

# Constructive Interaction in a Learning Environment: An Emerging Theoretical Model and New Notion for SDLR

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## Abstract

How one being readied for learning? Self-Directed Learning (SDL) has been equated to Student-Centred Learning (SCL) in its implementation, despite it being defined as “Learning with or without the help of others in achieving the learning goals”. A mix-method was conducted to understand the readiness for SDL. Statistics showed that being readied for SDL was independent of learning styles and teaching styles. One could be readied for SDL in any learning environment. Classroom observations showed that constructive interactions contributed to the readiness for SDL by engaging students and teachers to the lessons. Hence, an emerging theoretical model with a new notion for SDLR is proposed.

**Keywords:** Theoretical model, Constructive Interactions, Self-Directed Learning, Readiness

## Introduction

A definition for Self-Directed Learning (SDL) was introduced by Knowles in 1975. Knowles defined SDL as “*a process in which an individual takes the initiative, with or without the help of others, in diagnosing their learning needs, formulating and implementing appropriate learning strategies and evaluating learning outcomes.*”

Based upon the definition, many researchers have endeavoured into the study of SDL. Despite the definition proposed by Knowles was indicating SDL as learning with or without the help of others, many have equated SDL with Student-Centred Learning (SCL) when comes to the implementation (Hassan Murad & Parthibha Varkey, 2008; Kek & Huijser, 2011; Towle & Cottrell, 1996). Indeed SCL was developed with the concept of which teacher plays the role as facilitator, but to what extent teacher should facilitates is quite ambiguous (Schweisfurth, 2013). These seemed to show a misinterpretation of SDL when Knowles' (1975) definition is considered.

Based upon the interpretation mentioned, many have designed research of Self-Directed Learning Readiness (SDLR) with the criterions of SCL (Kek & Huijser, 2011). Measurements were developed to understand SDLR. Much of these research have claimed that learners were as yet not readied for SDL (Belzer, Millar, & Shoemake, 2003; Chakravarthi & Haleagajara, 2010; Kleden, 2013; Van Den Hurk, Dolmans, Wolfhagen, & Van Der Vleuten,

2001). Furthermore, some students appear to reject SDL in the form of student-centred approaches because of a lack of skills and knowledge in what they learn (Ozan, Karademir, Gursel, Taskiran, & Musal, 2005). Learners have also been found to lack the skills of developing learning objectives for themselves (Pepper, 2010). Despite the efforts put into understanding SDLR, it is as yet to have a congruent definition of it among the researchers.

Could this misinterpretation of SDL in practice have somewhat caused the failure of SDL implementation? Due to an over emphasis on SCL, the design of SDL might have ignored the needs and development of teacher-centred learning (TCL) learners. In their study, Arunodaya, Rogayah, & Ahmad Fuad, (2009), highlighted that one single approach to teaching does not work well for every learner. Indeed, researchers like Hendry and Ginns, (2009) showed that learners learned best in various manners. The research by Carrió, Larramona, Baños, and Pérez, (2011), supports this argument as learners learn well in a combination of student-centred and teacher-centred learning environment. While it can be agreed upon that the learning styles of learners is probably the crucial determinant of learners' SDL capabilities, it is also plausible that regardless of whichever method a learner prefers he/she should be able to acquire the skills and knowledge to be self-directed. Hence, in order to implement SDL successfully, it probably should be carried out by catering for SCL and TCL in the implementation of the SDL. There are as yet much areas of SDL which needed to be explored (Hiemstra & Brockett, 2012).

### **Readiness is independent of learning environment**

For better understanding of readiness for SDL this research was designed to collect both quantitative and qualitative data. In a mix-method research multiple approaches were used in understanding a phenomenon or knowledge (Johnson, Onwuegbuzie, & Turner, 2016). Therefore, in this research an extensive literature reviews was conducted to analyse the SDLR scales developed by the past researcher, four (4) scales were used to find out the relationship of SDLR with teaching styles and learning styles, and classroom observation were conducted to capture the possible incidences related to SDL happened during lessons. The research was conducted with pre-university Biology students and teachers nationwide in Malaysia.

