
AC 2012-5105: SELF-DIRECTED LIFELONG LEARNING THROUGH FACE-BOOK: A PILOT IMPLEMENTATION ASSESSMENT

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Abstract

Social networking tools have reshaped the way we communicate; it is now much easier to reach out to targeted groups or even masses. Social networking has been broadly applied in media, marketing or in more specific contexts such as emergency response systems; however, its potential in information transfer hasn't been explored in the field of education. The Accreditation Board for Engineering Education and Technology (ABET) criteria require that engineering programs demonstrate that their students attain "*a recognition of the need for, and an ability to engage in lifelong learning*". To meet this requirement, a self-directed learning environment is implemented in senior level Process Control course in Plastics Engineering Department at University of Massachusetts Lowell. This paper presents the pilot implementation and assessment of the self-directed learning modules through Facebook. Program outcomes assessment and student feedbacks are examined to assess the pilot implementation and develop the program further. Discussions on applicability of this system in other engineering courses, and the effectiveness of the incorporation of social networks in a course environment are presented.

Introduction

Market competition and technological advancements drive companies to invest in the professional development of their employees. Therefore, it is common among companies to offer seminars, workshops, certificate programs and graduate level education tuition reimbursements to their employees. Even though these offerings have been proven to be mutually beneficial to employees and their companies; they consume company resources in terms of cost, personnel and time. With the increasing global competition and financial cut-backs, while the resources allocated for professional development shrank, its importance is fast expanding. This situation has influenced the expectations from entry-level workforce. In today's world, collage graduates are expected to be self-sufficient and resourceful in self-improvements and following the new trends in their field of work. All the expectations are forming a workforce that internalizes self-directed learning and makes it part of their lifelong professional goals.

Although employees and organizations are aligned when it comes to self-directed learning, the motivators for professionals to employ self-directed learning differs from the organizations' motivators. Employees' motivators are provided as: "*personal development (expert, passion, and self-improvement), employment (rank, promotion), competition (title, leadership), and financial (salary, bonus, commission) rewards.*"¹ Self directed learning can strengthen one's position within the organization as well as the attractiveness in the industry among other organizations. The increased importance of lifelong learning in industry triggered academia to develop and offer skills and tools to their students for them to become successful lifelong learners. That is, the ability to continue learning without the direct interaction with an educator. Supporting lifelong learning requires a shift in educator's position from offering continuing education courses to engaging in lifelong learning.² As the industry gear towards to the concept of employees improving themselves via self-directed lifelong learning; it highlights the engineering program graduates' lack of knowledge on how to self-learn. To address this lack of

knowledge, ABET criteria requires undergraduate engineering programs to provide students a training that will help them engaged in lifelong learning; making it an integral part of engineering education.³ The efforts of incorporating lifelong self-directed learning into engineering education resulted in development of tools and techniques. As an example, SDLRS is developed to measure students' readiness to self-directed learning.⁴ A lifelong learning system is presented to meet the needs of individuals as they progress towards their goals.⁵ As the educators developed tools and techniques; self-directed learning started to become an important component of undergraduate engineering education from freshman to senior level. In many cases, educators benefited from the open-ended nature of the capstone senior design course and implemented self-directed learning modules to introduce students to the concept of lifelong learning.⁶

As the application areas of self-directed lifelong learning expanded, researchers started to look into the disposition, characteristics and behaviors of the self-directed learners. When examined, it was seen that the people who successfully employ lifelong learning are motivated and engaged.⁷ Continuous lifelong learning needs to be lifelong, life wide, voluntary and self-motivated.⁸ The difference between self-directed learners with the non self-directed learners was defined as: "*self-regulated learners are aware when they know a fact or possess a skill and when they do not. Unlike their passive classmates, self-regulated students proactively seek out information when needed and take the necessary steps to master it*".⁹ Another study revealed the four principles for fostering self-directed learning skills as:

1. *Match the level of self-directed learning required in learning activities to student readiness*
2. *Progress from teacher to student direction of learning over time*
3. *Support the acquisition of subject matter knowledge and self-directed learning skills together*
4. *Have students practice self-directed learning in the context of learning tasks*".¹⁰

There is no one-fits-all solution when it comes to self-directed learning. Every individual has different ways of learning; some would learn better listening to the material whereas visual cues might work better for others. Even though the style of learning is a personal choice and students should be exposed to different types of learning materials; the motivation to learn and voluntariness of the process is common for all.

