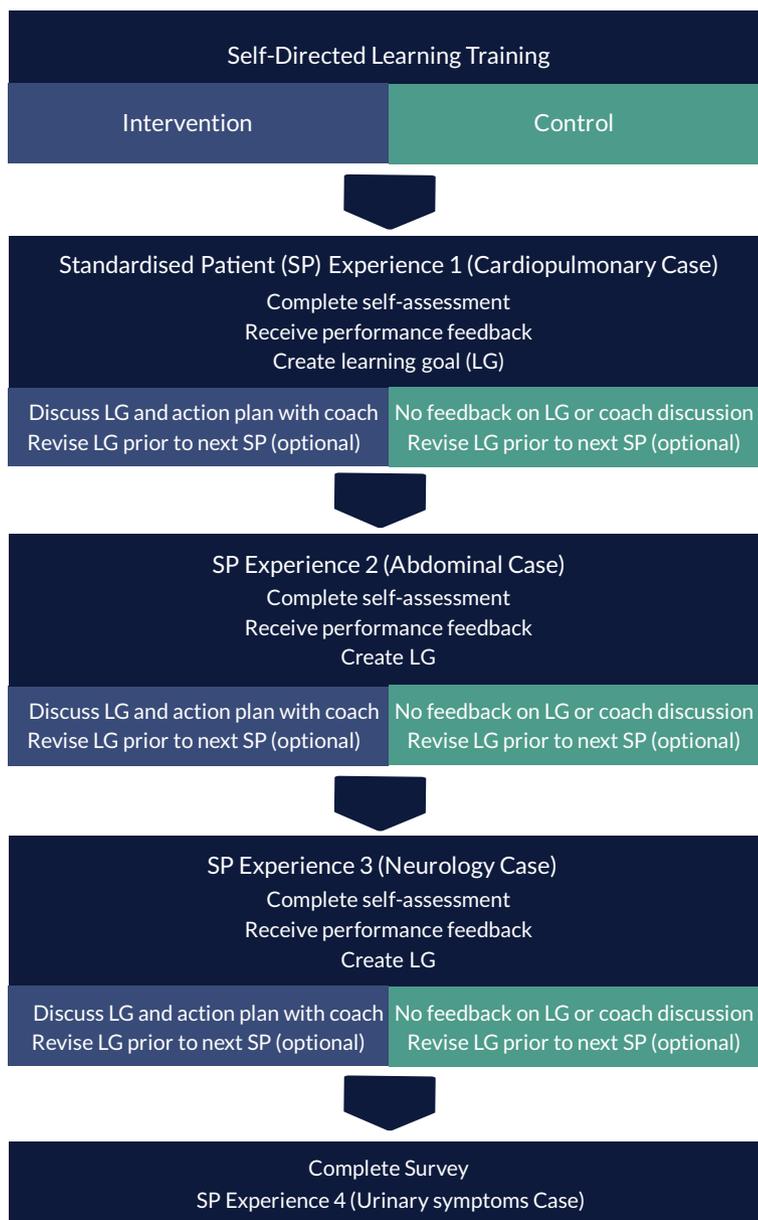


Figure 1. Student experience by group.

where they recalled their most recent LG and described any actions taken to achieve this LG for the primary outcome of LG implementation.

For the secondary outcome of the incorporation of performance feedback into LGs, we used the data entered into the online learning management system for the LG source (derived from self-assessment, faculty member feedback, SP feedback, or a combination of self-assessment and feedback). From these data, LGs were categorised as incorporating feedback (faculty feedback, SP feedback or a combination self-assessment and feedback) or

not incorporating feedback (exclusively from self-assessment). For the secondary outcome of change in performance over time, scores in each of the domains (history, physical, communication skills and oral presentation) from the first and final assessments were used.

Analysis included descriptive statistics and logistic regression analysis. All analyses were performed with SPSS Statistics for Windows, Version 22.0. (IBM Corp., Armonk, NY, USA).

RESULTS

Of the 171 students in the course four students were excluded for incomplete data, leaving 167 students (82 students in the control group; 85 students in the intervention group). Baseline characteristics were similar between the groups (Table 1).

Learning goal implementation

Overall, 79.0% (132/167) of students reported implementing their LGs. Of the students in the intervention group, 91.8% (78/85) implemented an LG, compared with 65.9% (54/82) of students in the control group (odds ratio, OR 5.7; 95% confidence interval, CI 2.4–14.2) (Table 2). Female students were more likely to implement LGs than male students (OR 2.8, 95% CI 2.2–14.4). The LG implementation was not related to performance on the history taking, physical examination or oral presentation components. Performance on communication skills was negatively associated with LG implementation (OR 0.86, 95% CI 0.75–0.98). Students with a coach implemented more LGs after controlling for gender and performance. (OR 5.6, 95% CI 2.2–14.4).

