

Modify Flipped Model of Co-regulation and Shared-regulation Impact in Higher Education, and Role of Facilitator on Student's Achievement

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Abstract—Background: Flipped learning approach is a well-organized learning model leading to efficient active learning, effective peer-to-peer collaboration, and student-teacher interaction. However, to date, strategic implementation of co-regulation and shared regulation is rare in a flipped model in higher education. Hence, applying the self-regulation, co-regulation and shared-regulation strategies in flipped learning model is something necessary.

Aims: This research is to propose and modify the current flipped learning model by adding some elements like providing some co-regulation and shared regulation strategies to enhance the level of student's self-regulation skills giving rise to better student's academic achievements by using technology next to instructor support.

Methodology: The proposed model consists of the self-regulation, co-regulation and shared regulation strategies to enhance student's academic performance in a peer-to-peer interactive way by creating a pool of scripted dialogical regulation questions to collaboratively assessment of the student's self-regulation resulted from learning analytics and semantic analysis of the regulation dialogical questions and answers exchanged by students online.

Results: The expected outcome of this research is a modified flipped model for students in higher education to strategically have an effective self-regulation and peer-to-peer co-regulation. Their enhancement leads to effective peer-to-peer collaboration and better academic success.

Keywords— *Flipped Learning Model, Self-Regulation, Co-Regulation and Shared Regulation, Peer-To-Peer Collaboration, Student-Teacher Interaction*

I. INTRODUCTION

Recently, the flipped educational model has gained popularity in higher education fields [1][2]. In general, the flipped model is a student-centered learning approach through which lectures are assigned as out-of-class homework normally by watching videos, web-based instructional materials, group discussions, activities and assignments, etc. [3], for enhancing student's involvement and learning outcomes through this flipped model [4][5][6].

Self-regulatory skills refer to strategies that assist students to perform and prepare for their class better way. The important role of Self-regulation Learning (SRL) in student's learning progress and improving its usage in flipped classes can lead to the student's academic success [2]. Furthermore, besides success for online learning [7-10], self-regulation can be used in real, online and mixed environments as well to enhance academic achievements [10][11]. Peer-to-peer and student-teacher interaction also can provide the students with feedback and reflective thinking leading to the enhancement of self-regulation skills [10][12][13].

The problem is that a lack of student's self-preparation strategies can lead to student's failure in-class activities involvement [1][14]. Furthermore, the inability of individual self-regulation makes it much more difficult for peer-to-peer interaction and also in team works. Therefore, to conquer challenges in the process of learning and planning effectively it needs the capability of strategically regulate oneself [15][16][17]. To date, emphasis on the role of co-regulation and shared-regulation is rare in higher education [18] and this opens an opportunity for research into the application of these methods.

Therefore, this paper highlights on the important role of the co-regulation and shared regulation in flipped learning model to develop the student's self-regulation skills in higher education by proposing co-regulation and shared regulation strategies, a pool of scripted dialogical queries, to enhance the quality of co-regulation and shared regulation component in the current model. Therefore, the research questions of this work are:

- What is the impact of implementing co-regulation and shared-regulation strategies on the improvement of self-regulation skills, the student's academic success, and the student's active and collaborative learning in the flipped method?
- What is the impact of implementing learning analytics on the enhancement of student's self-regulation skills?

- What is the impact of group-reshaping on the improvement of the student's self-regulation skills?

The remainder of this paper is presented in five sections. Section II provides an overview of related research. State of the Art describes in section III. Section IV introduces the proposed a New Model of Flipped Learning model. Discussion and Conclusion present in Section V and VI, respectively.

II. LITERATURE REVIEW

A. Flipped classroom concept

Flipped classroom is a current instructional and pedagogical innovation has been widely used in recent years and implemented in many schools and universities [19] with an extensive use of technology as a dominant teaching model in United States [10][20][21]. The 2014 Horizons Report investigated the heavy emphasis of this model in higher education in the following year [10][22]. The model is defined as an educational approach through which class attendance is transferred to home activities based on which students watch lecture and tutorial videos at home and homework, assignments and practices are shifted to the class as a class activity doing by peer's collaboration and instructor's supervision [23][24][25].

