Collective Learning Paradigm for Rapidly Evolving Curriculum: Facilitating Student and Content Engagement via Social Media

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ABSTRACT
Curriculum in the information systems discipline has been rapidly evolving. This is not only challenging for the instructors to cope with the velocity of change in the curriculum, but also for the students. This paper illustrates a model that leverages the integrated use of social media technologies to facilitate collective learning in a university teaching/learning environment. However, the model could be adapted to other organizational environments. The model demonstrates how various challenges encountered in collective learning can be addressed with the help of social media technologies. A case study is presented to demonstrate the model’s applicability, feasibility, utility, and success in a senior-level social computing course at the University of Arkansas at Little Rock. An evolving, non-linear, and self-sustaining wiki portal is developed to encourage engagement between the content, students, and instructor. We further outline the student-centric, content-centric, and learning-centric advantages of the proposed model for the next generation learning environment.

Keywords  
Collective learning, social media, wiki, classroom learning, team learning.

INTRODUCTION
Due to the rapidly evolving nature of the information system technologies, topics in the courses pertaining to programming languages, database technologies, social computing, among others within the information system curriculum need to be updated almost every semester. Consider the history of the web programming languages. There are almost a dozen popular computer languages in use since the year 2000, e.g., ActionScript, C#, Visual Basic .NET, F#, Groovy, Scala, Factor, Closure, Go, Dart, Ruby, etc. There are many more programming languages that are not as popular as others. This is not only challenging for the instructors to cope with the velocity of change in the curriculum, but also for the students to find their skill set obsolete when they graduate. Therefore it is imperative that the curriculum is adaptive and up-to-date. Further, the curriculum must also equip the students with lifelong learning capability so that they can educate themselves during their professional careers. When newly graduated computer programmers join a dynamically changing workplace after graduating from school, they face new challenges. Employer requires them to learn new skills (e.g., programming language, data analytics, data management, etc.) to perform daily tasks. At this point, learners do not have a formal educational environment, such as a classroom education, where teachers will teach them the new skills.

Several studies have reflected that individual learning, which has been a core component around which the education system has been institutionalized, does not fully enable learners to learn the process of learning (Salomon and Perkins, 1998). It has been observed that people learn faster and in much greater depth in groups, making them familiar with the process of learning. Group learning encourages students to engage in the learning process starting from academics to real-life work environment. The interpersonal communication skills that students develop in group learning environments are particularly helpful in organizations that are increasingly emphasizing on teamwork. Learners practice and exercise collectively on a topic in teams. In the group, students engage in discussions and motivate each other. Collectively, team can discuss, find answers to questions, and contribute in the advancement of the course topics. In addition, a closer engagement with the content enhances their capability to retain the concepts much longer (Ellis, Hollenbeck, Ilgen, Porter, West, and Moon, 2003).

Furthermore, many companies encourage employees to work collectively and collaboratively. For example, Windstream Corporation Inc., a Little Rock, Arkansas based telecommunication company that supports broadband, telephone and data solution for customers, practices team based learning using collaborative technologies at workplace. When the company hires new employees, they organize them in a team and select one lead analyst to guide new hires. New hires collectively learn job skills using collaborative technologies, such as Wikis. New employees help each other in the learning process along the way. So students need to be exposed to group learning and collaborative technologies and develop strong interpersonal
communication skills from their college experiences so that they are better prepared when they join a workplace, where most likely there will be no formal or structured learning environment.

However, such collective learning paradigms require active participation and cognitive involvement of the learners (Agarwal, 2011). Further, collective learning involves challenges pertaining to planning, structuring, managing, and evaluating. In this study, we focus on social media technology as an enabler for collective learning. This paper would illustrate a model that leverages the integrated use of social media technologies to support collective learning in a university teaching/learning environment. However, the model could be adapted to other work environments. The model demonstrates how various challenges encountered in collective learning can be addressed with the help of social media technologies. A case study is presented to demonstrate the model’s applicability, feasibility, utility, and success in a senior-level undergraduate Social Computing course at the University of Arkansas at Little Rock. An evolving, non-linear, and self-sustaining wiki portal is developed to encourage engagement between the content, students, and instructor. The course wiki illustrates the model’s ability to encourage students contribute towards the advancements of the course topics. Such a collaborative content enrichment lends multiple perspectives for curriculum development. We further outline the student-centric, content-centric, and learning-centric advantages of the proposed model for the next generation learning environment.

