Self-Directed Learning
Learning in the 21st Century

Lynde Tan
Joyce Koh Hwee Ling
For all our students, the educator’s raison d’être
ACKNOWLEDGEMENTS

This book is definitely the synergistic work of the authors and the teachers who have passionately shared their struggles and successful efforts in facilitating self-directed learning. Without their contributions, this second monograph on self-directed learning never would have come about. Each of their names could easily be listed on the cover alongside the authors’ and we express our deep appreciation to them.

We would like to extend our gratitude to the Principal, Vice- Principals, Head of Departments, Subject Heads and the collaborating colleagues of the teachers listed below (in alphabetical order):

- Anderson Secondary School: Mr Kwok Sheng Da, Ms. Lee Yan Mui Dolly, Mr. Loke Khin, Mr. Loo Jia Bin, Mr Ranganathan Jagan, Mr. Sim Lee Yong, Mr. Tan Chee Wee
- Chestnut Drive Secondary School: Mr Aaron Tang Wei Lun
- Elias Park Primary School: Mdm Mastura M. Hashim and Mdm Vasanthi Rengaraju
- Fuhua Primary School: Mr Ho Kok Soon and Mrs Robbie Lee-Pary
- Geylang Methodist Primary School: Mr Yin Jian
- Hong Kah Primary School: Mrs Pauline Soh and Mrs Wong Soo Ching
- Innova Junior College: Ms Mindy Wong Min Yin
- Rulang Primary School: Mr Kwan Tuck Soon
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS  
TABLE OF CONTENTS  
LIST OF FIGURES  

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>TITLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPTER ONE</td>
<td>INTRODUCTION</td>
<td>6</td>
</tr>
<tr>
<td>CHAPTER TWO</td>
<td>CRITICAL PERSPECTIVES OF SELF-DIRECTED LEARNING</td>
<td>11</td>
</tr>
<tr>
<td>CHAPTER THREE</td>
<td>WORKED EXAMPLES</td>
<td>31</td>
</tr>
<tr>
<td>CHAPTER FOUR</td>
<td>ROLES OF TECHNOLOGY IN FACILITATING</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>SELF-DIRECTED LEARNING</td>
<td></td>
</tr>
<tr>
<td>CHAPTER FIVE</td>
<td>CONCLUSION</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>BIBLIOGRAPHY</td>
<td>58</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Gibbons’ (2002) SDL Spectrum and Student’s Readiness</td>
<td>8</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Suggested Self-Directed Learning Framework</td>
<td>18</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Switching off the Internal Dialogue</td>
<td>26</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Key Activities in the WebQuest on Mensuration</td>
<td>38</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Extension of Learning in Mathematics</td>
<td>39</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Use of <em>VoiceThread</em> to Develop Students’ Ownership of Learning</td>
<td>57</td>
</tr>
</tbody>
</table>
CHAPTER ONE
INTRODUCTION
“You cannot teach a person anything; you can only help him find it within himself.” – Galileo

1.1 Background

Recent scholarship in educational research has argued for a range of 21st century skills which purport to prepare our young people for participation in a technological and globalised world (Ananiadou & Claro, 2009; Binkley et al., 2012; Dede, 2009; The Partnership for 21st Century Skills, 2011; Warschauer, 2011). The distinguishing argument put forward by the scholars resonates with Dewey’s (1915) exhortation that “if we teach today’s students as we taught yesterday’s, we rob them of tomorrow” (p.167). The digital age draws educators’ attention to the changing characteristics of learners, their learning environments, the resources they use and their new culture of learning. Given the constantly changing demands of globalisation, stringent questions about the notion of literacy, the constitution of 21st century skills and the social outcomes of schooling have been raised. Despite the dissenting views on these issues, the importance of developing self-direction as a 21st century skill has entered common parlance. The argument for self-directed learning (SDL) in K12 education can be dated back to the time when Seymour Papert (1993), one of the earliest proponents of educational technology, contends that children will do best by searching for themselves the specific knowledge they need.