A comparison of the past research in measuring the SDLR was done by compiling the constructs of various scales. Table 1 shows the summary of some common scales used in the research of SDLR.

According to Table 1, some general skills of readiness to pursue SDL had been studied by many researchers like Guglielmino, Murray Fisher, Oddi and Brockett. These skills basically suited for students in any principles of study (Hoban, Lawson, Mazmanian, Best, & Seibel, 2005), as these skills reflected the emotional, cognitive and learning skills readiness of students in any form of learning. Hence, some researchers like Du (2012) and Geertshuis, Jung, & Cooper-Thomas (2014) suggested that being readied for SDL is when an individual possessed the needed skills and knowledge for a particular principle of study. It is also suggested that each and every student will have their own level of readiness towards SDL (Hendry & Ginns, 2009).

Table 1 History of Self-Directed Learning Readiness Scales Development

Researcher	Year	Scale	Target Group	Scale development method	Data analysis tool	Constructs	Total of items
<b>Ayyildiz</b>	2015	Self-Directed Learning Skills	High-school students in Turkey		CFA EFA	Attitude towards learning	<b>40</b>
<b>Tarhan</b>						Learning responsibility	
						Motivation and self-confidence	
						Ability to plan learning	
						Ability to use learning opportunities	
						Ability to manage information	
						Ability to apply learning strategies	
						Assessment of learning process	
						Evaluation of learning success/results	
<b>Stockdale, Susan L.</b>	2011	Personal Responsibility Orientation Model of Self-Directedness in Learning (PRO-SDLS)	College Students			Awareness	
<b>Brockett, R. G.</b>						Self-Efficacy	
						Control	
						Motivation	
<b>Swapna Naskar Williamson</b>	2007	Self-rating scale of Self-directed learning (SRSSDL)	undergraduate nursing students	Delphi Technique	Internal consistency : Chronbach's Coefficient Alpha	Awareness	12
						Learning strategies	12
						Learning activities	12
						Evaluation	12
						Interpersonal Skills	12
<b>Murray Fisher</b>	2001	Self directed learning readiness scale for nursing education	Undergraduate nursing students	Delphi Technique	Varimax rotation, Chronbach's coefficient alpha, Item-to-total correlations	Self-management	13
						Desire for learning	12
						Self control	14
<b>Oddi</b>	1986	Oddi Continuing Learning Inventory (OCLI)	Graduate students in Law, Nursing and Education		Orthogonally Rotated Four-factor solutions	Proactive/reactive learning drive domain	11
						Commitment/aversion to learning	7
						Cognitive openness/ defensiveness.	6
	Revised in 2006				Chi-square	<i>Revised version</i>	
						Learning with others	6
						Learner Motivation/Self-Efficacy/Autonomy	8
						Ability to be Self-Regulating	5
						Reading Avidity	

<b>Guglielmino</b>	1977	Self-directed learning readiness scale (SDLRS)	Delphi Technique	Openness to learning opportunities Self concept as an effective learner, Initiative and dependence in learning Informed acceptance of responsibility for one's own learning A love to learn, Creativity Future orientation Ability to use basic study and problem solving skills
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Summarized from the literature reviews, SDL is theorised as a process of learning which is not confined to any form of learning and teaching environment. Therefore, learner is believed to be readied for SDL in any form of learning and teaching environment. In other words, SDLR can be independent from learning styles and teaching styles. Nevertheless, SDLR is understood as the specific skills and knowledge which one needed for a particular principle of learning. However, the general skills and knowledge in learning is a pre-requisite for student to be self-directed. Hence, SCL is not SDL approaches per se. As supported by Mazmanian & Feldman, (2011), a theory needs to be improved for SDL. Perhaps a better understanding of SDLR is needed too. Our Malaysian students needed to be readied to learn for life (Yean, 2014) as in SDLR skills and knowledge is developed for one to be readied in achieving their learning objectives.