Specifically, we make the following contributions in this paper,

- Developed a collective learning model to cope with the challenges of a rapidly evolving curriculum leveraging social media technologies,
- Implemented the model in a senior-level undergraduate Social Computing course at the University of Arkansas at Little Rock’s Information Science curriculum,
- Demonstrated the model’s ability to develop a self-sustaining and non-linear wiki for the course,
- Provided methodologies for objective evaluation of student participation assessment in collaborative settings,
- Demonstrated the efficacy of peer evaluation component of the collective learning model, and
- Outlined student-centric, content-centric, and learning-centric advantages of the model for the next generation learning environment.

Next, we will discuss the related literature in this domain.

RELATED WORK

Collective learning is a process where two or more individuals learn in a group environment. They help each other to learn along the way, which is mutually beneficial for them. Collective learning has been useful in explaining diverse phenomena in educational environment. Social media platforms are known to be well suited for collaborative processes. Further, statistics show that majority of students use social media in their daily life and 90% of them prefer to use social media in the classroom (Wolfe, 2007). However, to be able to use social media in the learning environments there is a need for good quality control measures. Wiki is one of the popular collaborative technologies, however challenges pertaining to vandalism have affected its adoption as an industry-wide standard because of its openness and low barrier to publications (Hasan and Pfaff, 2006). One of the solutions to address vandalism is using Statistical Language Modeling (SLM) (Chin Street Srinivasan Eichmann et al., 2010). Other tools to check content quality and readability in wiki include, Automatic Essay Scoring (AES) and Gunning-Fox Index (Agichtein, Castillo, Donato, Gionis, and Mishne, 2008). Additionally, Twitter (a microblogging website) has been experimented with in collaborative learning (Groseck and Holotescu, 2008). Twitter can be used for educational activities such as organizing ideas, sending notes, managing meet ups and collaborating with others. More importantly, Twitter can help learners to improve editing skills.

Next generation of students form a big part in current educational system. It is very important to know their learning styles. They prefer to know “Where to find the information?” rather than “How does it work?”. Next generation learning strategies include team-based learning in classroom, engagement of teachers and students in the learning process, and their understanding of new digital technologies (Ivanova and Ivanova, 2009). Students use digital interactive media such as videos, interactive television, social media, etc. for content generation in learning process (Claros and Cobos, 2012). Mobile phones and smart handheld devices are gaining traction in classrooms. Mobile phone facilitates active learning in classroom. Some of the uses of mobile phone are SMS and photo MMS. SMS can be used for multiple choice, short answer problems and photo MMS can be used to send notes by photo messaging (Lindquist, Denning, Kelly, Malani, Griswold, and Simon, 2007).

Next, we will discuss the proposed collective learning model.

COLLECTIVE LEARNING MODEL

For constantly evolving disciplines it is not only imperative for students to learn the fundamentals, but also get acquainted with the process of learning. The proposed model encourages students to be ‘free agent learners’ (Nagel, 2009) and impart
lifelong learning capabilities to cope with evolving disciplines. Further, instructors often find themselves constantly developing, maintaining, and evaluating the subject (Finlayson, Cameron, and Hardy, 2009). Towards this direction, the paper proposes to leverage various learning paradigms, such as ‘learning by doing’ (Newland, Agunias, and Terrazas, 2008), active learning (Bonwell and Eison, 1991), and collaborative learning (Jacques, 2000; Cockrell, Caplow, and Donaldson, 2000), to promote an active participation and cognitive engagement with the material. This enhances the students’ capability to familiarize with the process of learning and their ability to retain the material much longer making it a formative experience. The process simultaneously contributes to the advancement of the educational content and keeps it up-to-date. Further, educational material benefits from multiple perspectives via collaborative content enrichment.

To accomplish research objectives, the proposed model is implemented using an evolving, non-linear, and self-sustaining wiki. In the collective learning model, every course module has a core component and an extended component. The learning is, therefore, accomplished in two phases: Phase 1 (also known as the conceptualization phase), where core components are learned and updated, and Phase 2 (also known as the experience, reflection/observation, and application phase (Kolb, 1984)), where extended components are developed. The collective learning model is illustrated in Figure 1, which is adapted from our earlier work presented in (Agarwal, 2011). Below, we explain each phase in detail.