More than years ago, flipped classroom idea was introduced and initiated by recording the lecture voices for their absent students and put them into online video sharing and social media platform for students who are non-attended class. This process was helpful for teachers not only focusing on teaching but trying to help and guide low-performed students [22][25]. In spite of the advantages of flipped approach for the student's academic success, implementing the innovative strategies to enhance the efficiency of this learning model is beneficial to eliminate the existing minor deficiencies which fulfils the purpose of this research.

B. Impact of the pedagogical instrument on self and co-regulation

Lack of external support for out of class online asynchronous learning is a determining factor for student's dropping out or procrastination as there is no highly interactive guidance and students solely learn by themselves [10][26][27]. In such circumstances, self-regulation plays a pivotal role and student's cooperative learning is also beneficial to improve learning and clarify the misconceptions through peer-to-peer interaction [10][28]. The flipped model proposed by Lage et.al. [24] indicated that student's perception was positive towards asking questions and learning from peers. Jiyan et.al. [29] proposed a model in which group discussion was regarded as one of the best parts of this model, but it still needs more research to make a more coherently supportive link between online and face-to-face learning approaches. In 2017, Lo and Hew [19] used the principles of instruction to design the flipped model in which, the possibility of in-class collaboration with peers resulted in clarifying the misconceptions and problem-solving. However, teachers were not able to check their student's out-of-class performance and students couldn't get immediate help and feedback from peers and instructions. In sum, to date, the findings related to the enhancement of collaboratively regulation skills in the flipped model are inconclusive [30].

In this paper, some modifications and extensions were implemented in this regard to propose the enhanced flipped model.

C. Technology Usage

Although the current flipped model indirectly highlights the role of technology for the purpose of self-regulation enhancement, there are no strategies to innovatively improve self-regulation skills through technology usage. In 2016, Lin and Hwang [3] proposed a flipped model equipped with the self-regulated monitoring system which is a platform through which students do self-evaluation based on that their self-regulation performance will be diagnosed by the database.

Results demonstrate that the higher self-regulated students performed better than the lower ones. This, in turn, assist teachers to concentrate more on low-performed students, however, still implementing some co-regulation strategies to assist students in cooperative learning is required in this model [31]. Considering the purpose of this research, the idea of learning analytics is beneficial in student's self-regulation evaluation resulting in group re-shaping and re-teaching the self-regulation strategies, to enhance the efficiency of the flipped learning outcome.

D. Self-regulated learning strategy

Self-regulated learning (SRL) consists of a combination of different angles of learning described as cognitive, metacognitive, motivational, emotional and behavioral aspects. As a result, self-regulation is regarded as one of the most important areas of research in education. According to Panadero [32] the most remarkable models of SRL are shown in several previous studies [11][13][15][33]. Based on Pintrich's model in [32], SRL includes four phases of self-regulated learning processes: (I) Forethought, Planning, and Activation, (II) Monitoring, (III) Control, (IV) Reaction and Reflection. Each phase consists of four distinct perspectives in regulation: Cognition, Motivation/Affect, Behavior, and Context. However, Pintrich's model, which developed in the late 90s, is still the most research model offering a remarkable number of SRL processes and in terms of regulation of behavior, and its uniqueness [32]. So, the four phases of Pintrich will form the basis of teaching and re-teaching students' self-regulation skills in this research.

