

# Implementation of Self-Directed Learning in a Preclinical Respiratory Medical Course

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## Introduction

Self-directed learning (SDL) is a type of learning experience that allows individuals to take responsibility for their education. Students determine and formulate their own learning objectives and identify, analyze, and synthesize resources relevant to their self-identified learning needs. In addition, SDL involves facilitators of learning rather than direct transmitters of knowledge as typically seen from educators.<sup>1,2</sup>

SDL is imperative to incorporate in the medical curriculum to help medical students develop lifelong learning skills.<sup>3,4</sup> The Liaison Committee on Medical Education (LCME) defines four specific components of SDL that must be incorporated into medical education: 1) identify, analyze, and synthesize relevant information, 2) assess information source credibility, 3) share information with others, and 4) receive feedback on their efforts.<sup>5</sup> Here, we created an SDL activity and determined if this format of SDL aligns with the SDL components defined by the LCME<sup>5</sup> using content analysis of students' evaluations and reflections. We additionally evaluated whether these evaluations and reflections involve other themes previously identified (awareness, knowledge, appreciation, environment, and confidence).<sup>6</sup>

## Aims and Objectives

This project aims to address how each of the four components of self-directed learning as defined above are used by medical students, the effectiveness of each of these components, and how medical students perceive the different components of SDL. Here we use de-identified student course evaluations and SDL reflections gathered from a medical education course that has implemented SDL to identify themes that can help us better study the components of SDL. In the future, it is possible that medical education can be made more effective in its use of self-directed learning if we are able to identify the effectiveness and student perceptions of the different components.

The specific objectives of this study are as follows:

- 1.) determine the students' satisfaction with SDL,
- 2.) conduct systematic analysis using the de-identified student course evaluations and SDL reflections to identify themes related to SDL, and
- 3.) correlate the students' perceptions of SDL with the published literature on SDL components.

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## Methods

### Participants and Setting

- Participants were first-year medical students at Oakland University William Beaumont (OUWB) School of Medicine enrolled in the Respiratory organ systems course during the 2021 and 2022 winter semesters.
- Students were randomly divided into groups of 8 for the SDL project lasting the duration of the 5-week course.
- Groups met virtually using Zoom™ with their teammates and twice with course leadership, followed by a presentation and reflection (Figure 1).

### Data Analysis

- Students' reflections were analyzed using content analysis to determine if themes were present that matched the LCME components<sup>5</sup> and categories and subcategories that have been previously described.<sup>6</sup>

## Course Design

### WEEK 1

- SDL training and overview of project
- Teams were assigned and chose Respiratory topics to study
- Teams created learning objectives

### WEEKS 2 & 3

- SDL Feedback #1: Faculty feedback on groups' learning objectives
- SDL Feedback #2: Faculty feedback on groups' draft presentations

### WEEK 4

- Students work to finalize their presentations
- Final faculty feedback of groups' presentations

### WEEK 5

- Students present to peers and faculty
- Students submit presentation evaluations, team member evaluations, and SDL reflections

**Figure 1.** Timeline and implementation of self-directed learning within the Respiratory course at OUWB. Students had the entire five-week period to collaboratively perform research on a respiratory-related topic within their groups and create a presentation. The project was self-directed by the students with opportunities to receive faculty feedback. Students also anonymously submitted peer and course evaluations.