**Figure 1. Leveraging Social Media in Developing Core and Extended Components of Various Course Modules. The Sequence of Activities Involved in the Two Phases is Depicted by Number Prefixes**

**Phase 1: Developing core component** involves the instructor to prepare the fundamental instruction material or the core component. The instructor prepares the teaching material (step 1) and delivers it to the students (step2). Students can comment, ask questions, get help (by the peers or the instructor), rate questions and answers, and post additional resources. The discussion could be organized in-class or offline using social media, such as blogs, Twitter, TodaysMeet, HotSeat (also known as backchannels), etc. (step 3). Coordinating discussion via social media would help students shed inhibitions about voicing opinions (Kolb, 1984). The instructor could possibly update core component by incorporating the discussion (step 4) and make it available to the students. Asking or answering questions, rating responses, class participation, and other forms of positive behavior (e.g., submitting assignment before it is due) could be rewarded with points and customized virtual badges using functionalities provided by social media platforms. Students can track their participation level through leader boards, thereby encouraging a participatory and collaborative learning environment. Further, the data would help understand learning behavior and drive performance.

**Phase 2: Developing extended component** involves learners, organized in teams, to discuss/revise core component (step 5). In this step, students reflect over concepts (via blogs, Twitter) and discuss their possible applications (via in-class exercises). Students contribute towards advancing the basic educational content to extended component. This will be coordinated using the course wiki. Wiki provides easy collaborative access to all the team members with the facility to rollback to any previous version. Active participation and cognitive engagement with the educational material would be required from the students thereby familiarizing them with the process of learning. Teams then present the advanced educational content in the extended component to fellow students and instructor to facilitate peer-review (step 6). Instructor compiles all the reviews and scores from the students (step 7), suggest necessary changes to the respective teams, and approves the revision (step 8) to create an...
approved extended component. Other collaborative learning platforms, such as Teamie (Teamie, 2013) would be explored to facilitate coordination.

**CASE STUDY IN SOCIAL COMPUTING COURSE**

In this section, we present a case study to demonstrate the model’s applicability, feasibility, utility, and success. The case study was conducted in a senior-level undergraduate course Social Computing (IFSC 4360) in the university environment (University of Arkansas at Little Rock). The aim was to collaboratively develop a comprehensive article on social media technologies. Students were given a basic lecture on social computing concepts as a part of conceptualization phase (steps 1-4 of the proposed model in Figure 1). Course blog was setup to answer student queries concerning the lectures. Students were then asked to form teams and research and reflect on social computing concepts. During second phase they were asked to explore the core concepts and prepare extended components (steps 5). Students then presented their findings that were peer assessed (steps 6). The feedback from the peer assessment was used by the teams to improve their submissions and shared it on the course wiki. The collaboration was not only confined within a team but also spanned across multiple teams. Screenshots of one such extended component on the “State of Social Media” are shown in Figures 2. Based on the students’ feedback, their experience with social media technologies was fruitful. Students were more actively and enthusiastically involved in the exercise. Collaboration within team and across teams was made simpler using Wikis. Further, at a larger scale, students were observed to be more behaviorally active in the class. Some students were not as expressive in-class as they were on course blogs and gradually became less hesitant during in-class discussions.

![Table 1. Assessment Rubrics for the Educational Content developed by the Collaboration](image)

Proposed model was put to test and the outcome was evaluated according to the collaborative evaluation plan (Figure 1). There were 18 students in the class who were organized into 9 teams of two students each. For each team, two simultaneous evaluations were performed. One was performed by the instructor and the other was performed by the peers using the rubrics mentioned in Table 1. The peer evaluations were then averaged for each of the six dimensions. Essentially each team was evaluated by 16 students and the instructor on 6 dimensions mentioned in the rubrics in Table 1. Finally, a cumulative evaluation for the teams both for the peers’ and instructor’s evaluation is computed by averaging the evaluation scores for all the six dimensions. The evaluation results are presented for each of the six dimensions in Figures 3(a)-(f). The cumulative evaluation averaged on all the dimensions is shown in Figure 4. The correlation between students’ and instructor’s evaluation is shown in Figure 5. It can be observed that the proposed collaborative assessment strategy is effective due to a high correlation value ($R^2 = 0.9732$) between instructor and peer evaluation scores. This demonstrates that not only the proposed collective learning based model enriched learners’ experience through social media but also helped in effective evaluation. The model exhibits an empirical analysis and a methodology to develop a strong foundation of collective learning leveraging social media.
Figure 2. Collaboratively Developed Article on Social Media Technologies using Collective Learning Model
Figure 3. Collaborative Assessment of the Material and Evaluation of the Students based on the Proposed Collective Learning Model using the Rubrics in Table 1