E. Awareness of SRL and SSRL

In 2015, Jarvela et al. [31] used the Radar tool that exist in Virtual Collaborative Research Institute (VCRI3) for helping the students accurately have "self-assess and peer-assess" to make their final judgment of both individual and group status which have led to a better collaborative work [34], and enhance the awareness of one's SRL and Socially Shared Regulation of Learning (SSRL) which is effective for Computer Supported Collaborative Learning. Thus, it can say that Radar can provide information about the social and cognitive status of the group members [35] leading to the group awareness of the potential challenges that might weaken their collaboration to activate effective strategies [31]. Therefore, the Radar tool can be beneficial in this research by giving the opportunity to strategically provide the students' awareness of SRL and SSRL, however, the foundation of Radar is based on student's self-reflection and to manage the challenges in the process of learning, peer-to-peer interaction and feedback are required [16] which confirms the purpose of research through innovatively creating co-regulation and shared regulation strategies.

III. STATE OF THE ART

In 2017, Blau and Shamir-Inbal [18] modified the traditional flipped learning model in higher education based on the student's reflection on the course elements and the role of its participants in which the traditional flipped classroom model [23], (Grey rectangles as shown in Fig. 1), merged with the additional components added to the model based on their findings, (White rectangles as shown in Fig. 1). In this research, five components of the re-designed flipped model have specifically modified; which are, Co-regulation and shared regulation, Instructor as facilitator, technology use, collaborative and active learning, however, the focus of the research is more on co-regulation and shared-regulation and the role of facilitator in this regard.

A- Process steps

In the current flipped model, 36 students participated in advanced academic course based on self-regulated learning, teamwork, and face to face (synchronous and asynchronous lessons). It also included website for videos, forums and links to collaborative documents, course content which was open to be edited and sharing by students, collaborative documents to be discussed by students in groups of three, collaborative database as a tool for more analysis and monitoring of learning, assessment criteria for students to assess their performance and video conferencing platform, anywhere at anytime.

At the end, the data refers to the reflection of the students about the method through which they learnt the course into five categories:

1. Teaching and the role of the instructor;
2. Learning and the role of students;
3. Types of learning regulation;
4. Assessment in order to promote learning, SRL and co-regulation;
5. Contribution of technology in supporting teaching, learning, and assessment [18].

Therefore, the redesigned flipped model is considered as a base to the proposed model and improvement occurs through implementation of new strategies based on the existing limitation in the current model.

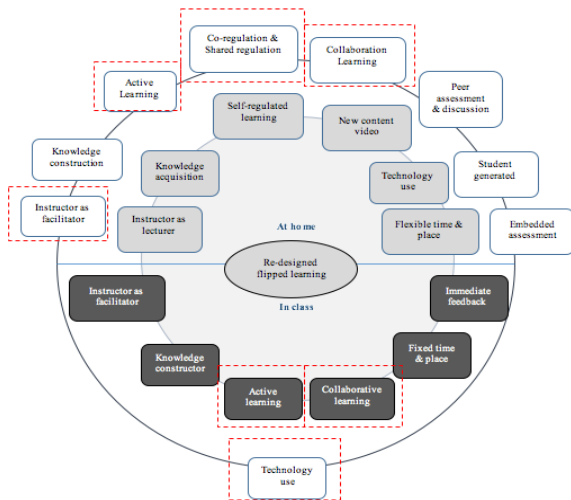


Fig. 1: Re-designed Model of Flipped Learning [18]

B- Features

According to the finding of this research, in traditional FC model proposed by Chen et al. [23], learning occurs in out-of-class only by watching videos of the lecturer. While, in the redesigned flipped model student's active learning occurs in both of in/out-of-class. Furthermore, the redesigned flipped model can open new horizons to enhance higher-order learning skills by student's interactions, teamwork and discussions, peer feedback, creating learning materials and sharing them with peers. There is also the possibility to draft editing based on the result of other classmates' assessment leading to the enhancement of student's critical thinking to solve complex problems and communication and social skills.