## References

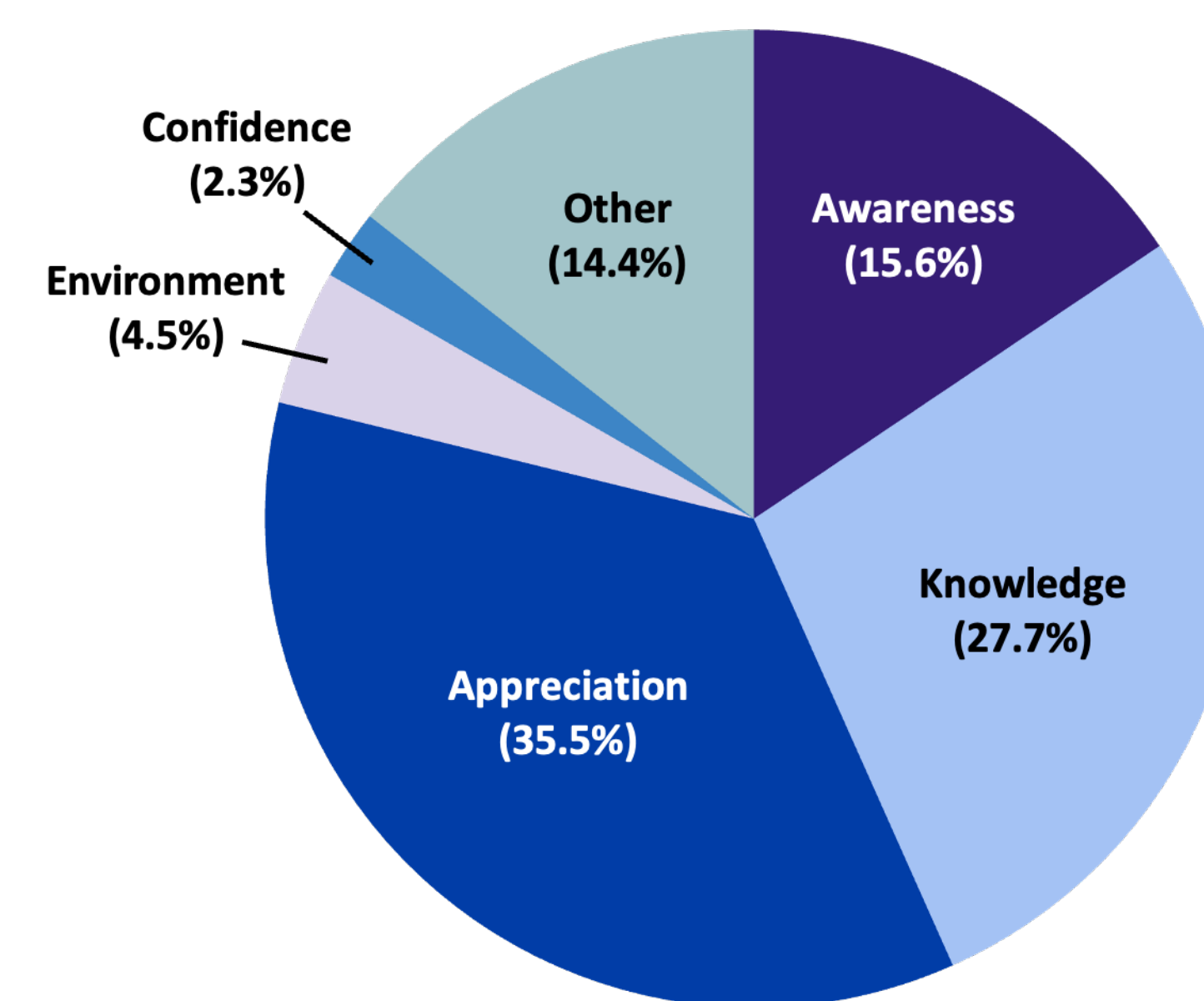
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| Year (N)   | Strongly Disagree | Disagree | Neither Agree or Disagree | Agree | Strongly Agree | Average (STD) |
|------------|-------------------|----------|---------------------------|-------|----------------|---------------|
| 2021 (123) | 14%               | 13%      | 19%                       | 29%   | 25%            | 3.4 (1.4)     |
| 2022 (122) | 15%               | 19%      | 30%                       | 22%   | 15%            | 3.0 (1.3)     |

**Table 1.** Students' anonymous evaluations of SDL. Students were asked in the course evaluations to what extent they agreed with the statement, "Self-directed learning effectively enhances my learning." A 5-point Likert scale was used to quantify student satisfaction (1=strongly disagree, 2=disagree, 3=neither agree or disagree, 4=agree, and 5=strongly agree). The mean and standard deviation for each year is presented.