The effectiveness of the self-directed learning is also closely tied to the availability of the information. In this current day and age millions of people reach, view and share information through internet and social networks. The advertising companies target specific audiences based on their online profiles. Even though the effectiveness of the social networks is understood; the implementation of social networks into education has been rather slow or non-existent in many situations. This study presents a pilot implementation and assessment steps a pilot implementation of self-directed learning into an engineering course via social network. Facebook¹¹ has been selected as the social networking platform.

Pilot Implementation

General Course Description

The senior level Process Control course is a 3 credit course offered in Plastics Engineering Department at University of Massachusetts Lowell. In the Fall 2011 semester, 33 students were enrolled in the course. The course covered topics such as, instrumentation, signal conditioning, data acquisition, feedback control, process monitoring, DOE, SPC/SQC, and Taguchi methods. The course meets twice a week for two 75-minute sessions. Students have two homework assignments per week and two project assignments per semester. While the homework assignments are individual effort, both of the projects are group effort. Even though there is no lab component attached to the course, the projects require students to perform hands-on measurements with thermocouples and DAQ data loggers. The homework assignments, projects, mid term and final exam are each worth 25% weight of the final grade. During the Fall 2011 semester a new component – Self-Directed Learning Modules –has been added to the course. In an effort to keep the self-directed learning voluntary, students who participate and complete the self-directed learning modules received extra credit. Each module was worth 2.5%, totaling a 10% extra credit for the full participation. Students who choose not to participate in the self-directed learning experience did not receive any penalty points.

The Self-Directed Learning Component

The self-directed learning component is implemented into the course through four steps; the introduction step, the 1st assessment step, the implementation step and the 2nd assessment step. The details of the steps are shown in Figure 1. In the introduction step, the students were provided with an in-class presentation about self-directed learning, lifelong learning and the importance of gaining the lifelong learning skills. In an effort to measure students' behavior, knowledge and understanding the concept of self-directed learning, an initial survey is distributed following the introduction presentation. The pre-experience survey questions and outcomes are discussed in detail in the Assessment phase of this paper. The implementation phase took place over the course of 4 months during the Fall 2011 semester. Students are provided with links to the self-directed learning modules via course's Facebook page. In order to measure students' understanding of the material, each module (link) is followed by 2-3 questions for students to answer. Students who answered the modules and posted their replies on course's Facebook page received extra credit for their efforts. Although the participation was on voluntary basis, the extra credit provided an incentive. This setting kept the whole learning experience self-directed. Once the implementation phase is completed, students are provided with the 2nd Assessment phase where two separate assessments are conducted. The course instructor conducted one set of assessments to review students' understanding of the materials. Another set of assessment was conducted in the form of post-experience survey to measure the overall student experience.

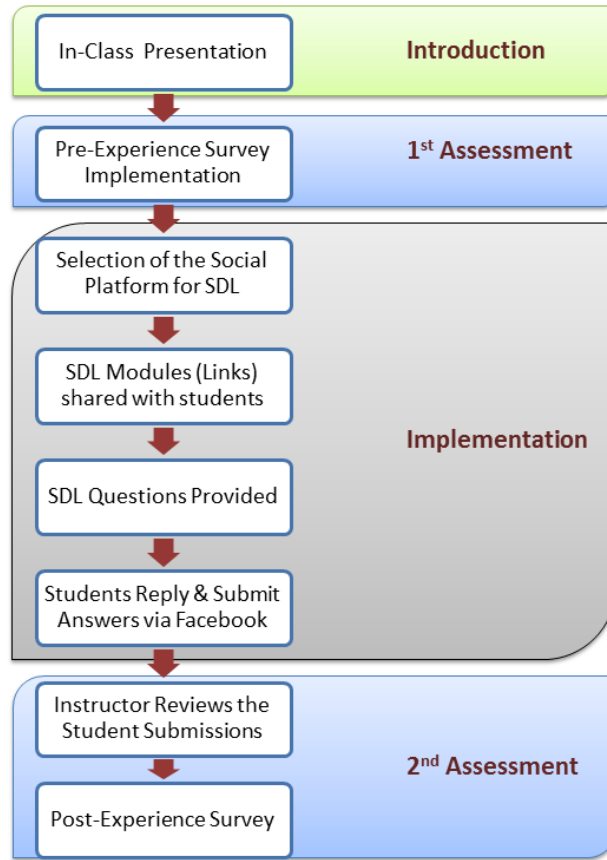


Figure 1. Pilot Implementation and Assessment Steps

Implementation of the Self-Directed Learning Modules

Prior to sharing the self-directed learning links with the students, a survey was presented to determine the most common social network platforms students actively use. The question was provided in multiple-choice format as shown:

- “Do you have accounts with any of the following networks? Please circle all that apply.*
- Facebook*
 - Linkedin*
 - Twitter*
 - Other “*

In an effort to get a better understanding of students’ social network memberships, they were encouraged to select all that apply. The outcome distribution of the above question is shown in Figure 2.

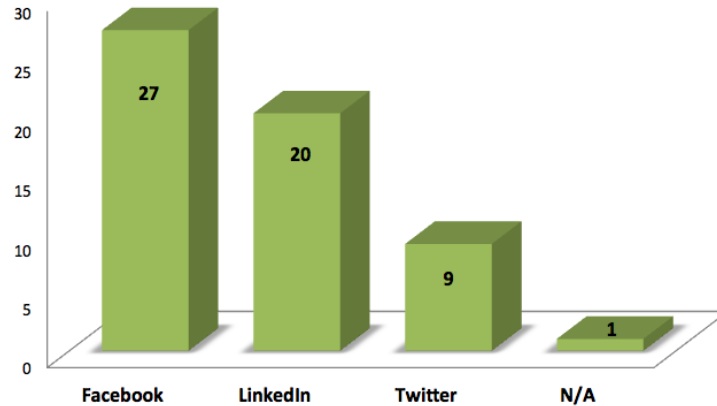


Figure 2. Students' Social Network Account Ownership Distribution

Even though there were 33 students enrolled in the class, 31 students opted-in to take the survey. Among the 31 students who took the survey:

- 23 students had more than 1 social network account
- 27 students had Facebook accounts
- 20 students had LinkedIn accounts
- 9 students had Twitter accounts
- 1 student did not have any social network account

Based on the outcomes of this survey, Facebook was determined to be the most common social networking platform. Hence, the course instructor decided to use Facebook as the social networking platform for the course. Once the platform was decided, the course instructor created a course Facebook page on September 2011. Upon creating the Facebook page, the instructor shared course Facebook page link with the class and informed them to “Like” the page if they wish to participate in the self-directed learning component of the course. Students were able to see the page updates in their “News Feed” after they “Like” the page. The News Feed is a personalized page in Facebook designed to consolidate the updates about users’ friends, the pages they like, and any other Facebook related activity or group they are a part of. As the course instructor posted the assignments on the course’s Facebook page, students were able to get notifications in their News Feed. This way, students were informed about the self-directed learning assignments while they were logged on to Facebook. Each self-directed learning module post was followed by a set of questions, usually 2-4 questions per set. The self-directed learning modules and the following assessment questions were also conducted via Facebook. Once the instructor posts the link to the module and the associated questions, a News Feed story was available to the page members on their personal page. Members also receive a notification message upon posting of the new module and questions. Students who wished to complete the self-directed learning assignments needed to follow the link posted by the course instructor and read, listen, or watch the provided material and answer the questions posted by the course instructor. Even though the main focus of the process is self-directed learning, students were asked to post the replies to the questions on course’s Facebook page. This way they would be able to provide their perspective to other students; helping them understand that there could be more than one approach to engineering problems. The proposed layout for the self-directed learning via Facebook is shown in Figure 3.