Overall, the instructor in holistic flipped learning model that proposed by Chen et al. [23], design the digital learning environment only, while in the re-designed model instructor also have extra features such as online discussion participation, tracking the student's group learning progress, encouraging student's interaction. Therefore, these features can improve the regulation skills leading to the higher level of cognitive learning behaviour based on Blooms Taxonomy [36]. Another impact feature of this research is the usage of collaborative database for data analysis and synthesis, through which pairs of students gained the type of the knowledge acquired.

One of the most important features of this research is collaborative learning of the course content. During the sessions, students can share relevant materials on the forum and give each other suggestions and feedback about the elements of the course content. As well, the database is beneficial for student's joint learning and data analysis if required in the future [18].

In a nutshell, facilitator, technology [3], inter-related strategies, and instructions [31] can help to enhancement strategically student's self-regulation in a collaborative way. This success can give rise to a more efficient flipped classroom and better student achievements [37].

However, it can say in the redesigned model students enhanced the two types of group regulation indirectly through their active learning and academic interactions. In other words, regulation is embedded in other learning characteristics and categories and there is not a strategically separate category for it. Considering the fact that implementing these two types of regulation is rare in higher

education [18][38] in order to overcome the independently learning challenges and gain mastery over the process of planning and learning, one individual needs to strategically and purposefully regulate oneself and others in a group together [15][16][17]. Hence, implementation of some co-regulation and shared-regulation strategies, in particular, is something essential that fulfills the purpose of this research.

IV. THE PROPOSED MODEL

Based on the limitations above of the current flipped approach, some important elements were added to the components of the new model approach, as shown in Fig. 2 in Green elements in some Grey and White rectangles.

The main emphasis of the enhancement is on providing some co-regulation and shared regulation strategies to improve the quality of the flipped pedagogical design by implementing some modifications to the components; such as "instructor as facilitator", "Usage of technology", "Active learning", and "Collaborative learning". These modifications are in line with the purpose of the enhancement of the student's self-regulation, co-regulation and shared regulation skills for having a more efficient flipped learning outcome in the course of the student's academic success, see Fig. 3.

A. Enhanced co-regulation and shared regulation

The addition of components to strategically enhance co-regulation and shared regulation is justified by the work of Jarvela [31], who used the features of a regulation tool called Radar. Radar tool is a self-reflection type of self-regulation assessment that consists of six questions.

The students fill in Radar separately and individually and the result related to each student appears on the screen. Hence, it provides the students the awareness about the status of the individual, and group members. It was created based on the pillars of self-regulation phases related to social and cognitive behavior. In spite of the advantages of Radar tool for SRL and SSRL awareness, it suffers some limitations from different angles. The questions are monologues, formal and not in the form of conversation, however, empowering the self-regulation abilities occurs more efficiently and effectively through giving and receiving support and collaboratively communication in peer-to-peer interactions [39]. Moreover, in order to overcome the challenges in the process of learning, one individual needs to develop self-regulation skills through strategies, peer support, [31][40], mutual regulation, [30][31] and collaborative learning.

Hence, in the proposed model, based on the principles of Radar tool [31], and also the four pillars of self-regulation phases in Pindrich's model [32], a pool of scripted co-regulation and shared regulation dialogical questions were created in a way that can be collaboratively and actively used by students in a daily conversation, as detailed in Table 1. As the students need to be self-regulated in the flipped learning approach to monitor the process of their learning performance, [37], the necessity of the intervention of regulation strategies is beneficial.

Table 1 shows a pool of scripted dialogical questions in the forum as one co-regulation and shared regulation strategy improves student's self-regulation skills resulting in a more successful flipped learning outcome in an academic course. It is simple and informal so that students can use them online and face to face while normally they are talking with each other. Therefore, these questions are considered as an

effective peer-to-peer and collaborative way to enhance the student's self-regulation behavior which in turn improves the efficiency of flipped learning approach results in better academic achievements and empowers students to discover gaps in skill, knowledge, confidence, and motivation.

In a word, the strategic intervention of face-to-face and online pool of scripted dialogical co-regulation questions can be enhanced.