The Singapore Ministry of Education has developed the third Masterplan for Information and Communications Technology (ICT) in Education that posits self-directed learning as one of the key 21st century skills that should be nurtured in our students (Teo & Ting, 2010). Singapore teachers have theories and models to help them teach effectively in didactic learning environments. However, less is known about self-directed learning and how this can be fostered and sustained in our schools, despite its importance for Singapore’s 21st century education.
In the earlier monograph on self-directed learning, Tan, Divaharan, Tan, and Cheah (2011) who have provided useful starting points for defining the term, suggested ways of operationalising it with ICT in school practices and examining ways of assessing it that are viable in our local context. It begins with the shared concern of improving students’ self-directed learning. It defines self-directed learning as a 21st century skill that encompasses the following salient features:

a) Ownership of learning: Personal responsibility in identifying learning gaps and setting learning goals;

b) Self-management and self-monitoring: The process of managing tasks, time and resources as well as the ongoing efforts of making improvements or taking actions to meet the learning goals;

c) Extension of learning: Making links across disciplines, connections between formal and informal learning as well as interests in and out of school.

Drawing on Gibbons’ (2002) work on adolescents’ self-directed learning, the authors suggest that self-directed learning is better understood as a spectrum that begins from the lowest level of incidental self-directed learning to the highest level of self-directed learning (Figure 1). Although these phases may not necessarily occur in a linear and hierarchical order, it is indicative of the progressive development of students’ readiness in self-direction.

To be relevant to teachers, the earlier monograph offers principles, with worked examples, for supporting self-directed learning from the lowest to the highest level. Using accessible language, Tan, Divaharan, Tan, and Cheah (2011) pose guiding questions to engage teachers in considering issues related to the following aspects of supporting self-directed learning, such as the attainment of learning outcomes and the degree of self-direction, technology integration, selection of instructional strategies and resources.
Figure 1. Gibbons’ (2002) SDL Spectrum and Student’s Readiness

<table>
<thead>
<tr>
<th>Phases of SDL (Gibbons, 2002)</th>
<th>Student’s readiness</th>
<th>Student’s SDL Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ownership</td>
<td>Monitoring and Management</td>
</tr>
<tr>
<td>Self-directed learning</td>
<td>High</td>
<td>High ownership, identify and commit to learning goals</td>
</tr>
<tr>
<td>Self-planned learning</td>
<td></td>
<td>Skilful in managing and monitoring own progress of learning</td>
</tr>
<tr>
<td>Self-managed learning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching students to think independently</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Incidental self-directed learning</td>
<td>Low</td>
<td>Low ownership, dependent on teachers to direct learning</td>
</tr>
</tbody>
</table>

(The authors thank the Singapore Ministry of Education for granting permission to reproduce Figure 1, entitled SDL Spectrum and Student’s Readiness, on page 20, Self-Directed Learning with ICT: Theory, Practice and Assessment, written by Tan, Divaharan, Tan, and Cheah.)
Congruent with the goal of developing the learner in self-directed learning, assessment for learning inevitably takes precedence. The earlier monograph focuses on developing students’ capacity in self-assessment with respect to the behavioural indicators of self-directed learning and performance outcomes. In addition, it also draws attention to teachers’ assessment of students’ behavioural indicators of self-directed learning and their scaffolding for self-direction. For these formative assessments, Tan, Divaharan, Tan, and Cheah (2011) recommend the use of rubrics and portfolio which place emphasis on the developmental nature of learning and the inseparable nature of teaching and assessment in classroom instruction.

1.2 Overview of the Monograph

This monograph builds on the earlier work by Tan, Divaharan, Tan, and Cheah (2011). It draws on the same definition of self-directed learning. Like the earlier monograph, it is intended to be a resource for teachers and educators who are grappling with the question of how best to facilitate students’ self-directed learning.

Framed by the permeable boundary between school and out-of-school learning experiences, this monograph attempts to extend the earlier monograph by focusing on the conditions that encourage the appropriate dispositions for students’ self-directed learning; they promote ownership of learning, self-management and self-monitoring, and extension of learning which constitute the salient features of self-directed learning. The conditions that teachers need to design, salient features of self-directed learning and the context of learning are presented as a framework which we hope will illuminate how self-directed learning can take place in Singapore. Using worked examples, we suggest ways of making self-directed learning viable in our local educational context.