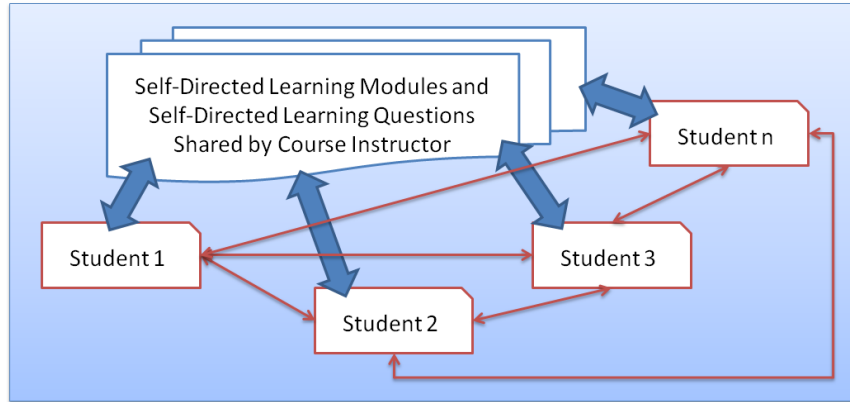


Figure 3. Network Connection of Resources and Users in a Social Network Setting

The contents of the self-directed learning modules are selected to provide students a different perspective of the course topics by providing materials that are directly or indirectly related to the course materials. The modules also do provide a real-life example and application of the materials covered in the class. Throughout the semester, students are provided with 4 separate links from various online and media sources: USA Today¹², NPR¹³, Plastics News¹⁴, and Biz Journals¹⁵, respectively. The self-directed lifelong learning links are provided in the form of interviews, articles, and news reports; whereas the content of the links are on lean manufacturing, plastics processes and controlling the process characteristics through the implementation of lean manufacturing. The assessment questions for each module were developed by the course instructor and intended to measure students' overall understanding of the material. The questions also made it possible for the course instructor to determine the students who completed the self-directed learning assignments to receive the extra credit. Once all the self-directed links were posted and the questions were answered, the implementation part of the process was completed. The second and the final assessment component along with the assessment outcomes are discussed in the Assessment and Outcomes part of this paper.

Assessment and Outcomes

The two-step assessment phase includes pre and post experience surveys along with instructor's review of students' submissions. The pre and post experience surveys intended to understand students' approach and their reaction to the self-directed lifelong learning through Facebook; whereas the instructor's review was aimed to assess students' understanding of the material provided in the modules. The pre and post experience surveys contained three identical questions along with few additional questions. The identical questions aimed to measure the change in students' thinking and approach to the self-directed lifelong learning while the rest of the questions intended to understand students' perspective, and recommendations for future implementations of the self-directed lifelong learning modules.

Students are provided with same three questions prior to and completion of their self-directed learning experience. A five-point Likert scale is used to measure students' answers. The students were asked to assign a value answer to each question from 1 through 5; 1 being strongly disagree, 2 being disagree, 3 being neither agree nor disagree, 4 being agree and 5 being strongly agree. Using the Likert scale provided students with the flexibility to express how they feel about the questions in a quick and easily quantifiable fashion. The outcome comparison of pre-

experience and post-experience surveys for the three identical questions is shown in Table 1. The first question measured students' perspective on whether engineers can use self-directed learning to educate themselves about technological advancements and developments. Prior to the self-directed learning experience students on average agreed (4.06) that engineers could educate themselves. Following the in-class self-directed learning experience students were more confident (4.26) in their ability to self-learn the technological advancements and developments. The second question assessed whether self-directed learning was appropriately addressed in undergraduate education. Prior to the in-class experience they neither agreed nor disagreed (3.06) that it was addressed. Following the in-class experience students' responses to the question showed a 5.8% increase in confidence. Even though they still felt unsure whether self-directed learning was appropriately addressed in undergraduate education, the increase in the average proved an improvement. The third question assessed whether engineers can keep up with the new technologies and improvements by following media. Prior to the in-class experience students agreed (4.06) that engineers can keep up with the new technologies via media resources, and the post-experience outcome showed an increase (4.29) in students' responses supporting the question.

Table 1. Outcomes Comparison of Pre and Post Experience Surveys

Questions	Pre-Experience Survey	Post-Experience Survey	% Change
Engineers can educate themselves about technological advancements and developments through self-directed learning	4.06	4.26	4.00%
Self-directed learning was appropriately addressed in the undergraduate education	3.06	3.35	5.80%
Engineers can keep up with the new technologies and improvements by following media	4.06	4.29	4.60%

The outcomes of these three questions, as provided in Table 1, show a positive trend in students' understanding and approach to the self-directed learning concept. It also validates students' capabilities to follow and learn technological advancements by following media resources on their own.

Prior to the self-directed learning experience, students were asked the following survey question to determine their approach in sharing information.