### Readiness continuum

According to Fisher, King, and Tague (2001) SDLR exists along a continuum and is present in all individuals to some extent. In other words, all individuals develop different levels of readiness for SDL (Chu & Tsai, 2009; Du, 2012; Hendry & Ginns, 2009). This idea of a continuum was supported by the research of Gyawaii, Jauhari, Shankar, Saha, and Meraj, (2011). Therefore, as a first argument, the authors interpret that readiness for SDL falls within a continuum as illustrated in Figure 1.

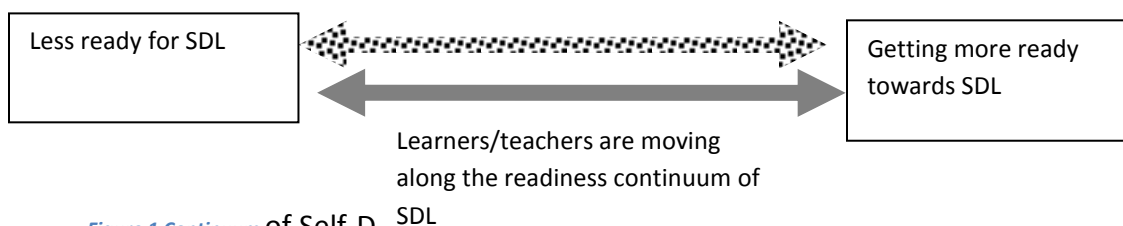


Figure 1 Continuum of Self-D

Keeping the idea of continuum of SDLR in mind, the current research designed to understand how SDLR should be identified. Consequently, correlations between students' SDLR and learning styles, and teachers' SDLR and teachings styles were identified quantitatively.

## **Methodology**

According to the understanding of the past research, the current research adopted a mixed-method approach. The aim was to understand Self-Directed Learning. This aim was achieved by correlating the Self-Directed Learning Readiness (SDLR) among the STPM Biology students to the learning styles, and correlating the Self-Directed Learning Lesson Readiness (SDLer) among the STPM Biology teachers to the teaching styles. The correlations provided the relationship of SDLR and SDLer with the learning styles and teaching styles respectively. With the quantitative correlation results, a continuum of SDLR was developed based upon some existing educational theories.

In addition, classroom observations were conducted in a nationwide manner to explore the factors influencing the SDLR and SDLer. According to the results, constructive interaction were found playing role in enhancing the readiness among teachers and students. This result has further enhanced the developed continuum of SDLR as discussed in the subsequent parts of this manuscript.

## **Results**

### **Learner could be readied for SDL in any form of learning styles and teaching styles**

Four (4) scales were used in this research to understand the correlation of students' and teachers' readiness for SDL with learning styles and teaching styles respectively. The readiness for SDL among students and teachers were measured with two scales developed through three Delphi rounds; the "Self-Directed Learning Readiness Scale for Biology" and the "Self-Directed Lesson Readiness Scale for Biology". Learning style was measured with an adapted scale the "Preference of Learning Styles for Biology" and teaching style was measured with the "Teaching Style Survey" which obtained online at [longleaf.net/teachingstyle.hxml](http://longleaf.net/teachingstyle.hxml). Table 2 and Table 3 show the results of the Spearman's Rho Correlations, SPSS version 20, of students' and teachers' SDLR with learning styles and teaching styles respectively. The four (4) scales were administered to 566 students and 55 teachers of pre-university Biology nationwide in Malaysia. Consent and approval were given by the participants and the school administrators for the administration of scales. The scales were administered with the presence of the researchers and collected immediately from the participants once completed.