| LCME SDL Components  | Q1: What have you learned during the SDL session in the Respiratory course?<br>% contribution (# of events) |           | Q2: How will you continue to use SDL in your practice or future?<br>% contribution (# of events) |            |
|--|---|-----------|--|------------|
|  | 2021  | 2022      | 2021   | 2022       |
| Identify, analyze, and synthesize information relevant to their learning needs | 33.6 (49)   | 45.9 (89) | 54.5 (102)   | 67.6 (119) |
| Assess the credibility of information sources                                  | 26.0 (38)   | 11.9 (23) | 10.2 (19)  | 13.1 (23)  |
| Share the information with their peers and supervisors                         | 32.9 (48)   | 21.6 (42) | 25.1 (47)  | 9.7 (17)   |
| Receive feedback on their information-seeking skills                           | 7.5 (11)  | 20.6 (40) | 10.2 (19)  | 9.7 (17)   |

**Table 2.** Data from content analysis of students' SDL reflections evaluating their usage of the SDL components. Students reflected upon their learning experiences with SDL in the course (Q1) and the value of SDL in their future practice as physicians (Q2). These reflections were evaluated using content analysis to quantify students' mentions of the SDL components as defined by the LCME.<sup>5</sup> Four individuals analyzed the reflections independently for content. Data shown here has been reconciled and includes the relative percent contribution of each SDL component from the content analysis and the number of mentions in students' SDL reflections (# of events). N=123 (2021) and N=122 (2022).



**Figure 2.** Pie chart representing the mean percent contribution of each category described in Table 3. Reconciled data from the content analysis of students' SDL reflections found themes of these predefined categories. The average % contribution across 2021 and 2022 was determined (N=245). In descending order of frequency, the students' reflections discussed themes relating to appreciation, knowledge, awareness, other category, environment, and confidence. "Other" refers to themes within the reflections that could not be described by the existing categories or subcategories.

## Results

| Categories                 | Subcategories                                      | Q1: What have you learned during the SDL session in the Respiratory course?<br>% contribution (# of events) |                   | Q2: How will you continue to use SDL in your practice or future?<br>% contribution (# of events) |                   |
|----------------------------|--|---|-------------------|--|-------------------|
|                            |  | 2021  | 2022              | 2021   | 2022              |
| Awareness                  | The importance of SDL in Practice                  | 2.5 (30)  | 1.8 (25)          | 12.8 (170)   | 10.5 (156)        |
|                            | Misinformation                                     | 0.0 (0)   | 0.1 (1)           | 0.1 (1)  | 0.0 (0)           |
|                            | Societal Issues                                    | 0.5 (6)   | 1.3 (19)          | 0.3 (4)  | 0.5 (8)           |
|                            | Inadequacies in the Health Care System             | 0.3 (4)   | 0.5 (7)           | 0.1 (1)  | 0.7 (11)          |
|                            | Research Processes                                 | 6.4 (77)  | 3.2 (45)          | 6.9 (92)   | 3.0 (45)          |
|                            | Other:   | 2.0 (24)  | 4.4 (62)          | 0.4 (5)  | 3.4 (51)          |
|                            | <b>Total (awareness):</b>                          |   | <b>11.8 (141)</b> | <b>11.2 (159)</b>  | <b>20.6 (273)</b> |
| Knowledge                  | Identification of Knowledge and Tools for Practice | 4.4 (53)  | 5.0 (71)          | 15.2 (201)   | 22.6 (335)        |
|                            | Identification of General Knowledge                | 21.2 (252)  | 9.9 (140)         | 5.5 (73)   | 1.6 (24)          |
|                            | Other:   | 4.2 (50)  | 9.4 (133)         | 4.9 (65)   | 7.1 (106)         |
|                            | <b>Total (knowledge):</b>                          | <b>29.7 (355)</b>   | <b>24.3 (344)</b> | <b>25.6 (339)</b>  | <b>31.3 (465)</b> |
| Appreciation               | Collaboration                                      | 15.7 (187)  | 23.5 (332)        | 12.3 (163)   | 18.8 (279)        |
|                            | Communication                                      | 4.5 (54)  | 6.5 (92)          | 4.3 (57)   | 5.3 (78)          |
|                            | Teaching Skills Taught                             | 8.4 (100)   | 1.3 (18)          | 7.5 (99)   | 1.4 (21)          |
|                            | Practice   | 3.4 (41)  | 0.1 (2)           | 13.6 (180)   | 2.0 (29)          |
|                            | Other:   | 8.3 (99)  | 3.6 (51)          | 1.7 (23)   | 1.2 (18)          |
|                            | <b>Total (appreciation):</b>                       | <b>40.3 (481)</b>   | <b>35.0 (495)</b> | <b>39.4 (522)</b>  | <b>28.6 (425)</b> |
| Environment                | Enjoyed the Course Design                          | 2.7 (32)  | 4.0 (56)          | 2.3 (30)   | 1.6 (24)          |
|                            | Experienced Feeling Overwhelmed                    | 0.9 (11)  | 1.5 (21)          | 0.6 (8)  | 0.1 (2)           |
|                            | Other:   | 1.8 (21)  | 1.7 (24)          | 0.5 (6)  | 0.5 (8)           |
|                            | <b>Total (environment):</b>                        | <b>5.4 (64)</b>   | <b>7.1 (101)</b>  | <b>3.3 (44)</b>  | <b>2.3 (34)</b>   |
| Confidence                 | Increased Belief in Self and Abilities             | 1.8 (21)  | 1.5 (21)          | 2.5 (33)   | 2.0 (29)          |
|                            | Other:   | 0.5 (6)   | 0.8 (12)          | 0.2 (2)  | 0.1 (1)           |
| <b>Total (confidence):</b> | <b>2.3 (27)</b>                                    | <b>2.3 (33)</b>   | <b>2.6 (35)</b>   | <b>2.0 (30)</b>  |                   |
| Other                      |  | 10.6 (126)  | 19.9 (282)        | 8.4 (111)  | 17.5 (260)        |
|                            | <b>Total (other):</b>                              | <b>10.6 (126)</b>   | <b>19.9 (282)</b> | <b>8.4 (111)</b>   | <b>17.5 (260)</b> |