B. Enhanced instructor as facilitator and enhanced use of technology

The addition of components to improve the performance of the instructor as facilitator is implemented and the justification for the enhancement resulted from [3]. Based on the student's self-regulation diagnosis results from the database, teachers evaluate and distinguish between the high and low self-regulated students. This way, the teacher can efficiently put more emphasis on the self-regulation enhancement of the lower achieving students leading to improving the self-regulation skills. In the current flipped model, the database is only used for the student's joint learning [18] while, it can be beneficially used for student's self-regulation evaluation [3] out of the result of learning analytics derived from the co-regulation questions that students are exchanging.

In fact, according to Thomas et al. [41] students with better emotional intelligence are more successful in their academic achievements at universities. Therefore, achieving additional learning analytics on the student's emotional state is also beneficial for the student's academic success.

In the proposed model, based on the concept of each co-regulation dialogical question, related keywords are considered as codes, as shown by Table 1, which is allocated to each question. The keywords in dialogical texts are analysed and depending on the positive or negative meaning of the selected words, data analysis of student's self-regulation performance occurs which results in the awareness of student's SRL.

Similarly, the instructor can individually monitor the student's dialogues on forums to be aware of their regulation status. This, in turn, results in the student's categorization into higher and lower achieving based on their self-regulation performance [3] which creates the opportunity for re-shaping the groups, online and face to face, in such a way that there is a mixture of both in each group. This way, the higher achieving students help the lower achieving students in each group and there is a balance in the process of self-regulation learning in flipped classes. As results from Lai's flipped model [3] demonstrate that students who apply the self-regulation strategies in flipped learning approach are more expert and successful and have a better self-regulation performance in the flipped classroom, the instructor re-teaches the self-regulation strategies to the lower achieving students and concentrates more on them as they need more care. As well, the instructor can have the same way of observation and group management when students are learning collaboratively in class and face-to-face (See Fig.2).

Furthermore, instructor's monitoring of the student's online mutual and cooperative regulation performance and self-regulation diagnosis results from learning analytics and particularly semantic analysis can be beneficially and supportively used for re-shaping the groups and re-teaching

the self-regulation skills to lower achieving students in the flipped learning approach to improve the student's academic success.

In a word, several enhancements can be included, for example:

- Student's monitoring of the dialogical co-regulation questions and replies (online and physically)
- Learning analytics from interaction
- Instructor's evaluation
- Instructor and re-teaching self-regulation skills
- Group re-shaping (online and in-class)

C. Enhanced self-regulation learning

Several researchers have been an emphasis on the importance of implementing some strategies, guidance, and assistance to support students conquer the challenges of self-study through active learning in the flipped learning approach. They believe that not implementing the proper self-regulation guidance and instruction results in the student's low self-regulated behavior and failure in the flipped learning approach [3][10][42] which properly justifies the necessity of enhancing the 'self-regulation learning' component in the current flipped model to strategically teaching and re-teaching the self-regulation skills. A common model that can offer significant strategies of SRL was done by Panadero (2017). Based on Pintrich's model in [32], SRL includes four phases of self-regulated learning processes, namely: 1) Forethought, Planning, and Activation; 2) Monitoring; 3) Control; 4) Reaction and Reflection. Each phase consists of four different perspectives in regulation which are: Cognition, Motivation/Affect, Behavior, and Context. In order to fulfill the purpose of this research, Pintrich's self-regulation method will be applied in the proposed flipped model to teach and re-teach self-regulation skills, as demonstrated in Fig. 2.

In a word, two main enhancements can be included here:

- Teaching self-regulation skills

- Re-teaching self-regulation skills.

D. Enhanced active learning and collaborative learning

In order to conquer the learning challenges, one individual needs to regulate oneself and other individuals together which highlights the important role of co-regulation [30][31]. The importance of collaboratively improving the self-regulation skills properly confirm the necessity of the enhancement of two components, 'Active learning and Collaborative learning' in the current flipped model.

