Exploring the application of self-directed and cooperative learning in information systems education: a critical analysis

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Abstract: Learning is a continuous process of acquiring knowledge. Information systems (IS) is a sub-discipline of computing discipline with a focus on providing theory and practical teaching and learning opportunities and experience for students in the area of managing computing resources in an organization and society at large. The application of self-directed and cooperative learning in information systems (IS) education has been an area of interest for researchers and educators. Self-directed learning emphasizes the learner's autonomy, while cooperative learning emphasizes collaboration and communication among learners. This paper presents a critical analysis involving self-directed and cooperative learning in IS education through a rapid review of the application of these learning approaches in IS teaching and learning. This study used a rapid review in searching, identifying, and analyzing relevant peer-review papers in critically analyzing the application of self-directed and cooperative learning in IS teaching and learning process. The analysis was done through a systematic approach reviewing relevant literature and identifying the benefits, challenges, and implications of self-directed and cooperative learning in IS education. The data analysis followed a rapid review approach to reaching the findings. The study revealed the meaning of SDL and CL and their application in IS teaching and learning process. The study also found different models that encourage the application of SDL and CL in IS teaching and learning process. The paper concludes with recommendations for IS educators and suggestions for future studies.

Keywords: cooperative learning; information systems education; information systems; learner-centered; learning; self-directed learning.
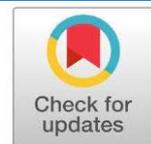
INTRODUCTION

Learning is a lifelong process while how to learn is essential for lifelong learning (Tekkol & Demirel, 2018). Learning involves the process of acquiring knowledge to change the behavior and social reasoning of students. The field of information systems (IS) is constantly evolving due to technological advancements, making it necessary for IS educators to equip learners with relevant knowledge and skills. To achieve this, various learning approaches have been used, including self-directed and cooperative learning. Self-directed learning involves learners taking charge of their learning process, while cooperative learning involves learners working together to achieve a common goal. Both approaches have been used in IS education, but there is a need to critically evaluate their application.

In IS discipline, learning assists in providing knowledge to understand the application and management of computer resources in an organization. Learning is done in different ways in IS disciplines, such as the self-directed learning (SDL) approach, cooperative learning (CL), contact session, and many more. SDL

allows IS students to drive their learning process with limited guidance from the lecturer or facilitator. According to Knowles (1975), SDL assists students in self-direct their learning process while using the right resources. While CL is an instructional theory, approach, or strategy that encourages learning in small groups to facilitate dialogue with one another (Bosch, 2017). Also, the CL approach groups students in small groups to work together toward a common learning objective. Achieving SDL and CL involves a good attitude, behavior, discipline, problem-solving ability, and support. However, lecturers act as facilitators in an SDL and CL in monitoring and guiding the learning process in the right direction. Though, this digital age present IS students with the opportunity to learn and acquire knowledge and skills on their own from all sources using the Internet and social media. Internet, social media platforms, and a few others make IS students ready for self-directed and cooperative learning in this digital age.

Presently, higher education institutions (HEIs) are overcrowded, and the number of lecturers is limited in managing the increasing number of students in HEIs. However, the time of Covid-2019 pandemic limits social, educational, and other gatherings but HEIs around the globe are gradually returning to normal. Lecturers and HEIs management are challenged in managing the growing number of students in a contact learning session (Muthusamy, 2015; Lawal & Isah, 2022; Chukwuma, 2022; Uzomah, 2022). At the same time, parents are faced with the challenge of whether to send their children to a particular institution, based on the student (learner) ratio per class (Marais, 2016). The overcrowding promoted lecturer-centered learning in directing students to learn in a particular direction, which has a negative impact because lecturers' control of the student's behavior and discipline is limited. To manage this kind of challenge, self-directed learning (SDL) and cooperative learning (CL) is handy for eliminating these challenges in promoting continuous learning at all times and places. SDL and CL provide IS students the opportunity to learn and study in the absence of a lecturer. However, IS lecturers (facilitators) need a full understanding of students' learning skills, abilities, needs, and attitudes which are essential components in the SDL and CL process.

This research presents a critical analysis of the application of self-directed and cooperative learning in IS teaching and learning. The paper begins by defining self-directed and cooperative learning and then proceeds to review relevant literature on their application in IS education. The analysis identifies the benefits and challenges of each approach and discusses their implications for IS education. The paper concludes with recommendations for IS educators and suggestions for future studies.