According to the results, minimum variations were shown in the correlations between students' SDLR and learning styles, and teachers' SDLR and teaching styles. In other words, no particular learning styles or teaching styles were found correlated to SDLR more significantly. Hence, it indicated that being readied for SDL is independent of learning styles and teaching styles.

Table 2 Spearman's Rho Correlation of Students' SDLR and Learning Styles

	Theorist	Pragmatist	Activist	Reflector
<b>Correlation Coefficient</b>	.219**	.244**	.241**	.317**
<b>Sig. (2-tailed)</b>	.000	.000	.000	.000

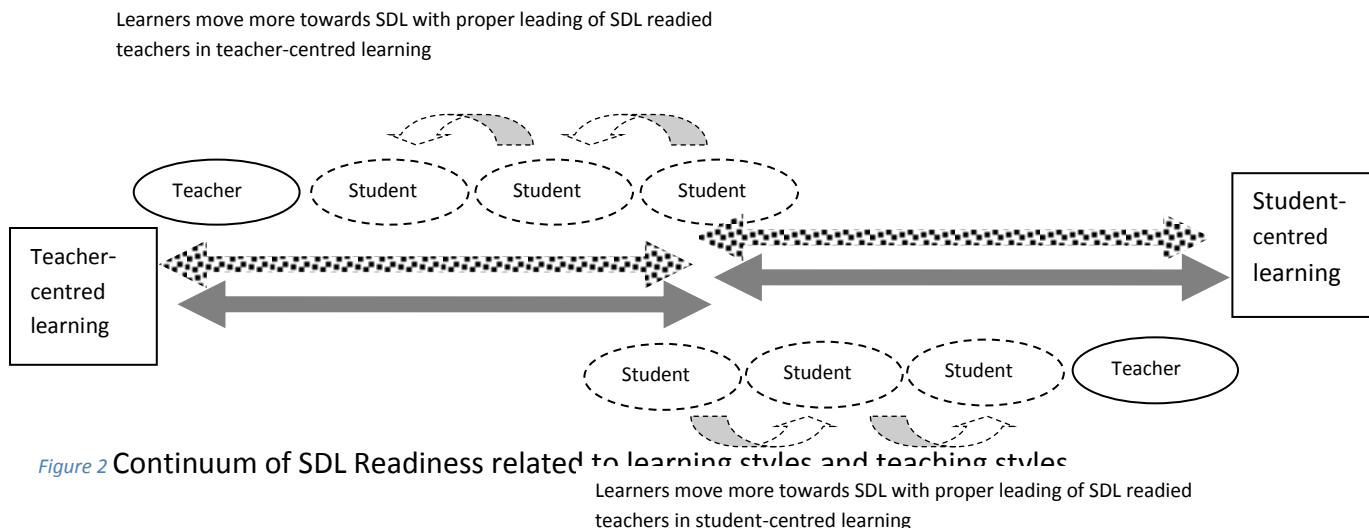
\*\* Correlation is significant at the 0.01 level (2-tailed)

Table 3 Spearman's Rho Correlation of Teachers' SDLR and Teaching Styles

	Expert	Formal Authority	Personal Model	Facilitator	Delegator
<b>Correlation Coefficient</b>	.591*	.508**	.569**	.606**	.480*
<b>Sig. (2-tailed)</b>	.000	.001	.000	.000	.001

\*\* Correlation is significant at the 0.01 level (2-tailed)

Based upon the results above, the SDLR continuum was further developed to two ends, one which is student-centred learning and the other teacher-centred learning respectively. Regardless of where the student is positioned along the continuum, (meaning the student can be exposed to a totally student-centred or teacher-centred environment or somewhere in between) it is interpreted that he/she can be SDL readied. This is illustrated in Figure 2 below.



A few theories were adopted in discussed below.