The justification for this enhancement comes from an efficient regulation tool called Radar proposed by Phielix in [31]. Although Radar strategically used for the student's awareness of self, co and shared regulation status in a group, SRL assessment occurs based on the student's self-reflection and there is no way of collaboratively self-regulation assessment through peer-to-peer interaction, however, Lage et al. [24] investigated that the students have a positive attitude towards learning from peers by asking questions and receiving replies in their proposed flipped model.

Considering the constructive perception of active and collaborative learning, the necessity of enhancing the regulation strategies by implementing the predetermined dialogical questions and answers in the flipped model is something inevitable.

In the proposed model, there is a remarkable effort to empower the self-regulation assessment through implementing the communicative dialogical regulation conversations in the process of collaborative and active learning both in the face to face and online learning activities, as seen in Fig. 2, which in turn improves the student's academic success in flipped learning approach.

Put it briefly, the main enhancement is that the strategic intervention of face-to-face and online pool of scripted dialogical co-regulation questions and replies.

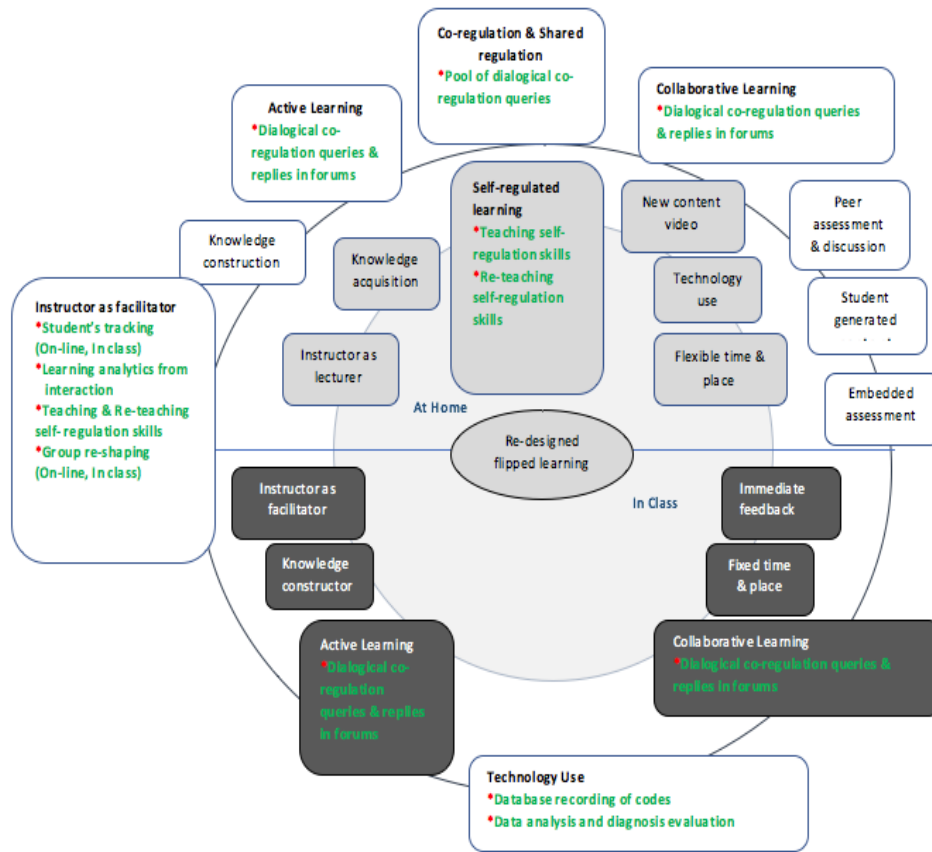


Fig. 2: Proposed a New Model of Flipped Learning

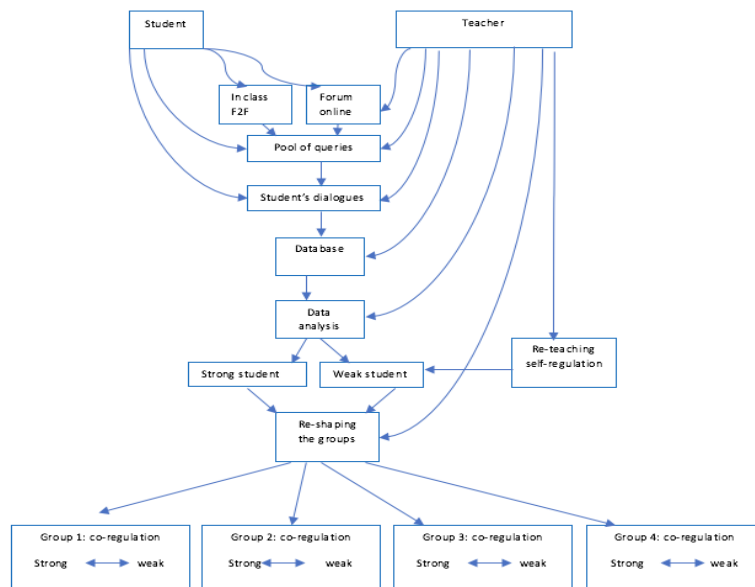


Fig. 3: The Process Steps of the Component Enhancement in the Proposed a New Model of Flipped Learning

TABLE I. THE POOL OF DIALOGICAL SCRIPTED CO-REGULATION AND SHARED REGULATION QUERIES BASED ON THE PRINCIPLES OF THE RADAR TOOL [31] AND BASED ON PINTRICH'S [32] FOUR PHASES OF SELF-REGULATION STRATEGIES.

Code	A Pool of Scripted Dialogical Co-regulation and Shared Regulation Questions	Justification
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Specific Learning Goals	- Do you understand exactly what we have to do? - I am dividing the big tasks into small ones to set better goals. How about you? - I don't know how to do this task. Can you help me?	It helps the students to analyze the learning tasks and set specific learning goals and strategies to achieve these goals.
Cognitive Load	- What exactly are the things we need to know?	It helps the students to assess their cognitive load before starting the task.
Level of Difficulty	- Do you also find some of these tasks more difficult than others? - Which task is easy for you to do? Can you help me?	It helps the students to evaluate the level of difficulty of the task.