METHOD

The demand for IS research and findings is increasing at a high speed which has placed a literature review. According to Snyder (2019), there is an accelerated knowledge production in business which encourages literature review as a research methodology. There is a number of literatures such as systematic literature reviews, semi-systematic, integrated, narrative reviews, meta-analysis, rapid reviews, and many more (Snyder, 2019). Rapid review is a research methodology that synthesis systematic review components in a simplified form or omits some components in the production of knowledge quickly (Tricco, Antony,

Zarin, Strifler, Ghassemi, Ivory & Straus, 2015). According to McCartney, Hearty, Taulbut, Mitchell, Dryden and Collins (2017), rapid review is used in a study to search, identify and analyze relevant peer-review papers within the research domain. While Dimova and Mitchell (2022) suggest that rapid review streamlines systematic review components and produces timely findings. Though, there is no single definition of rapid (Tricco et al., 2015). For this study, a rapid review is a research method that omits some components of systematic literature review in producing quick production. The rapid review was deployed in the study in analyzing relevant peer-review literature on the application of SDL and CL in IS discipline in facilitating the teaching and learning process. The rapid review addresses the following research questions were explored:

a)   What are SDL and CL and their application in IS discipline?

b)   What are the models suitable for the application of SDL and CL in IS teaching and learning process?

c)   What are the roles of the IS lecturers in enhancing SDL?

d)   What are the principles of CL and CL as a strategy to enhance SDL?

e)   What are the implementations of CL and practical examples of teaching strategies in SDL?

RESULTS AND DISCUSSION

RQ1: The SDL and CL and their application in IS discipline

Cooperative learning (CL) in IS discipline

According to Bosch (2017), CL is an instructional theory, approach, or strategy which has been used for a year by Socrates with the idea to teach students to learn in small groups to dialogue with one another. Over time, researchers have joined in exploring CL in a classroom, but David and Roger Johnson contributed the most to CL strategy between the 1980s and early 2000s (Bosch, 2017). The theory promotes the grouping of students in small groups to work together towards a common objective in which everyone depends on each other wealth of knowledge in achieving a given goal. Bosch (2017) states that the CL strategy assists learners to build knowledge through interaction with one another to discover ideas and skills and engage in ordinary discourse. The CL procedure can be regarded as a social, dialogue, and collaborative learning strategy deployed by teachers to engage students to work as a team towards a common goal.

CL strategy can be suitable for SDL in IS discipline because students initiate, are motivated, and discover learning needs, which builds their learning process. In regard to the above, SDL attributes mentioned, SDL creates those resilient IS students to contribute meaningfully in a cooperative learning strategy; it also ensures that students remain relevant towards achieving a common goal. However, CL doesn't mean that IS students must sit in one venue; instead, they can contribute from any location using technology or digitally. CL aimed to build a relationship, prepare, and equip students with competence and

skills for the industry (Woods & Chen, 2010). However, lecturers find it very challenging in managing the teaching syllabus, evaluation group and individual grading, and others (Wadawi, 2013).

Understanding self-directed learning in IS discipline

This section covers the definition of SDL, models for SDL, SDL students in IS discipline, and the role of the IS lecturers to improve SDL. SDL is a process that allows students (learners) to prepare, initiate, and direct their learning process without the help of a lecturer or others. According to Golightly (2018), SDL is a process by which students initiate a learning process, diagnose learning needs and opportunities, formulate learning objectives, and identify the needed materials without the assistance of a lecturer. While Dehyouri, Behnam, and Hosseini (2016) suggest that SDL ensures that students take responsibility, control, and monitor their learning knowledge through motivation, self-regulation, self-efficacy, metacognition, locus of control, and goal orientation. SDL also ensures that an IS student identifies and adopts suitable learning strategies and assesses the learning goals and outcomes. The success of SDL lies in the student's ability to self-initiate, organize, direct, set goals/objectives and manage the learning process and evaluate the outcomes timely and accurately. In this digital age, the advancement of technology is making IS students knowledgeable with the ability to learn on their own without being observed. This digital age keeps promoting SDL through the power of the Internet and social media; students can learn new knowledge, skills, and values without going into the classroom or thinking within four walls of a classroom being directed by a lecturer/facilitator or instructor. According to this study, SDL is the way for IS students to be empowered and learn in this digital age. SDL students are those who can be accountable for their learning process (Kumar, Omprakash, Mani, Swaminathan, Maheshkumar, Maruthy & Padmavathi, 2021).

Technology is the power of 21st-century daily life and activities, and students keep learning on a go, anytime, and anywhere. Their continuous search for knowledge and learning can be regarded as SDL. Tredoux (2012) sees SDL as proactive learning with a constant quest for knowledge beyond one's boundary, with a student taking control of the learning journey and process. In this study, IS students and lecturers need to adopt the 21st century SDL (teaching) process that allows students to self-think, self-organize, self-motivated, self-initiate, self-sourced out materials, and self-set learning objectives (outcomes); and be able to evaluate their learning objectives/outcomes. During the COVID-19 pandemic, SDL was in practice by students across various disciplines including IS students globally. Because SDL empowers students to self-manage, control and monitor their learning outcomes and process independently (Loeng, 2020; Shahrouri, 2016).