Figure 4. Cumulative Evaluation Scores for each of the Nine Student Teams Averaged on all the Six Dimensions
The following figures (Figure 6 through Figure 11) are good examples of collaborative learning outcomes using the proposed collective learning model. Through these figures we demonstrate a methodology for the instructors to objectively evaluate students’ contributions using features from one of the most widely used learning management systems, i.e. Blackboard. Instructors can determine how students are collaborating on their respective contributions through the article modification. Figure 6 shows the collaboration between two students on the course wiki on the topic “Social Games / Virtual World”. It is displayed in version 2 and version 3 that a student modified other student’s work. In this figure, words highlighted in red are deleted words and green highlighted are added words in the article. Figure 7 depicts the legend of these edits. It shows text removed, text added and text changed with highlighted blue with underline. In Figure 8, history of the edits on the article is displayed from version 1 to version 10. In addition to this, page history is showing the student that modified the topic, the time it was created and the versions of each modified work in details. So the instructor can find out the students who were working on the topic. Instructor can evaluate students by looking at Figure 8. It is important to see how student collaboration improved the state of the article through different versions. Figure 9 shows the first version of the article. If we look at the final version of the article in Figure 10, we can observe that the article is now well organized, informative, and very resourceful. This demonstrates that the collaborative editing is helpful in improving the quality of the article. Figure 11 shows the participation summary of collaborative work of the students. This summary can be used by the instructors to objectively evaluate the students’ contributions and grade their efforts. The various attributes that are displayed include number of words edited, percentage of edits made in the article, number of pages edited, and the percentage of pages edited. In participation summary of Figure 11, one student modified over 5000 words that amounts to 32% of total modifications in the article. This is a good indicator to assess students’ level of contributions.
Social Gaming/"Virtual Worlds"

A virtual world is an artificial environment that can be explored by multiple users simultaneously. These environments can be used for various purposes, such as education, entertainment, and research. They allow users to interact with each other and with the environment, creating a sense of immersion.

History of Multiplayer/"Virtual Worlds"

In the early days, "virtual worlds" took the form of games, which were the first type of multiuser games. These games were simple, with limited graphics and gameplay. However, as technology advanced, so did the possibilities for virtual worlds.

The First Generation of Social Network Games

The first generation of social network games started in the 1990s. They were text-based games that allowed multiple users to play in real-time with each other. These games were simple, with basic graphics and gameplay. However, they provided the foundation for the development of more advanced virtual worlds.

The Second Generation of Social Network Games

The second generation of social network games started in the early 2000s. They were graphical games that allowed users to interact with each other in a more realistic environment. These games were popular due to their advanced graphics and gameplay.

The Third Generation of Social Network Games

The third generation of social network games started in the late 2000s. They were social games that allowed users to interact with each other in a more immersive environment. These games were popular due to their advanced graphics and gameplay.

The Fourth Generation of Social Network Games

The fourth generation of social network games started in the early 2010s. They were mobile games that allowed users to interact with each other in a more mobile environment. These games were popular due to their advanced graphics and gameplay.

The Future of Social Games

There is a lot of potential for the future of social gaming. We can expect to see more advanced graphics, more complex gameplay, and more social interaction.

Figure 6. Page Comparison by Participants - An Example of Student Collaboration in Wiki
Social Games/Virtual World

Virtual World/Worlds and "Social Games/ "Virtual Worlds"

A social world is a shared space in real-time where people are connected through digital and networked environments. Although different social games have unique rules and mechanics, they share some fundamental elements such as shared goals, meaningful outcomes, and social interactions. This makes them distinct from other forms of digital content like movies or video games.

The term "social game" is often used to describe these types of games. These games are designed to be played collaboratively and allow players to interact with each other in real-time. They often feature elements such as social networking features, virtual goods, and competitive gameplay.