- *If you come across a news article, radio show or a TV program that you find beneficial for your career, how likely are you to share it with your colleagues and classmates through a social networking platform?*

The students had five options to express their frequency of information sharing on social platforms: always, usually, sometimes, seldom and never. Even though the distinction between these five choices are not easily quantifiable, the results show that approximately 90% of the students share the information they see worthwhile on social platforms; whereas roughly 10% of students never share links on social networks. The detailed distribution of students' responses is shown in Figure 4.

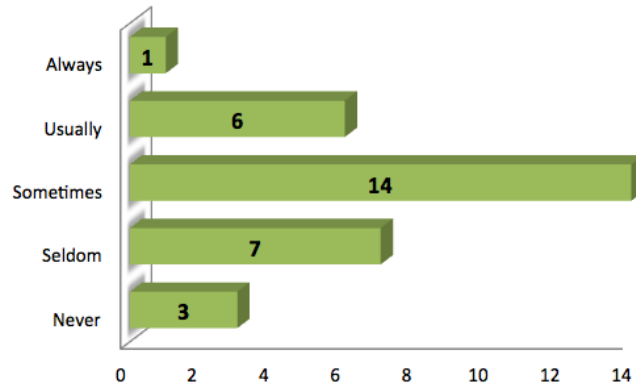


Figure 4. Students' likeliness of sharing links with classmates

The answers to this question support the objective of this pilot study. That is, students are open to the idea of using social networking platforms to share information with their classmates and colleagues. And more resources will become available and accesible as more students share.

Following the implementation of self-directed learning modules students are provided with two additional questions assessing the content of the self-directed learning modules and whether they feel confident to share information with the course after graduation. Both questions were evaluated by students using the 5-point Likert scale. Below are the two questions and their assessment outcomes:

➤ *The contents of the self-directed learning modules were relevant and beneficial.*

The above question intended to measure students' response on relevancy of the modules to the course topic, their degree and their careers. The distribution of students' responses are shown in Figure 5. Close to 60% of the students agreed the relevancy of the content whereas approximately 12% of the students didn't think the content was relevant to them. Close to 30% of the students were neutral about the relevancy of the modules. Further investigation revealed that the high percentage of neutral responses were related to incomplete modules. Some of the students did not complete all of the modules, so they were not sure of their relevance, and chose to stay neutral.

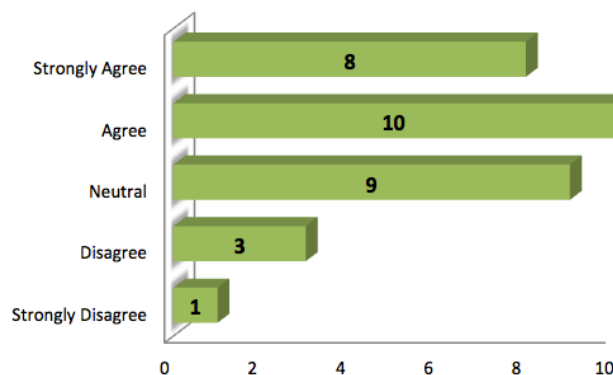


Figure 5. Students' Response Distribution on Relevancy of the Self-Directed Learning Materials

The second post-experience survey question was aimed to assess the possibility of students' contribution to the course even after graduation.

- *I might share links with the course Facebook page after graduation. I think I can provide valuable information to the students who will be taking this class in the future.*

The majority of the students, a little over 70%, responded positively to share the resources they find beneficial at the course's Facebook page to provide relevant information to future students. The distribution of students' responses is for this question is shown in Figure 6.

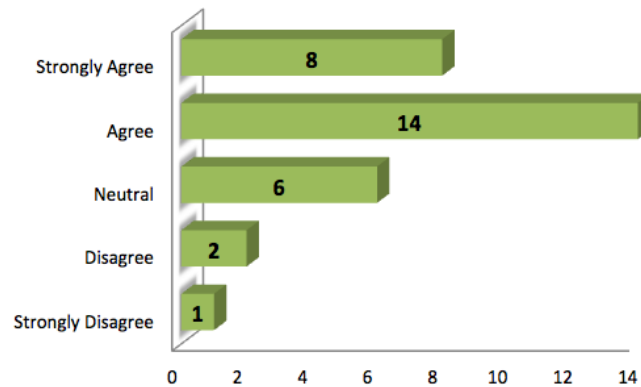


Figure 6. Students' Likelihood of Sharing Links on Course's Facebook Page after graduation

When the both pre and post experience surveys along with the students' overall reaction is examined, it is concluded that students responded positively to the idea, however the instructor observed challenging moments for some of the students. The challenges and the conclusions of the study along with the proposed future work are presented in the remainder of this paper.