The application of CL and SDL in IS discipline

The application of self-directed and cooperative learning in information systems (IS) education has been an area of interest for researchers and educators. Self-directed learning is a learner-centered approach that emphasizes the learner's autonomy and responsibility for their learning process (Knowles, 1975). On the other hand, cooperative learning is a collaborative approach that emphasizes communication and teamwork

among learners to achieve a common goal (Johnson & Johnson, 1989). Both approaches have been used in IS education, but their application and effectiveness are still a subject of debate. Several studies have investigated the effectiveness of self-directed and cooperative learning in different educational settings. For instance, Nandi, Hamilton, and Harland (2016) studied the application of self-directed learning in a postgraduate information technology program and found that learners who engaged in self-directed learning were more motivated and achieved better results than those who did not. Gokhale (1995) also found that cooperative learning enhances critical thinking skills in a technology education program. These studies demonstrate the potential of self-directed and cooperative learning in promoting learning outcomes, but there is a need to critically evaluate their application in IS education.

Self-directed and cooperative learning are two commonly used approaches in the teaching and learning process of information systems (IS). Self-directed learning refers to the process in which learners take charge of their learning and are responsible for setting their learning goals, strategies, and outcomes (Knowles, 1975). On the other hand, cooperative learning involves learners working together in small groups to achieve a common learning goal (Johnson & Johnson, 1989). Both self-directed and cooperative learning have their advantages and disadvantages in IS teaching and learning. Self-directed learning is beneficial in that it allows learners to take ownership of their learning and develop the necessary skills to learn independently (Moore, 2013). This approach also encourages learners to develop critical thinking, problem-solving, and decision-making skills, which are essential in the IS field (Nandi, Hamilton, & Harland, 2016). However, self-directed learning requires a high level of motivation and self-discipline, which may be challenging for some learners (Hartnett, St George, & Dron, 2011).

Cooperative learning, on the other hand, promotes active learning and engagement among learners, which is beneficial in the IS field, where teamwork and collaboration are essential (Gokhale, 1995). This approach also fosters social interaction and communication skills, which are crucial for IS professionals (Webb & Palincsar, 1996). However, cooperative learning may lead to groupthink, where learners may conform to the group's ideas without critically analyzing them (Janis, 1982). In the IS field, a combination of both self-directed and cooperative learning may be the most effective approach. For example, learners could be given the opportunity to set their learning goals and strategies but work in small groups to achieve their objectives. This approach would allow learners to develop both individual and teamwork skills, while also promoting critical thinking and problem-solving (Kaplan & Maehr, 2007). The application of self-directed and cooperative learning in IS teaching and learning has its advantages and disadvantages. Educators need to carefully consider their teaching goals and learners' needs to determine which approach is most suitable. A combination of both approaches may be the most effective in promoting critical thinking, problem-solving, and teamwork skills among IS learners.

RQ2: The models suitable for the application of SDL and CL in IS teaching and learning process

Several SDL models can be implemented in IS discipline for students and lecturers to keep learning continuously (Kumar et al., 2021; Tredoux, 2012). The educational environment keeps evolving, and SDL models have been proposed for students in IS discipline to meet the needs of 21st-century learning trends and expectations. Here are the commonly used SDL models over the decades (Kumar et al., 2021; Tredoux, 2012; Long, 1989).

Long's model for SDL

Long's model presents the "four quadrants" model proposed in 1989. The model focused on young students having two dimensions pedagogical control and psychological control (Tredoux, 2012). According to Tredoux (2012), "pedagogical control" covers the extent to which students possess the ability to decide on their learning goals, gather materials and resources, and evaluate criteria. While psychological control is regarded as the willingness of the students to actively control and maintain the process of learning. As IS students are expected to use technological resources to engage in the learning process by which these technologies encourage learning as you go.

On the quadrants, according to Tredoux (2012), quadrant I cover the "low pedagogical control and psychological control," which highlights students' active willingness to prove their "self-directedness" and less support from the lecturer (facilitator). The second quadrant (quadrant II) presents the "high pedagogical control and high psychological control," which states that the facilitator controlling the learning process possesses the self-directedness of the students. The researcher further highlights that Quadrant III is the reverse of Quadrant II, which shows "low pedagogical control and low psychological control". Quadrant III is an indication that students' participation in the learning process is solely dependent on the facilitator's effort to control the process. Finally, Quadrant IV shows "high pedagogical control and low psychological control" which explains learners with "little self-directedness" while the facilitator (lecturer) gives "stronger" support. The "pedagogical control and psychological control" should be balanced for SDL to be possible. Any element of unwillingness from the students to direct or control their learning process, then a facilitator should support the SDL process (Tredoux, 2012). In another way, Long's model can only be used for first-year students in IS discipline and higher education institutions.