**The Social Element**

Firstly, in social constructivism as proposed by Vygotsky (Figure 3), students develop their own learning when supported by social interaction (Schunk, 2012). In ZPD it is believed that with the guidance of more capable person, student is able to learn skills or aspects of a skill that go beyond the student's actual developmental or maturational level. Therefore, the

authors propose teachers (no matter what teaching style they adopt) should interact with students in the way that trigger the development of skills and knowledge for SDL, in other words, developing the students SDLR. Grow, (1991) further explained that students move through stages of increasing self-direction and teachers will either enhance further or hinder this progress. This social interaction will include effective use of language to scaffold learning (Nielsen, Randall, & Christensen, 2015), absence of which would undermined the accessibility of students to information. Vygotsky's emphasis on language as a tool that is utilised by students to capture knowledge presented by teachers, interpret this knowledge within and then to express this knowledge in their own way must be given special attention in the endeavour to make students SDL ready (Verenikin, 2008). Language of teachers in the classroom irrespective of teaching styles is pertinent to the engagement of learners in the development of SDL readiness. As effective social interactions happen in the process of learning, students' readiness for SDL will advance their existing skills and knowledge. That interaction between teachers and students will help improve the mastering of skills and knowledge for SDL has been indicated by Jiusto and DiBiasio (2006) as well as Weaver, Rosen, Salas, Baum, and King (2010). It is believed that teachers are able to promote the development of skills and knowledge for SDL (Cherif, 2011). Therefore, readiness for SDL is believed to be irrelevant of teaching styles and learning styles.

### ***Meaningful Learning***

Secondly, according to Ausubel's "Meaningful Learning" (Schunk, 2012), students must make sense of their learning prior to be able to engage themselves in the learning process. Learning becomes increasingly meaningful when appropriately selected, organized and integrated within existing cognitive structures to link with one's life objectives (Brookfield, 1985; Hannafin, Hannafin, & Gabbitas, 2009). Only when the learning is related to students' life objectives, the students will be engaged with the learning process. This affiliation to learn will motivate the students to engage in their learning. This in turn will involve metacognition to integrate their skills and knowledge towards achieving the learning goals. Thus, students can be readied for SDL in using their skills and knowledge by engaging them meaningfully in their learning.

### ***The Spiral advance of knowledge***

Thirdly, Jerome Bruner suggested that students existing knowledge develops spirally (Schunk, 2012). It is a continuous process of topping up the existing knowledge. This knowledge development continues regardless of the preferred teaching styles and learning styles. The processes of learning happens almost simultaneously within oneself which includes the process of acquisition, the process of transformation, and the process of evaluation (Bruner, 1975). Student needs continuous sharpening of skills and knowledge for SDL in order to reap the benefit from it in every level of learning (Dyanan, Cate, & Rhee, 2008). As the development of knowledge continues, students should acquire adequate knowledge and skills to pursue the respective subjects.



### **Higher order of cognition and knowledge development**

According to Bloom's Taxonomy, SDL readiness can be reflected by a higher order of cognition and knowledge development (Dydan et al., 2008). These higher order skills and knowledge involve metacognition in transforming the knowledge to daily problem solving skills (Hannafin et al., 2009). Nevertheless, the lower levels of knowledge domains suggested in Bloom's taxonomy are also involved in the specific skills and knowledge for a particular subject. The specific skills and knowledge will slowly develop from the lower level of knowledge domains to the higher levels of Bloom's which will develop the metacognition required for SDL.

Based upon all the underpinning theories, it is anticipating that being readied for SDL involved the spiral accumulation, from basic to specific, of skills and knowledge of the discipline. Hence, the readiness for SDL is independent of learning environment and is specific for different discipline.

### **Constructive Interactions in Learning Environment**

In order to further understand how SDL takes place during lessons, classroom observations were conducted. The classroom observations were conducted with 16 teachers and their students from East and West Malaysia. Table 4 shows the records of observations done.