Incorporation of performance feedback into learning goals

Students who developed LGs with a coach were more likely to incorporate performance feedback into their LGs than the control group: 90.2% (74/82) versus 38.1% (32/84); $p < 0.05$ (Figure 2).

Table 1. Baseline demographics

	Intervention (coach feedback)	Control
Gender (% identifying as female)	56.6%	48.2%
Age (years, mean)	24.2	23.9
% with prior coaching experience	2.4%	2.2%

Table 2. Effect of a faculty member coach

Variable	Group		χ^2 / t	p
	Control	Intervention		
Taken any actions to implement clinical skills learning goal? (% yes)	65.9	91.8	16.9**	<0.001
Incorporation of clinical performance feedback into learning goal (% yes)	38.1	90.2	48.9**	<0.001
Change in communication skills score (means)	-0.9	0.6	-1.06	0.29
Change in history-taking score (means)	-4.8	-3.5	-0.06	0.54
Change in physical examination score (means)	-0.7	0.9	-1.23	0.22
Change in oral presentation score (means)	1.3	8.6	-2.34*	0.02

Percentages are limited to participants who indicated that they incorporated feedback into their learning goals.

*p < 0.05; **p < 0.001.

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Performance improvement

Students developing LGs with a coach had larger gains in oral presentation performance than students who did not receive coaching (p < 0.05). There were no significant differences in performance changes in communication skills, history taking and physical examination in this group.

DISCUSSION

In this study, the majority of students implemented LGs after receiving performance feedback using the R2C2 model. The addition of coaching around LG development amplified the effects of feedback, with more learners implementing LGs. Furthermore, students who developed LGs with a coach were

much more likely to incorporate feedback into their learning goals. To our knowledge, this is the first study to evaluate the impact of coaching on SDL development in pre-clerkship medical students.

Prior studies have highlighted the complexities of LG development and implementation and have demonstrated that

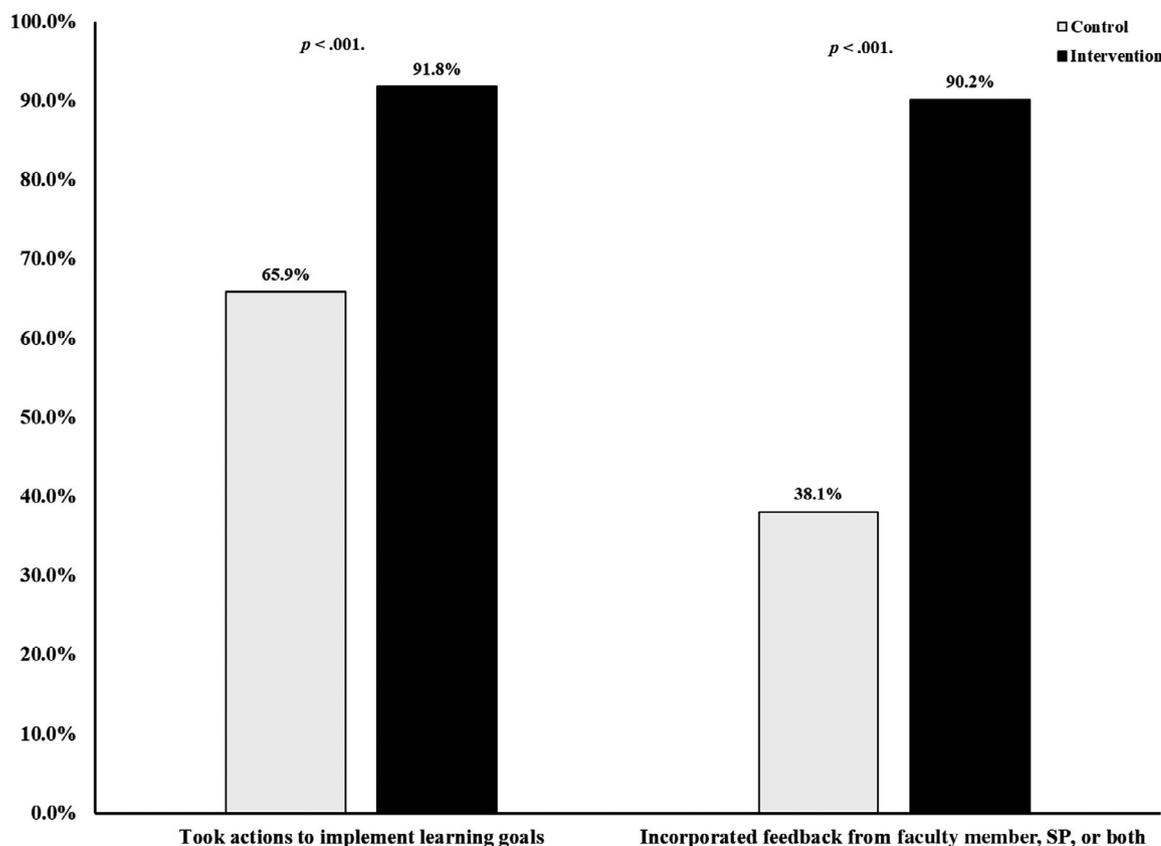


Figure 2. Incorporation of performance feedback into learning goal. SP, standardised patient.