Candy's model for SDL

According to Tredoux (2012) and Abraham, Hassan Ahlam Damanhuri, and Salehuddin (2016), Candy's 1991 SDL model has two dimensions: process and outcome (product) with four distinct phenomena: "(a) personal autonomy, (b) self-management, (c) self-control, and (d) autodidact (independent)". "Personal autonomy" remains a fundamental goal of educational institutions which is geared towards promoting the personal attributes of students in being independent, free to make a choice, and rational thinkers. Self-management is regarded as the willingness and ability of a student to learn on his or her own without a guide

(manage their learning process). Self-control covers the control of the learning process, while autodidact (independent) deals with learning outside the education environment (Tredoux, 2012; Abraham et al., 2016).

This model understood the difference in IS "students' self-direction" is seen in different situations (Abraham et al., 2016; Song & Hill, 2007; Tredoux, 2012). According to Tredoux (2012), a student can possess a "high level of self-direction" in an environment which they are comfortable and familiar with. Students in IS discipline are diverse in experience, interest, knowledge, and skills. The application of Candy's SDL model makes it suitable for IS students in achieving SDL and life-long learning.

The Brockett and Hiemstra's Personal Responsibility Orientation (PRO) SDL model

Learning is a process that must be controlled by the actors involved. Brockett and Hiemstra (2018) PRO model for SDL, highlights two parts or dimensions: firstly, (a) "personal responsibility in the teaching-learning, and (b) personal responsibility in one's thought and actions", secondly, "a student's desire or preference for assuming responsibility for learning" (Tredoux, 2012). The model emphasizes that students control their response to a given situation and gain control on the situation itself. Students' self-directedness is the act of willingness to take responsibility for their learning and eagerness to do it appropriately. A student has learning choices to make and directions to take in achieving their desires, but they have to take responsibility for the consequences (Kumar et al., 2021; Tredoux, 2012; Stockdale & Brockett, 2011). SDL is built on responsibility, but educational institutions and lecturers provide the opportunity and support that encourage SDL.

Learning takes place in an environment that can be regarded as a "social context." According to Tredoux (2012), social context is considered to be the physical environment or the institution where learning occurs such as society (students' community and HEI (off and online institution)), libraries, and others. However, the PRO model failed to recognize the online learning environment in the digital age as a learning context (Tredoux, 2012). However, the model can be suitable for IS students based on its ability to allow students to be self-responsibility and choose their learning preferences.

Garrison SDL model

Garrison's SDL model was proposed in 1997, which combines "(a) self-management, (b) self-monitoring and (c) motivational dimensions" (Yang, Su, & Bradley, 2020; Tredoux, 2012; Abd-El-Fattah, 2010). By Tredoux (2012), "self-management" deals with a student's control of the learning process (context) to achieve the learning goals and objectives. The student taking control of the learning process involves collaboration and engagement with peers, educators (teachers), and the school in the learning content. In making the collaboration, students should be given choices and guidance on how to proactively engage in the learning process Tredoux (2012).

Self-monitoring can be seen as the capability of the learners to monitor and manage their cognitive and meta-cognitive process of learning (Tredoux, 2012; Yang et al., 2020). The researcher further suggests self-monitoring gives the student the ability to (a) identify their learning strategies, (b) think and rethink their

thought, (c) be responsible for the personal meaning of their construct, (d) reflect profoundly and critically think, (e) provide feedback and construct meaning from it, (f) be responsible in their learning. Learning is a continuous construction of knowledge, and achieving self-monitoring involves the integration of this knowledge and requires commitment through reflective and collaborative engagement with others Tredoux (2012). During self-monitoring, self-directed learner monitors their learning progress through observation, judgment, reaction, and activities towards performance. Self-monitoring is responsible, while self-management is to be in charge (control) (Yang et al., 2020; Tredoux, 2012; Abd-El-Fattah, 2010).

Motivation presents an essential role in initiating, managing, and maintaining all efforts in achieving cognitive objectives and goals. It coordinates the learning context (control) and cognition (responsibility) in the learning journey, ensuring that achievement is reached (Tredoux, 2012; Yang et al., 2020). According to Tredoux (2012), in the Garrison SDL model, motivation is divided into parts: (a) "entering motivation" which covers a learner participating in the learning space while (b) "task motivation" is the task that keeps and persist the learner to stay in the learning process. A learner is motivated through the goal/s to enter motivation, and a learner remains in the process when the learning goal meets learning needs and expectations and is achievable, these increases entering motivation. Task motivation goes with self-control and management in taking responsibility for constructing their meaning and understanding Tredoux (2012). Within IS discipline, for students to engage effectively in SDL, they must self-manage, self-monitor, and be self-motivated in achieving their desired learning outcome or objective.