Table 4: *Record of Observations*

States	Number of schools covered	Duration of visit	Number of schools revisited	Duration of revisit	Number of schools where observations were conducted	Number of observations done
Sabah	3	1 week	-	-	1	1
Sarawak	2	1 week (Miri)	-	-	1	1
	4	1 week (Kuching)	-	-	1	1
Perlis	1	2 days	-	-	-	-
Kedah	3	1 week	-	-	-	-
Pulau Pinang	4	1 week	-	-	1	1
Perak	4	1 week	2	1 week	1	1
Selangor	6	5 weeks	2	2 weeks	3	7
Kuala Lumpur	6	6 weeks	4	4 weeks	3	13
Melaka	4	2 weeks	-	-	1	2
Negeri Sembilan	3	2 weeks	2	2 weeks	-	
Johor	4	1 weeks	-	-	-	
Kelantan	4	1 weeks	-	-	2	2
Terengganu	4	1 weeks	-	-	1	1



States	Number of schools covered	Duration of visit	Number of schools revisited	Duration of revisit	Number of schools where observations were conducted	Number of observations done
<b>Pahang</b>	3	1 weeks	-	-	-	-
<b>Total</b>	55	25 weeks 2 days*	10	9 weeks	15	20

Classroom observation protocol was developed for the researcher to record the incidences during lessons observed. The focus of the observations was to record and observe the incidences happened during lessons. Consent for observation was given by teachers and school's administrators before commencement of each classroom observation. During observations, the researcher recorded incidences happened during the lessons every five (5) minutes. The researcher was a passive observer in this research, no intervention was applied. Observation field notes were written during the observation. Photographs and video recordings were taken only with the approval of the teacher during the observations. The photographs and video records together with the observation field notes were then transcribed into expanded field notes for analysis. Triangulation of the expanded field notes were done to identify the incidences happened during the observations. Apparently many interactions between teachers and students were captured during the observations. Despite numerous interactions were observed, some of them were found to be non-constructive as they disengaged teachers and students from the lessons. The following discussion focused upon the types of interactions which are constructive and how the interactions contributed to the readiness for SDL.

An early codes of the constructive interactions were identified and send for three (3) rounds of peer reviews from the observation expanded field notes Table 5 shows examples of the interactions observed during the classroom observations. These interactions were considered constructive when it engaged students or teachers emotionally, cognitively and physically during lessons. Emotional engagement was captured as emotional expressions like happiness, attentiveness, and laughter were observed during the lessons; cognitive engagement was captured through actions like answering questions and contribution of ideas; and physical engagement was captured through actions like taking part in the class activities and searching for answers in books. Examples of the excerpts and engagement identified was showed in Table 6.

Table 5 *Examples of Interactions Between Teachers and Students During Classroom Observations*

<b>Final Themes</b>	<b>Explanations/Descriptions</b>	<b>Sample of Excerpts</b>
<b>Encouragement</b>	Words like, good, good try, great, what do you think, can you explain more, were used in encouraging the students to participate in the conversation	Teacher kept giving encouragement to students' response... (Perak, TFN24 R35 – 36)
<b>Asking Question</b>	Teacher asked questions and students answer was the common practice in most of the observed classes.	A lot of questions were asked during lessons... (Kuala Lumpur, TFN4 R88 – 89)
<b>Guidance</b>	Teacher provided guidance verbally to help the student in completing the task given.	Hints will be given to help students in getting the answers (Kuala Lumpur, TFN3 R33 – 34)
<b>Calling names</b>	Teacher called out students to give answer to her questions	Teacher called out name to answer her questions.(Kuala Lumpur, TFN2 R39)
<b>Praising</b>	Teacher praising the students for their efforts, correct answers, and attempts	The whole class was enlightened while the teacher started praising the student for being able to answer the questions. (Kuala Lumpur, TFN7 R23 – 25)
<b>Discussion</b>	Teacher having discussion with students	Discussion happened among teacher and students very often. Teacher attended to each student well. (Kuala Lumpur, TFN6 R47 – 48)
<b>Private talk</b>	Teacher went to the student and have private talking to one particular student	Teacher answered the questions only to the particular student. Most of the students behind were left unattended. (Kuala Lumpur, TFN5 R41 – 42)
<b>Focus group teaching</b>	Teacher went to the group of students and guide the group in their assignment	Students working in pairs to conduct the presentation. Teacher is helping and guiding beside closely. (Selangor, TFN25 R89 – 90)
<b>Prohibition</b>	Teacher stopped the student interacting with each other	Teacher prohibited the students from talking... teacher instructed the students to seat apart from each other, to avoid copying and discussion. (Kuala Lumpur, TFN10 R34 – 36)
<b>Humiliation</b>	Teacher openly humiliated the students by using word like "Why you cannot understand this?"	Teacher raised her voice and humiliated the students for not able to master the concepts... (Kuala Lumpur, TFN8 R44 – 45)