Assessment	- Do you understand everything? - Everything seems simple to me. How about you?	It helps the students to make an assessment of task comprehension.
Assessment	- What do you understand by? - I understand everything very well. How about you?	It helps the students to evaluate their cognitive aspects before they start the task.
Confidence	- I am feeling interested in this task. How about you? - I have a lot of motivation to do this task. How about you? - I have enough self-confidence to do this task. How about you? - I am feeling anxious about this task. How about you? - I don't have any motivation to do this task. Do you know how I can motivate myself? - I know the task well. But I don't have the self-confidence to do the task. How about you? Can you help me?	It helps the students to evaluate their motivational aspects and confidence.
Emotion	- My mood and feeling affect my study. Do you know how can I manage this? - My bad mood and feeling negatively affect my study. Do you know what exactly should I do? - When I am stressed out, I can't concentrate really well on my studies. Do you know what exactly should I do? - Sometimes, I am not in a good mood to focus on my study. Do you know how I can motivate myself? - When the academic workload is high, I am badly stressed out. Do you know how can I control my feeling? - When the academic workload is high, I am badly stressed out. Do you know how can I monitor my study? - When the academic workload is high, I am badly stressed out. Do you know how can I set a plan to overcome? - When the academic workload is high, I am badly stressed out. Do you know how can I manage my time? - Sometimes I can't be on schedule because of stress and anxiety. Do you know how can I improve my time management? - Do you know how can I be more optimistic about doing this task?	It helps the students to evaluate the correlations between their emotional aspects, learning strategies and their learning results in order to determine the effectiveness of the learning strategies.
Motivation	- I am sure we can do this task really well together. How about you? - Do you think we can do this task together?	It helps the students to be aware of the quality of their performance and assess the level of their concentration and perseverance while doing a task.
Team-Work	- Do you think our team is higher enough to do this task? - As a team, we study really well and I really like this. How about you?	It helps the students to have a better assessment of group status with respect to doing the task.