Oswalt's SDL model

The model proposed "3-Factor Model" in 2003 by Oswalt (2003) with nine (9) key concepts which are "(a) opportunity, (b) support, (c) collaboration, (d) motivation, (e) context, (f) cognitive skills, (g) skill with context, (h) skill with SDL, and (i) willingness to control one's learning" (Tredoux, 2012; Kumar et al., 2021). The "3-Factor Model" is "(a) learning situation, (a) components of learning, and (c) students" attributes, which aimed to group the nine key concepts. Under the learning situation, opportunity, support, and collaboration are included. According to Tredoux (2012) and Kumar et al. (2021), an opportunity depends on the lecturer's (facilitator) ability to be committed to the learning situation in SDL. The student must be motivated and committed to giving students the chance and support to construct their learning knowledge. The support includes expert guidance and resources in the learning situation. The collaboration involves "peer-to-peer" support in the learning situation (Tredoux, 2012).

The second factor is the learning attribute, which includes "integrates content skills, SDL skills, and willingness to direct one's learning" (Tredoux, 2012). Students' level of skill, which is based on prior knowledge, this knowledge has a direct influence on the construction of own learning knowledge in a learning context. A high level of SDL skills is a means to successfully carry out learning using the SDL approach. The cognitive, motivational, and context of learning are housed with the component of learning. Students' cognitive factors involve "critical self-reflection" on learners building personal knowledge in the

learning process. The motivational factors include self-efficiency and others. The analysis of these models assists in understanding how IS students react and apply SDL in their learning process in the digital age. IS disciplines have the opportunity to adopt an SDL process in supporting students because these students are getting exposed to informal learning environments and platforms; then, the formal SDL process will be an add-on to them in acquiring IS (educational) knowledge.

The self-directed IS student

Lecturer-centered involves traditional teaching and learning process where a lecturer directs the teaching while students are passively engaged in the learning process (Tredoux, 2012). The lecturer-centered model in IS discipline of teaching and learning gives the lecturer the authority to provide a directive to students on what to do at any given time in the learning process. Students are forced to receive any form of knowledge delivered by the teacher without their involvement in building or interacting effectively in the learning process. In this situation, learners learn little or nothing in the process. According to Tredoux (2012), students are not engaged or motivated to learn under teacher-centered learning circumstances. Kahiigi Kigozi, Vesisenaho, Hansson, Danielson and Tusubira (2015) believed that students especially in developing countries are learning content receivers and lecturers are givers under the lecturer-centered approach. Then, there is a need for students in IS to be involved and carry along in the process, which inspired the self-directed learning process.

Self-direct learning involves a self-directed learner who manages and directs his or her learning process. A self-directed student is a student who posse an initiative mindset, is independent, eager to learn, patient, self-organized, and responsible for his learning process, and outcome (Tredoux, 2012; Kumar et al., 2021). A self-directed IS student is self-efficiency, disciplined, and courageous in tackling challenges towards self-achievement. Self-directed IS student possesses the ability to study and understand basic and complex problems. Students of today in IS discipline can be regarded as self-directed students because of their eagerness to learn, and courage to discover new knowledge using the Internet, social media, and many other digital technology tools. IS discipline students can be encouraged to become self-directed students because of the high amount of information on the Internet and social media at their disposal. This information online can assist IS students in learning new things, which will directly influence their learning process. For students to remain informed and relevant, self-directed learning is the way to go.

RQ3: The role of the IS lecturers to enhance SDL

Lecturers are the fundamental role players in administering the SDL approach in the IS discipline. As many students in IS discipline are dominated by tech-savvy, lecturers play two important roles in SDL administration: enhance students' capabilities and foster the learning process and experience.

Enhance learner's capabilities: Lecturers provide an opportunity for students to learn in the SDL approach. Lecturers help students to initiate, plan, organize, involve in the learning, and assess their learning process and outcome in SDL. The students are allowed to take control of their learning process toward

achieving learning desires and outcome/s. Lecturers ensure that the laydown initiative is adhered to, and plans are followed in an organized matter; they also ensure that learning goals and objectives are achieved during and at the end of the learning process.

They ensure that IS students are empowered with the ability to cope, learn, and maintain an excellent learning outcome. The enhanced learner's capabilities depend on the available opportunity and support provided by the lecturers in the learning process. An improved capability also allows IS students to understand the key information to learn, but the student decides how to learn.