Table 6 *Types of Engagement Observed During Classroom Observations*

<b>Excerpts (audit trails)</b>	<b>Actions</b>	<b>Types of engagement</b>
<b>Students' names were mentioned when the teacher asking questions. Therefore, students were actively engaged and following her lessons. (Melaka, TFN23 R60 – 62)</b>	Attentiveness / following lessons	Emotional / Physical
<b>Students asked a lot of questions at the end of the lessons. (Melaka, TFN23 R68)</b>	Asking questions	Cognitive / Physical
<b>Whole class seemed happier and enlightened when teacher praise the students who answered the questions correctly. (Kuala Lumpur, TFN7 R23 – 25)</b>	Seem happier / enlightened	Emotional
<b>When students were conducting laboratory work, teacher was walking around to give guidance when necessary (Kuala Lumpur, TFN6 R46 – 47)</b>	Conducting laboratory work	Physical / Cognitive
	Walking around to give guidance	Physical / Cognitive

Initial codes were then identified for the interactions which contributed to the engagement of teachers and students to the lessons. Three (3) rounds of peer reviews were conducted to identify the final themes of the interactions. Apparently some of the interactions were contributing positively to the engagements, meanwhile some are not. The interactions which contributing positively towards the engagements of teachers and students to the lessons were considered as Constructive Interactions.

The observation data indicated that teachers and students tend to engage in the lesson when constructive interactions occurred. These engagements appeared to create the interest to teach (for teachers) and learn (for students) which eventually could enhance the skills and knowledge for learning Biology. With better skills and knowledge it is believed that both the STPM Biology teachers and students could be more readied for SDL.

From the results of the current research, constructive interactions seem to occur during lessons in any teaching and learning environment (either student-centred or teacher-centred). Apparently, what is important is to create the opportunity for interactions and monitor the interaction to minimize meaningless interactions during lessons. Past research also showed that students lack exposure to interact in various teaching and learning approaches (Chakravarthi, Halegajara, & Judson, 2010; Gurjeet, Navkiran, Cecilia, & Bulik, 2002; Jiusto & DiBiasio, 2006). Hence, the role of teachers in SDL lessons need to focus on creating the opportunities for constructive interactions. This result gave support to the current proposition that students and teachers should interact with each other in order to be readied for SDL as underpinned by the research's social constructivist theoretical framework.

### Emerging theoretical model for SDLR

Based upon the quantitative and qualitative results, and the existing underpinning theories, readiness for SDL is anticipated to be independent of learning styles and teaching styles, and also specific in subject matter. In addition, readiness for SDL is enhanced by constructive interactions which contributed in engaging the teachers and students in lessons. In view of the results of the research, an emerging theoretical model for SDLR is proposed. This model is shown in Figure 3.