V. DISCUSSION

In this study, the modified flipped model in higher education is proposed by including several elements (Green text colored inside some of the Grey and White rectangles) as reflected in Fig. 2, to the components of the current flipped model in White rectangles shown in Fig. 1, that was proposed by Blau and Shamir-Inbal [18] in 2017, which is been enhanced from the holistic traditional model in Grey rectangles in both Fig. 1 and Fig. 2, and suggested by Chen et al. [23], in 2014. The positive outcome of this flipped modification is innovatively creation of efficient strategies through student communication to interactively help each other to enhance their level of self-regulation skills. To satisfy this, a pool of scripted dialogical co-regulation and shared regulation questions were created as a strategy to enhance the self-regulation skills and implemented online and face-to-face to help students share their self-regulation information and get help from each other's knowledge and experience. Compared

the current flipped model and proposed flipped model, it can say:

- In the current flipped model, students learnt their regulation skills without specific strategies as the concept of self-regulation was embedded in the course content and students just learning regulation skills by collaboratively doing the course. While, in the proposed flipped model, the instructor acts as facilitator and teaching occurs through active monitoring of student's communication and dialogical questions and replies they exchanged in the forums and also by learning analytics resulted from the database which gives an accurate assessment of the student's regulation status.
- In the current flipped model, facilitators only help students by putting comments and feedback related to the study materials. While in the proposed model, tracking of student's dialogical regulation

conversations in the forums leads to an additional deeper understanding of the student's self-regulation abilities.

- In the current flipped model, the use of database as a digital tool is only for joint analysis of the examples of the course content and students were learning by doing. While, in the proposed model, database results from learning analytics identify weaknesses which will offer opportunities for re-teaching self-regulation skills and allow a considerable opportunity for group re-shaping to be more supportive to the student with low ability in self-regulation skills.

In all, considering the important role of self-regulation skills in the success of the flipped learning approach, the enhancement of the components mentioned remarkably improves the quality of flipped learning outcome paving the way for a more successful academic achievement in higher education.

VI. CONCLUSION

The purpose of this research is proposing a modified model of flipped learning by adding elements to the components of the current model through using the principles of the Radar tool [31] and the four pillars of Pintrich's self-regulation model [32], and also the application of learning analytics and more specifically semantic analysis. This modified model can emphasize the important role of strategically implementing co-regulation and shared regulation abilities to enhance the student's self-regulation skills for successful learning in a technological era. In this regard, the crucial role of database as a digital tool is more highlighted by efficiently implementation of the learning analytics out of the student's self-regulation performance resulted from the dialogical co-regulation scripted questions and also answers students exchange in forums. Furthermore, the role of instructor as facilitator is more emphasised by categorization of the low performed and high performed students in terms of self-regulation abilities based on the result of the learning analytics. This in turn, brings the constructive idea of re-shaping the groups consisting of the combination of higher and lower achieving students together which supportively paves the way for efficiently developing the self-regulation skills in a collaborative way. Addition elements is implemented in a way that interactively enhancement of the self-regulation skills occurs in both collaborative and active learning online and face to face giving rise to the availability of regulation strategies in flexible time and place leading to the more successful flipped learning outcome.

Although the proposed model contributes to the efficiency of the flipped model by strategically enhancing self-regulation skills, some experimental design and examination of the accuracy of the proposed modifications are required. Probing deeper, the results in this work provide a strong foundation for future work. One future work is an expansion of the dialogical interchanges to enhance this type of regulation both in theory and practice.

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