Foster the learning process and experience: For a long, lecturer-centered has been the desired teaching and learning approach by many in the HEIs, as in the case of the IS discipline. Currently, SDL has been promoted as a new way of administering teaching and learning because of the huge amount of information available for students in the digital age. The role of lecturers in enhancing the integration of SDL means lecturers' ability to ensure that students adopt the approach as quickly as possible. Lecturers foster the connection between the use and practical usage of SDL by students in the teaching and learning process. They also introduce the IS content or topic to cover while the students conceptualize the process to apply in the learning possible.

RQ4: The principles of CL and CL as a strategy to enhance SDL

The principles of CL

CL strategy provides the mechanism for IS students to learn with one another towards one goal. The strategy involves five (5) main principles or elements which include "(1) positive interdependence, (2) individual accountability, (3) face-to-face promotive interaction, (4) social skills, and (5) group processing" (Bosch, 2017; Wadawi, 2013). These elements make CL align with SDL.

Positive interdependence

According to Bosch (2017), positive interdependence can happen when students understand that success depends on group collaborations, then the fellow group relationship is paramount. In IS application, students in the CL group are given individual tasks and responsibilities geared toward achieving the group mandate. IS students realize that interdependence is paramount to their success; if not, the group and individual will fail. This realization makes it possible for IS student to give their best efforts and be responsible for a group. The ability to achieve positive interdependence, four points are considered: 1) positive goal, 2) positive reward, 3) positive resource, and 4) positive role interdependence (Bosch, 2017) is an excellent strategy to adopt for IS discipline to achieve its CL strategy.

Positive goal: Students can do more on "positive goal interdependence" in a group project or assignment compared them doing it individually (Bosch, 2017). Positive goal interdependence is regarded as an explicit goal approach that allows students to engage, learn, and be motivated to achieve their learning goals. In IS discipline, SDL students applying "positive goal interdependence" can accomplish a lot in a group because it will allow them to have a clear purpose, learn, and contribute meaningfully.

Positive reward: According to Bosch (2017), "positive reward interdependence" allows students to increase their commitment level if they will be rewarded for achievement and meeting a decided target. Each group member can be paid when a particular goal is achieved or reached. The reward can come in the form of a bonus, grade mark, and percentage. The application of this reward in IS discipline will assist students in achieving high CL.

Positive resource: This involves the combination of personal resources in the group (Bosch, 2017). Access to resources is necessary for the achievement of the goal in a CL strategy. SDL in IS discipline involves access to adequate resources, which will ensure that the CL strategy is well-executed and achieved.

Positive role: Each student in a group is assigned a role and responsibility in the form of reading, recording, checking, and many others (Bosch, 2017). For example, the checker has the role and the responsibility to ask members to explain what they have learned and so on. The decisive role ensures that students in IS discipline learn accordingly.

Individual accountability

Individual accountability indicates learners' "personal responsibility" towards group welfare and success (Bosch, 2017). The researcher also suggests that individual responsibility ensures that students take responsibility for their learning and that others in the learning group. The student's learning process and task achievements are their accountability and responsibility. The IS student's accountability is accessed on every task; however, individual efforts are coordinated for the group to remain on track in accomplishing a task (Bosch, 2017). Personal accountability is the key to group success; it helps others to achieve significance and assists in decreasing individual workload, because of interdependence on each other in the group (Bosch, 2017). 21st-century students in IS discipline should be accountable for their learning process and outcome. IS discipline students must possess individual accountability for them to achieve personal learning goals in an SDL environment and function on the CL strategy in achieving group goals and tasks. Though, own ethical behavior and attitude increase the chances of success for IS students to succeed in an SDL in the digital age. In IS discipline, individual accountability makes a group durable, responsible, and achieving a task.

Promotive interaction

The success of CL is dependent on various kinds of individual responsibilities. Interaction is necessary for the success of CL because individual members continually provide feedback, update their process, and group challenges, and encourage one another in the group (Bosch, 2017). According to Bosch (2017), promotive interaction is made possible when every student in a group monitors, encourages, and facilitates each other progress continuously. Communication among each other increases "peer accountability", individual responsibility, and commitment towards group success and achievement. Promotive interaction in IS discipline is very active through face-to-face meetings and discussions; however, the face of digitalization can also be applied in making groups interact with each other through Zoom meetings, Team, Google

document discussion and chat, social media, and other online platforms. IS discipline students can apply promotive interaction in their persuade toward achieving SDL and CL in the digital age.

However, according to Bosch (2017), promotive interaction is characterized by (a) promoting trustworthiness, creating a productive work environment, and decreasing anxiety and depression. (b) provide an environment where feedback and interaction excel to improve group performance. (c) promotes mutual benefits and motivation and information sharing. (d) it challenges each other to think and reason critically. (e) it promotes individual and group responsibility and accountability. These characteristics are vital in the IS student's achievement of the CL strategy.