**Table 3.** Reconciled data from content analysis of students' SDL reflections evaluating their usage of predefined categories associated with SDL. Students reflected upon their learning experiences with SDL in the course (Q1) and the value of SDL in their future practice as physicians (Q2). These reflections were evaluated using content analysis to quantify students' mentions of 5 predefined categories and corresponding subcategories that had previously been described.<sup>6</sup> Four individuals analyzed the reflections independently for content. A summative analysis is presented that includes the relative percent contribution of each category and subcategory from the content analysis and the number of mentions in students' SDL reflections (# of events). "Other" refers to themes within the reflections that could not be described by the existing categories or subcategories. N=123 (2021) and N=122 (2022).

## Conclusions

We implemented an SDL activity within a preclinical Respiratory medical course (Figure 1). The students' perceptions about whether SDL effectively enhanced their learning was variable, though most students agreed that SDL effectively enhanced their learning (Table 1). About 24% of students felt neutral and 15.5% of students disagreed or strongly disagreed that SDL effectively enhanced their learning. These findings could partially be a result of SDL being a relatively new concept to students as well as some students finding it time consuming and not beneficial (data not shown).

The component "identify, analyze, and synthesize..." was most frequently referenced (50.4%), followed by "share the information..." (22.3%), "assess the credibility..." (15.3%), and "receive feedback..." (12.0%) in the students' reflections (Table 2).

The categories mentioned (Table 3) were, in order of frequency, appreciation (35.5%), knowledge (27.7%), awareness (15.6%), other (14.4%), environment (4.5%), and confidence (2.3%) (Figure 2). The relative contributions of these components slightly differed from a session that employed collaborative SDL as part of an elective course where the category of awareness was referenced most often (40%), followed by knowledge (24%), appreciation (16%), environment (14%), and confidence (6%).<sup>6</sup> These slight differences may be due to the fact that this elective was on the topic of COVID-19 and took place in 2020, and themes like awareness could have rightfully been prioritized by the students during the height of the pandemic. The differing number of participants (this study N=245 vs our referenced study N=14) could also contribute to the observed differences.

A future project will be to use grounded theory analysis of our findings in "other" themes (i.e. exam preparation, learning new skills, etc.) (Table 3) to develop hypotheses on SDL.

In conclusion, we have developed an SDL activity that aligns with the components of SDL as defined by the LCME<sup>5</sup> as well as multiple predefined categories described previously<sup>6</sup>, supporting the notion that SDL is imperative for medical students to master and practice as future physicians.<sup>3,4</sup>