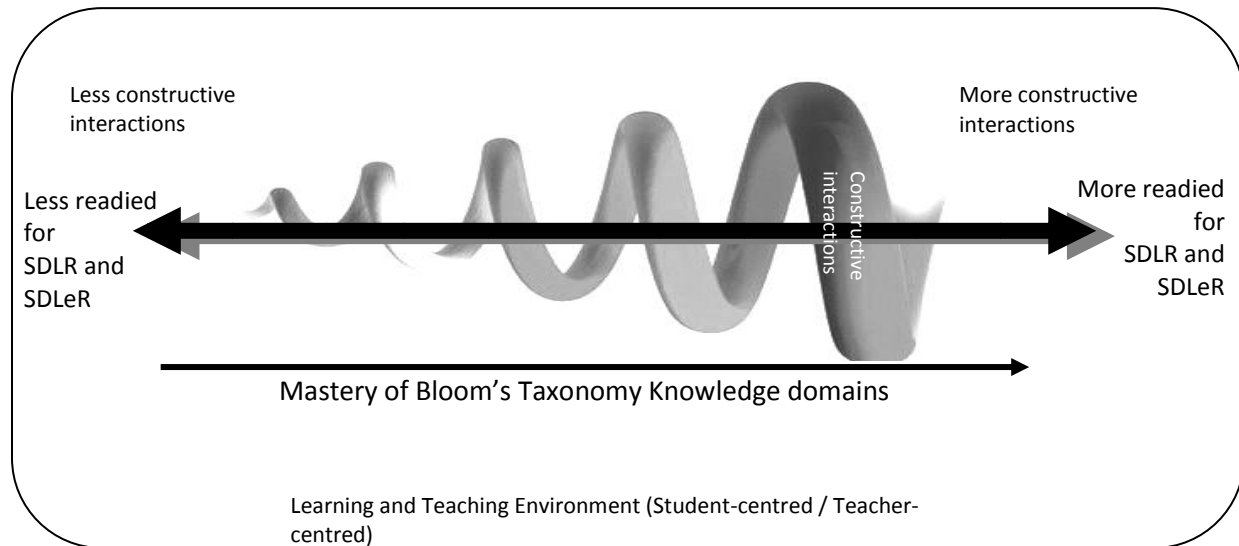


Figure 3 Emerging Theoretical Model of Self-Directed Learning Readiness

According to the model in Figure 3, SDLR is anticipated to be acquired in any form of learning environment. Constructive interactions is crucial in enhancing the mastery of skills and knowledge needed for SDL, hence contributed to the readiness for SDL. More constructive interactions during the lessons is anticipated to be able to enhance better development of skills and knowledge.

### Conclusion

An emerging theoretical model for SDLR is proposed in this article. The model brings forward a new notion of SDLR as *“the specific skills and knowledge one possesses in setting and achieving the learning objectives with or without the help of others regardless of the learning styles and teaching styles”*. This emerging theoretical model encompasses the social constructivist ideas of Vygotsky, Bruner’s theory of spiral learning, and Ausubel’s meaningful learning which contributes for the students being more readied for SDL. In addition, Bloom’s Taxonomy supports the necessity of acquiring skills and knowledge at a higher level of cognition for becoming more readied for SDL.

### **Applications and implications**

The emerging theoretical model also shows an understanding of how SDLR should be developed. It argues that learners will acquire the skills and knowledge for SDL and become more ready for SDL regardless of the type of learning styles or teaching styles they prefer. Therefore, SDL should not be confined only to SCL approaches. Indeed SDLR is developed with the efforts of making sense of the learning to one's aims through constructive interaction.

In order to acquire the skills and knowledge for SDL students should make sense of their learning. Hence, by interacting constructively with others will help the development of the skills and knowledge for a particular discipline of study. Therefore, a notion of SDLR should be instilled in order for the correct implementation of SDL in any curriculum. Constructive interactions could take place in any form of teaching and learning environment. The fallacy of making SDL equate to SCL should be rectify to ensure the success of the SDL curriculum. It could be the constructive interactions which we need to focus. Role of teachers during lessons not only as knowledge disseminator and facilitator of activities, but also planner for constructive interactions to take place.

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