Social skills

Teamwork and workmanship are necessary for a CL environment, especially in IS discipline where teamwork is essential. According to Bosch (2017), CL is a function of the social skills of group members who must have high-level cooperation and motivate them to socialize and engage in teamwork. The researcher also acknowledged that interpersonal, team-spirit, and communication skills, teachable and learnable mindset, decision-making, and conflict management skills are needed in the CL situation. These skills and others are necessary for IS students to succeed as self-directed learners and engage in CL in this digital age. The ability of students to apply social skills makes it easier for them to cooperate and collaborate in a CL environment. It also allows them to share ideas and knowledge when working in a group toward achieving a common goal. Bosch (2017) further mentioned that social skills make it possible for students who come from different social and economic backgrounds; having different behavior and attitude to co-exist and work in the same group.

Group processing

Evaluation of performance is essential in a CL environment. According to Bosch (2017), group processing is the act of reflection on students' contributions to a given group task to determine individual and group performance to understand responsibilities to continue or discontinue. The group processing makes it possible for IS students to get feedback on performance and make modifications where necessary. The processing ensures the improvement in-group members' (students) effort and reduces task complexities, incorrect actions, and behaviors and reducing unnecessary and increasing team success (Bosch, 2017).

All the principles of CL are aimed towards ensuring that IS students are prepared, engage, and well-grounded in participating in CL in an SDL in this digital age. Lecturers as facilitators have a role to play in ensuring that students remain focused on the learning process and achieving the desired mandate.

CL as a strategy to enhance SDL

CL provides a strategy for IS students to be interdependent, accountable, interact, social skills, and group processing. At the same time, SDL ensures that an IS student initiates a learning process, diagnoses learning needs and opportunities, formulates learning objectives, and identifies needed materials without the assistance of a lecturer. With these characteristics, CL can be used to enhance and advance SDL in IS

discipline and the classroom. For CL to enhance SDL in IS discipline, the principles or elements of CL should be considered and aligned with SDL properly:

1. **Interdependent:** CL involves IS students being interdependent on each to succeed. They should be able to initiate, coordinate their learning, diagnose learning needs, discover resources, and evaluate learning outcomes in an SDL. The interdependence on CL makes a student achieve the characteristics of SDL.

2. **Accountable:** The principle of accountability is enshrined in CL, which can be used to strengthen SDL skills to manage and control initiatives and evaluation of students' learning outcomes. An individual application of CL will surely enable IS discipline students to be responsible, and accountable, and take control of their learning to destiny in the SDL learning process.

3. **Interact:** Through interaction, students at IS discipline can understand the need for effective communication between teachers and other learners in the SDL process. The application of interaction can enhance SDL ensuring that students engage with each other continuously in the digital age.

4. **Social skilled:** This principle will be able to enhance SDL in ways that students can apply different forms of soft skills in their learning process to enrich the process and achieve desired outcomes.

5. **Group processing:** Feedback is necessary to evaluate contributions and performance. Through this principle, SDL characteristics of self-evaluation are achieved. Also, IS discipline students can engage in CL and self-directed with the ability to evaluate their personal and group performance and achievement/s.

RQ5: The implementation of CL and practical examples of teaching strategies in SDL

The implementation of CL in the IS classroom

As noted earlier, CL is a strategy that allows students to work as teams in achieving learning goals and expectations. To implement CL in IS discipline, the application of the principles and elements in the IS classroom is important.

1. **Positive interdependence:** Students at IS discipline will be taught how to be interdependent positively on each other so that learning needs and goals to be achieved. They should be monitored and guided in the application of the characteristics of positive interdependence in the learning process.

2. **Individual accountability:** Accountability is essential for any IS student to succeed in CL, then students need to understand, appreciate, and practice accountability in the CL process. Also, their accountability to themselves and others makes it possible for them to attend to any given task trustfully without delays or excuses.

3. **Face-to-face promotive interaction:** On the interaction, CL involves IS students interacting with each in giving feedback, presentation of one's task, and discussion. IS students engaging in the CL process should understand the importance of interaction and be able to communicate and interact with

each other face-to-face or digitally. But, importantly, the implementation of interaction comes through IS lecturers educating students on the need for and importance of promoting the CL process.

4. **Social skills:** Socialisation is critical in the implementation of CL in IS classrooms. The implementation of CL depends on IS students' ability to socialize with other peers. Then, the social skills of the IS students must be active and applied.

5. **Group processing:** Learning a performance-driven, especially in IS discipline where programs are expected to function as planned and software in an organization works properly. The implementation of CL in IS discipline and classroom mean the evaluation of performance and learning outcomes of individual students and the group.