Collective Learning Paradigm for Rapidly Evolving Curriculum

Figure 7. Legend for Page Comparison

The Pros and Cons of Social Games

Social games connect people in a different way than other social networks. In general, it can be accessed from anywhere, it allows anyone and everyone to play a game, from parents, to kids can be something to build connections to with other people, building up your game alongside them. People communicate more when there is a mutual connection that they enjoy.

Adventures use the game by showing video advertisements in game, which, if the user watches, provides game benefits.

Social game platforms are currently collaborating with farmers to provide ‘Farm Cash’, each user has to buy using real money, to players who shop at their stores.

A big disadvantage to social games play in people’s lives is that it can cause a strain in relationships in real life. These games can be very addictive and cause users to prefer to play games over other activities. There is sometimes a preference for virtual social games instead of in real life. Many users require users to invest their friends to open up games. Also, many users once these companies use social games to take information from social networks.

Playing social games will sometimes force the user to grant the games access to their personal information and so post without their knowledge on their social network.

The Future of Social Games

There is a lot of acceleration as to the future of social gaming. There are many that believe that the bubble will eventually burst and collapse, while others believe that the "Golden Age" of social games will never end and that a platform has been hit however, the transformation of social gaming seems to be heading into the direction of mobile apps. More people are getting smartphones every day, and would like to play their games on the phone. Since a user cannot access the majority of games on the phone, developers are starting to create mobile apps for the gateway that access their online accounts.

Figure 8. Page History for Different Time Periods
Virtual worlds and “Social games”
A virtual world in its purest sense is nothing more than an artificially created digital environment. Although there are certain lower limits to what classifies a “world” in that it must have at least some visual aspect to it, or a way for us to perceive it. This means that a virtual world could be as simple as a text based game that describes the world in text, and leaves the player to visualize it in their minds. A virtual world does not have to be a game though; A realistic simulator that has the purpose of training astronauts for problems in lift off for a space shuttle is certainly a virtual world, but would not be considered a game by many.

The term “Social game” on the other hand is much more difficult to pin down. All multiplayer games have a social aspect since multiple people interact, however does this make them a “social game”? This depends on the person you talk to since the term could either mean all multiplayer games, or a game specifically designed around social elements not common in ordinary game mechanics.

History of multiplayer “Virtual worlds”
In the early days of virtual worlds in the form of games, we could see a few classic multiplayer games such as pong. Pong is one of the simplest of games that most people can remember, and it could arguably be stated as the beginning of multiplayer interactive games. Before the spread of inter-connectivity to the masses, games that were multiplayer were limited to the capabilities of the machine running them. This often limited games to 2-4 players with a few exceptions. This type of social gaming was often done with family or friends, and hardly involved interaction with people outside the person’s familiarity. When internet connectivity became widespread enough throughout the world, a few games started to have multiplayer capability over the internet instead of local connections. This allowed for complete strangers to play in a virtual world together, and created generations after that would become accustomed to this.

It was not until the creation of the first popular massively multiplayer online games that multiplayer gaming became less of random player interactions, and started to form communities. MMOs allowed for people to have a persistent virtual world to play in which they could form their own social groups. As such games became more popular, the social groups within these games grew larger and larger to eventually create large social media networks within the game and even outside of the game. Modern MMOs often have large social groups of hundreds to thousands of people which all share enough in common to hold the group together.

As social networks evolved, games like Farmville which are mostly single player in nature, yet also have multiplayer elements became extremely popular. The core elements of Farmville are single player, but activities in the game can be reflected with social media tools. Although social media integration is not direct player interaction, it is still a notable way of sharing the experience of the game and creating a somewhat persistent virtual world.

Figure 9. Version 1 of the Page on Social Games/Virtual World
Virtual Worlds and "Social Games"

A virtual world is a digital universe that allows users to interact and collaborate with one another. Although there are many types of virtual worlds, some of the most popular include online role-playing games (MMORPGs), virtual simulations, and social networking sites. These environments provide users with a unique learning experience that can be used to teach a variety of topics.

One of the reasons why virtual worlds are so popular is because they allow users to interact with each other in a virtual environment. This type of interaction can be used to teach a variety of topics, such as science, history, and language. In addition, virtual worlds can also be used to teach more personal skills, such as communication and problem-solving.