Student Feedbacks

Students were given an opportunity in the second survey assessment to provide feedback and suggestions to the instructor about their self-directed learning experience. Below are the most common few feedbacks:

- I liked the fact that we were provided with a technology-forward way of learning. It definitely opens up many opportunities
- I completed all of the self-directed learning modules, though I wish it wasn't through Facebook, I am not a big user.
- I had to create a Facebook account just so I can complete the extra credit modules and receive the extra credit. I will be cancelling my account after the course ends.
- The idea is great, but I think it is going to take few more years until people can understand and utilize it.

Students' feedbacks provided a clear understanding of how they think as well as showed the broadness of their feelings about the experience. Some students thought the idea and the process was a very good one and showed interest in following it after graduation; whereas, some students were not happy with the selection of Facebook as the platform.

Challenges

Throughout the semester, there were many challenges associated with the implementation of self-directed learning modules into the course curriculum via Facebook. Even though the majority of the students were familiar with Facebook there was a certain level of resistance and discomfort at first. For the first self-directed learning module, only a few students submitted their assignments on course's Facebook page, the rest of the students chose to email the assignment to the course instructor or chose to hand-deliver a hard copy during the class. Some students expressed the cause of their discomfort as "What if my professors check my Facebook account?". This was a valid concern given that most students use Facebook as their social networking platform rather than their educational platform, and the idea of their professor can check their Facebook pages could be discouraging. As a solution, students were suggested to adjust their Facebook privacy settings to prevent their non-friends from seeing their profile details such as pictures, wall or any other personal information that they didn't want seen by public. Since students and the course instructor were not friends on Facebook, their initial discomfort was addressed. As the second assignments were due on course's Facebook page, the number of students who submitted their assignments via Facebook increased, though there were still few students who emailed or hand-delivered their submissions. Few students informed the course instructor that they didn't have Facebook accounts, and few of them expressed their discomfort using certain features of Facebook, as they were not familiar with the platform very much. A detailed explanation on how to use the course's Facebook page and the associated tools provided by the instructor for the students who had trouble with the page. By the time for the third and fourth assignments, all of the students who participated in the self-directed learning modules submitted their assignments via course's Facebook page.

Students didn't experience an assignment or any other scholarly interaction via Facebook before, therefore their overall discomfort was due to using a new and unfamiliar method and system. And this was expected to a certain extent. The challenges that were experienced and resolved during Fall 2011 semester provided invaluable information in understanding what to improve and how to present the "new".

Conclusions and Future Work

This study provides an overview of pilot implementation of self-directed learning into a senior level engineering course via Facebook. Teaching self-directed learning, whether as a part of a course or as an individual assignment can be challenging. The overall student experience proved the process to be effective. Some students' discomfort due to using Facebook definitely created a barrier for them; whereas majority of the students expressed their excitement since something new and technology forward was implemented in their coursework.

The greatest learning experience has been addressing the challenges, which will definitely make it easier to communicate the concept with the students in the following years. The pilot implementation definitely provided a great understanding on how to handle student discomfort and how to improve the process to reach maximum participation. Based on the students' feedbacks and challenges faced, future implementations will include a detailed information session on using social networking tools and protecting privacy. Even though it is not a part of the curriculum, a discussion session to ease students into the application can be implemented.

Also based on the student feedback, the implementation process itself can be modified to provide more flexibility and freedom to the students. As an example, in addition to the self-directed learning modules provided by the instructor; in the future students can be asked to share a link to a material they think is relevant to the course content and they think that will benefit their classmates in their careers. This would provide students an understanding of how the instructor selects and shares the links, how they can differentiate between the relevant and irrelevant information, and develop questions to assess reader's understanding of the material. This method will also provide a vast array of resources and will provide flexibility to students to pick what they want to read and learn about, just like it in real life.

Overall the results collected from the pilot implementation suggested that the area has a great potential and also room for improvement. In the future, the proposed changes will be implemented and documented to monitor students' participation and involvement in the self-directed learning process.

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