This monograph is organised into five chapters. Chapter 1 highlights what has been established in the earlier monograph and articulates the intentions of this current one. In Chapter 2, critical perspectives of self-directed learning are explained to debunk some myths of the construct. It also suggests a framework that focuses on how teachers can design the conditions critical for facilitating self-directed learning in various contexts. Chapter 3 provides worked examples and reflections that are taken from teachers’ rich experiences and authors’ research. We propose in Chapter 4 that the use of technology
should pervade out-of-school studying or learning time. Although the roles of technology are dependent on the actual uses, we suggest a list of possible roles it can play in engaging students in self-directed learning. In the same chapter, we draw on any advances in educational practice that will interest those who are keen on improving the engagement of students in self-directed learning, using technology. Finally, we conclude with the importance of self-directed learning as one of the identified 21st century skills by the Singapore Ministry of Education.
CHAPTER TWO
CRITICAL PERSPECTIVES OF SELF-DIRECTED LEARNING

“I am always ready to learn, but I do not always like to be taught.” – Winston Churchill

Two Intertwining Foci of Self-Directed Learning

In line with research on self-directed learning, the two primary focus areas of self-directed learning in our school discourse centre on self-directed learning as a process and a personal attribute. It can be seen that the processes undertaken by students as they engage in self-direction serves to help them develop the attributes required of learners with personal autonomy.

Self-Directed Learning as a Process

Viewed from the perspective of self-directed learning as a process, Sefton-Green (2004) defines it as autodidactism, i.e. self-teaching and self-motivated learning. Song and Hill (2007) explain that when the term is understood as such, it is not referring to stepwise actions to fulfilling a goal, but rather, the emphasis is on the processes undertaken by learners to control the learning endeavour. Earlier self-directed learning frameworks from Candy (1991), Brockett and Hiemstra (1991) and Garrison (1997) also explain that the process-oriented notions of self-directed learning focus on ownership of learning and self-monitoring. Brockett & Hiemstra (1991), Candy (1991), Garrison (1997) and Gibbons (2002) further clarify that when self-directed learning is understood as a process, it possesses the following unifying characteristics:

(a) It is best understood as a continuum that exists to varying degrees in every learner.

(b) The responsibility of making decisions associated with the learning endeavour lie in the learners.

(c) It involves thinking and behaviours that the learners themselves select to direct and manage any activity.

(d) Learner control does not necessarily mean independent learning where learning takes places in isolation from others; it can involve one’s peers such as in collaboration with others.
(e) It necessitates the learner to self-monitor the learning process to be cognizant of whether one is heading towards or away from the identified learning goal.

**Self-Directed Learning as an Attribute**

When self-directed learning is posited as a 21st century skill, it is understood as an attribute, i.e. a quality or characteristic one has. A review of literature on the frameworks of self-directed learning shows that when self-directed learning is understood as such, the term is used to refer to personal autonomy (Candy, 1991), a goal, i.e. “a learner’s desire or preference for assuming responsibility for learning” (Brockett & Hiemstra, 1991, p. 24) or self-management (Garrison, 1997) where the focus is on the learner’s use of resources, learning strategies and motivation to learn. In Singapore, the Ministry of Education (2011) has described the self-directed learner as one who can:

(a) articulate their learning gaps;
(b) set learning goals and identify learning tasks to achieve the goals;
(c) explore alternatives and make sound decisions;
(d) formulate questions and generate own inquiries;
(e) plan and manage workload and time effectively and efficiently;
(f) reflect on their learning and use feedback to improve their schoolwork.

These are the desired outcomes the Ministry aims to nurture among our students in Singapore’s 21st century education. It is an attribute desired for all, not just attainable for the students in the Gifted Education Programme or those in junior colleges.