We performed a longitudinal educational intervention using a series of four standardised patient (SP) assessments as the basis for self-assessment, feedback and development of LGs

implementation cannot be predicted by any one factor.^{4,6,10} Beneficial strategies included programmatic support and the development of relevant LGs that are prioritised by the learner, and are specific, measurable and realistic.⁴ Given this prior work, we implemented those elements for all students. The students who worked with a coach on LG development had even higher rates of LG implementation. The reasons for this positive effect are likely to be multifactorial. First, coaches can guide learners to reflect on the available feedback and performance metrics to calibrate with their self-assessment. Coaches can also assist in establishing appropriate developmental goals using the SMART goal framework, making the LGs more actionable. Second, coaches can help the learner to navigate some of the previously identified barriers, such as uncertainty about how to implement behavioural change by helping the learners to create an action plan. Finally, coaches can help the students to navigate competing demands, can assist with the prioritisation of LGs and can hold the student accountable.

This study has important implications for medical education. In the ever-changing health care climate, the training of students in SDL in preparation for future learning is paramount. However, there is limited evidence on the best ways to train learners in SDL. This study demonstrates that the use of faculty member coaching for the development of LGs and action plans provides significant improvement in both the implementation of LGs and the incorporation of

feedback. The incorporation of feedback is an essential skill in the SDL process, and prior studies have demonstrated that most learners base LGs on self-assessment and do not incorporate feedback.^{6,8} Therefore, the use of a coach shows promise in increasing these behaviours.

There are several limitations of this study. Although there were significant differences in LG implementation, this study did not result in significant differences in most areas of performance between the control and intervention groups over the study interval. This may in part result from the relatively high performance of participants overall, making it difficult to detect significant performance differences. In addition, although this study demonstrated improvements in these behaviours within the context of the clinical skills, we did not examine whether these effects were sustained into clinical rotations. Finally, we did not analyse the quality of the LGs and therefore are not able to analyse the impact that the quality of LGs have on implementation.

CONCLUSIONS

For students, faculty member coaching facilitated better LG development and more frequent implementation compared with students without coaching. Pre-clerkship student coaching facilitated SDL behaviours.

REFERENCES

1. Keister DM, Hansen SE, Dostal J. Teaching resident self-assessment through triangulation of faculty and patient feedback. *Teach Learn Med* 2017;**29**(1):25–30.

2. Cutrer WB, Miller B, Pusic MV, Mejicano G, Mangrulkar RS, Gruppen LD, Hawkins RE, Skochelak SE, Moore DE Jr. Fostering the development of master adaptive learners. *Acad Med* 2017;**92**(1):70–75.
3. Accreditation Council for Graduate Medical Education. *ACGME Common Program Requirements (Residency)*. Chicago, IL: ACGME, 2019. Available at <https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/CPRResidency2019.pdf>. Accessed on 11 October 2019.
4. Lockspeiser TM, Li S-T, Burke A, et al. In pursuit of meaningful use of learning goals in residency: a qualitative study of pediatric residents. *Acad Med* 2016;**91**(6):839–846.
5. Hart J, Byrne-Davis L, Wass V, Harrison C. Medical students' action plans are not specific. *Clin Teach* 2019;**16**(3):258–262.
6. Wolff M, Stojan J, Cranford J, Whitman L, Buckler S, Gruppen L, Santen S. The impact of informed self-assessment on the development of medical students' learning goals. *Med Teach* 2018;**40**(3):296–301.
7. Lovell B. What do we know about coaching in medical education? *A literature review. Med Educ* 2018;**52**(4):376–390.
8. Bounds R, Bush C, Aghera A, Rodriguez N, Stansfield RB, Santen SA. Emergency medicine residents' self-assessments play a critical role when receiving feedback. *Acad Emerg Med* 2013;**20**(10):1055–1061.
9. Sargeant J, Lockyer JM, Mann K, et al. The R2C2 model in residency education. *Acad Med* 2018;**93**(7):1055–1063.
10. Chang A, Chou CL, Teherani A, Hauer KE. Clinical skills-related learning goals of senior medical students after performance feedback. *Med Educ* 2011;**45**(9):878–885.

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