Social Games/Virtual World (Version 10)

Figure 10. Version 10 of the Page on Social Games/Virtual World

The Pros and Cons of Social Games

Social games can be a great way to engage people in learning. They can be used to teach a variety of topics, such as science, history, and language. In addition, social games can also be used to teach more personal skills, such as communication and problem-solving.

The Future of Social Games

There is a lot of excitement about the future of social games. Many believe that they will continue to grow in popularity, and that new technologies will make it easier for people to access and use these games. As a result, social games will continue to play an important role in education and training.
BENEFITS OF USING COLLABORATIVE LEARNING MODEL

The proposed model leverages a collective learning approach via an orchestrated set of social media tools to – promote and sustain interaction and participation within and outside the classroom; familiarize students with the process of learning through reflection/exploration/application and help students to cope with constantly evolving technologies. The outcomes of the model include, the model itself; collaboratively developed social computing course wiki; assessment instruments, evaluation data, and findings; guidelines and case studies for integrating social media in education to facilitate collective learning. These strategies could be helpful in various disciplines and in different learning environments. The course wiki could assist in creating a similar course or reuse modules in courses in other disciplines, such as sociology, communication and journalism, business administration, among others. The merits of the collective learning model, categorized under student-centric, content-centric, and learning-centric, are outlined below.

Student-centric merits can be summarized as follows,

- The proposed model and wiki-based collaborative content development encourages critical thinking, participatory learning, and team building among students.

- Networked representation of knowledge in wiki supports the vision of natural learning to assist contextual understanding and accommodating psychological and cognitive variations in students’ needs.
• Intricate concepts can be explained in a comfortably conceivable terminology through students’ reflections, creative expressions, and discussions (via blogs, tweets, and wiki). This encourages the next generation engineers to develop new powerful ways to communicate science with people by leveraging social media.

• Benefits of the proposed wiki-based learning approach stretch beyond the realms of academia. In addition to encouraging teamwork, collaborative learning approaches are extremely helpful in organizations, where employees are expected to explore, experience, and educate themselves new technologies without formal training. In the ICT industry, where new technologies emerge frequently and quickly obtain industry-wide recognition, collective learning approaches could be helpful for our students. By emphasizing on the process of learning and encouraging the students to be ‘free agent learners’, the model helps train the next generation workforce.

Content-centric merits can be summarized as follows,

• Collaborative content development lends multiple perspectives to the instruction material.
• Collaborative content development through wiki is well suited for fast-changing courses, such as social computing, where concepts evolve in a ‘perpetual beta’ model.
• Networked representation of concepts in the wiki lends itself as a possible mechanism to ensure content quality.

Learning-centric merits can be summarized as follows,

• The proposed model and collaborative content development encourages active participation and cognitive engagement with the material resulting in a formative experience.
• The collective learning, leveraging social media, is highly adaptive to online or e-learning environment. Further, the model will help evaluate the challenges and opportunities of the emerging social learning paradigm, where social media technologies are combined with education to understand learning behavior and drive performance.

CONCLUSION

As the emphasis is shifting towards learning to learn putting the onus of learning on the learners, new ways of experimental learning have been explored. Another upcoming technology is the social media where content generation is shifting from a few producers to the consumers. The Web 2.0 paradigm has promoted collaborative content development. We attempt to blend these two significant paradigm shifts and explore their impacts on learning. Specifically, we proposed a collective learning model that leverages the integrated use of multiple social media. The advantages of the model including a built-in collaborative assessment strategy to evaluate the merit of the educational content are highlighted. Based on our findings of the proposed model, learning should not be compartmentalized rather it should be more open. A case study is presented to demonstrate the model’s applicability, feasibility, utility, and success.

Collective learning model has shown a great potential based on our evaluation. Students tend to embrace the social media technologies much faster and gladly incorporate in the learning environment. This is precisely the reason why all the social media technologies do not have a user manual and still people are able to grasp them quickly. They see, they learn. Some students are not as orally expressive as they are in writing. The quietest of the students have often been the most active on Twitter and the class blog and gradually have become less hesitant during in-class discussions.

As future direction, there would be further exploration of the proposed collective learning model both nationally at various US universities and internationally at the University of Auckland in New Zealand in Information Systems and Operation Management class. Students’ learning experiences will be further evaluated in terms of content engagement, content absorption, in class interaction, online interaction, comfortability with collaborative learning model, fidelity with collaborative learning model, trustworthiness of the content, comfortability with social media, and fidelity with social media.

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