It can be seen that the differences between these two foci of self-directed learning are not always apparent in practice. A practical difficulty faced by teachers when trying to implement self-directed learning is the dearth of models that can be used by teachers to organise instruction like inquiry-based learning, problem-based learning, scenario-based learning or case-based learning.

In this monograph, we pay attention to the intertwining foci of self-directed learning, both as a process and attribute. We believe that they are inseparable in practice. By developing operational definitions of these foci of self-directed learning in
this resource for teachers and other educators, we present a design process that can be used by teachers to create interventions for the improvement of self-directed learning in the expanded learning environments of today. We provide insights into ways where self-directed learning can take place in Singapore by drawing on illustrative examples from some of our primary and secondary schools as well as one of the junior colleges. These examples are drawn from teachers who are teaching students with special needs and those studying in the Express and Normal streams with a range of abilities.

**Self-Directed Learning is Contextually-Bound**

In this monograph, we follow Song and Hill’s (2007) definition that context can be understood broadly as the “environment where learning takes place” (p. 28). Viewed from this perspective, context can refer to the site of learning (e.g. school or outside of school), mode of learning (e.g. face-to-face setting or online) as well as factors that can impact a learner’s extent of self-directed learning, such as the instructional support provided by the teacher, the characteristics of students and their learning environments (Candy, P. C., 2004; Pilling-Cormick & Garrison, 2007; Song and Hill, 2007; Thomas, Strage & Curley, 1988).

Self-directed learning takes different forms in different contexts. In school, it can still take place within teacher-didactic teaching although it may not exist as a high degree of self-direction. For instance, Thomas, Strage and Curley (1988) explain that even when doing a drill-and-practice activity, the self-directed child is monitoring his learning when he begins to notice that he is not able to understand what is taught and expected of him or is struggling with a particular skill. The self-directed child would have requested for the teacher to repeat his teaching or clarify his doubts with the teacher. When engaged in a drill-and-practice activity as a form of individual seat work, it is also not surprising to observe a self-directed child using self-speech to focus his attention on the task at hand.

Literature from literacy research, especially those that focus on digital media and learning, have provided rich ethnographic accounts of young people’s online participatory culture which has led to self-directed learning outside of school (Delwiche & Henderson, 2013; Ito et al., 2008; Sefton-Green, 2004). Online fan fiction writing is a
case in point. Black (2009), known for her work on adolescents’ fan fiction writing, describes fan fiction as:

... a unique form of writing in which fans base their stories on the characters and plotlines of existing media and popular culture. When creating fan fiction, fans extend storylines, create new narrative threads, develop romantic relationships between characters, and focus on the lives of undeveloped characters from various media. (p. 398)

Black (2008) contend that writing in a fan fiction community fosters print literacy and other 21st century skills which school appreciate but have not inculcated in the school's formal instruction. For instance, adolescents who participate in online fan fiction writing self-direct themselves in authentic reading and writing while at the same time, acquiring school-based writing skills such as writing in a wide range of genres and developing competence in using technology in the real-world contexts.

Some studies have argued that self-directed learners benefit more from online learning than those who are not (Lee, Hong, & Ling, 2002; Shapley, 2000). In the online mode, learners are given the responsibility to manage and monitor their learning (Candy, 2004; Shapley, 2000). For instance, when participating in online learning, self-directed learners must be mindful of their progress, whether they have understood what is covered and met the learning objectives and if not, they need to know how to seek assistance and resources to improve their learning. Even when peers provide online assistance such as through the use of peers’ commenting, learners need the skill and knowledge necessary for evaluating their peers’ knowledge (Candy, 2004; Petrides, 2002).