Practical examples of teaching strategies in SDL

There are various types of teaching strategies that can be used by students in carrying out teaching and learning in promoting SDL in IS discipline. For the benefit of this paper analysis, the following are discussed:

1. **Lecturer-centered:** This is a strategy where a lecturer is a central instructor in the learning process. The lecturer directs the teaching-learning process informing the students on what to do and how the task will be done. students only wait and receive a lecturer's instruction without input. The strategy lacks students' involvement in the teaching-learning process, which makes them learn little or nothing at the end of the process. For example, a lecturer stands before the students introduce the topic for the day, starts talking, writing notes on the white or blackboard while students listen and take notes. At the end of writing the note, the lecturer asks, "Students; do you understand, students' response; Yes lecturer". The lecturer may further ask; any question, student; no question, lecturer; that is good". In this strategy, students do not participate in the process. This strategy can be applied effectively by students when engaging in SDL in IS discipline because can direct their learning process at the end of lecture time.

2. **Student-centered:** This is a teaching strategy centered on the student. students direct the teaching-learning in full involvement in the process. This strategy allows students to actively get involved in the discussions and ask questions while the lecturer guides and facilitates the teaching-learning process. This strategy also ensures that students learn well and participate in all the class activities. The strategy has the potential to SDL because students are allowed to think and initiate ideas in the learning process.

3. **Discussion:** There are various ways discussion can be achieved in IS classroom. For example, the lecturer introduced the topic, "The impact of Covid-19 on learner's education". Then, students are divided into a group to discuss the topic. The strategy allows students to work as a team in discussing the topic in coming up with ideas to address the topic. Students can learn with help from each other and share ideas and promote SDL.

4. **Cooperative learning (CL):** This is a pedagogical strategy that allows small groups of students to work in a group to achieve a common goal. According to Tredoux (2012), the CL strategy involves a small group of students with a common interest to learn, teach each other, solve a problem, and achieve learning goals. This strategy promotes collaboration, partnership, and cooperation in building team spirit and workmanship among students.

5. **Case study:** This is a strategy with a practical opportunity to allow students to apply what they have learned in the classroom to use in a real-life situation. In applying this strategy to the above example in the discussion section, students could be to demonstrate how Covid-19 have affected them personally. It will allow the student to discuss the personal impacts and challenges of the topic with them.

The Implications to Is, The Recommendations And Future Studies

Implications for IS

1. Self-directed and cooperative learning approaches should be considered in IS teaching and learning to promote critical thinking, problem-solving, teamwork skills, and communication skills among learners.

2. A combination of both approaches may be the most effective approach to achieve the desired outcomes.

Recommendations

1. IS educators should carefully consider learners' needs and learning goals when selecting a learning approach.

2. A blended learning approach combining both self-directed and cooperative learning may be effective.

3. The use of technology can support both self-directed and cooperative learning, particularly in distance learning settings.

Future studies

1. Future studies could investigate the effectiveness of different combinations of self-directed and cooperative learning in IS teaching and learning.

2. Research could focus on the role of technology in supporting self-directed and cooperative learning in IS teaching and learning.

3. Further studies could explore the factors that influence learners' motivation and engagement in self-directed and cooperative learning in IS education.

CONCLUSION

Teaching remains the center for knowledge acquisition and learning. The lecturer keeps making the teaching-learning process a reality while students make the process active. SDL was discussed in this paper as the new mode of learning in this digital age, while CL is the engine that drives teaching-learning to prepare students ready for the industry. In conclusion, this paper has critically analyzed the application of

self-directed and cooperative learning in information systems (IS) teaching and learning. The analysis reveals that self-directed learning promotes learners' autonomy, responsibility, and motivation, while cooperative learning promotes communication, teamwork, and critical thinking skills. Both approaches have been used in IS education and have demonstrated the potential in promoting learning outcomes.

However, the analysis also identifies challenges such as the need for learners to possess certain skills and knowledge to engage in self-directed learning and the need for effective group management and facilitation in cooperative learning. Additionally, there are implications for IS education, including the need for IS educators to carefully consider learners' needs and learning goals when selecting a learning approach and the potential use of a blended learning approach combining both self-directed and cooperative learning.

Based on these findings, this paper provides recommendations for IS educators, including the use of a blended learning approach, the incorporation of technology to support self-directed and cooperative learning, and the provision of guidance and support for learners to engage in these approaches effectively. Additionally, this paper suggests future studies to investigate the effectiveness of different combinations of self-directed and cooperative learning, the role of technology in supporting these approaches, and factors that influence learners' motivation and engagement in self-directed and cooperative learning in IS education.

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