The instructional support designed by teachers are critical in online instruction. In their study of K-12 teachers who were engaged in online instruction, Archambault and Crippen (2009) suggest that their competencies in appropriating the right balance between technology, content, and pedagogy are critical for the success of the learning strategies they design. This suggests that teachers play an important part in defining the contexts surrounding students’ experiences of self-directed learning. It is not the mode of learning per se (e.g. online learning) that determines students’ experience of self-directed learning but how teachers design that experience. For example, when setting
up an online learning task, has the teacher provided an appropriate balance of open-endedness and structure to facilitate students’ selection of the learning goals? Has the teacher provided sufficient guidelines to facilitate students’ planning of the learning process without being overly prescriptive? Has the teacher provided sufficient support to facilitate students’ self-monitoring and reflection of learning? Self-directed learning does not imply a wholly unstructured learning experience that is left entirely to the students to manage. Rather, it is a carefully designed learning process that aims at an appropriate balance of structured learning experiences with sufficient open-endedness for students’ self-management. Hence, it is naïve to accept the view that all incidences of e-learning or doing online homework is an example of self-directed learning experience.

**Self-Regulation: An Essential Element in Self-Directed Learning**

In Chapter 1, we stress that the Singapore Ministry of Education’s definition of self-directed learning focus on ownership of learning, self-management and self-monitoring as well as the extension of learning. According to Long (2000), the quality of self-directed learning is highly associated with the processes of self-regulation. In other words, self-regulation is a critical and necessary element in self-directed learning. Hence, in order to develop a self-directed child, important processes of self-regulation such as self-monitoring, self-instruction, goal setting, self-planning, self-selection of strategies and self-evaluation are emphasised (Long, 2000). Hence, in the issues of responsibilities, learner control and metacognition in learning take precedence when developing our students’ self-direction (Pilling-Cormick & Garrison, 2007).

Zimmerman (1990) defines self-regulated students as those who use self-regulated strategies to monitor and improve their attainment of academic outcomes. Self-regulation occurs through three phases, i.e. the forethought phase, performance phase, and self-reflection phase (Zimmerman & Campillo, 2003). In the forethought phase, students analyse their academic tasks to set goals for themselves and to plan the strategies of how they may reach their goals. Once this has been planned, students move to the performance phase where they execute these strategies which may include paying attention to the task and engaging in self-instruction to improve performance. Another important aspect of the performance phase is students’ engagement in self-
observation where they may keep records of data related to their task performance data as well as engage in metacognitive monitoring where they analyse their personal strengths and weaknesses with respect to task performance. In the third phase, students engage in self-reflection which includes self-evaluation of performance to identify the causes of these performance outcomes. Their satisfaction or dissatisfaction with the results impact how they move back onto the forethought phase to plan the next cycle of task performance. Zimmerman and Kitsantas (2005) have found highly self-regulated students to be more focused on developing their competencies for task performance rather than on the task performance per se. They tend to have intrinsic rather than extrinsic motives for task performance and are more willing to adapt their future strategies to circumvent poor task performance, rather than be defensive and to avoid task performance in future.

Pilling-Cormick and Garrison (2007) assert that a key difference between self-regulated learning and self-directed learning is that the former focuses on the internal processes that students can take to manage the attainment of academic goals whereas the latter considers contextual influences on students’ self-management and monitoring activities. Notably, Zimmerman and Campillo’s (2003) phases of self-regulated learning explicate in detail many of the cognitive and metacognitive processes that students use to support their self-regulation. Nevertheless, we argue that the role that can be played by the teacher in supporting student self-regulation as well as the design of learning tasks have not been addressed in models of self-regulation.

In recent years, self-directed learning models are beginning to recognise the need to consider both internal cognitive processes as well as the external influences from the learning environment (Garrison, 2007; Pilling-Cormick, 1999). In Pilling-Cormick’s (1999) Self-Directed Learning Process model, she highlights the need to consider contextual factors such as student characteristics and the characteristics of the learning environment which can influence the amount of control that students can have to engage in self-direction. To certain extents, contextual factors determine the kinds of learning that can take place through self-direction as well as the internal cognitive and metacognitive processes that can be evoked (Pilling-Cormick & Garrison, 2007). Therefore, it can be seen that for self-directed learning experiences to be effective,
teachers need to carefully structure the task environment to provide sufficient scope for students' self-direction. Yet, teachers also need to consider the kinds of scaffolds to put in place to support this process. Research of self-regulated learning can inform teachers about the kinds of cognitive and metacognitive processes involved as students engage in self-directed learning. This can serve to facilitate teachers' design of appropriate scaffolds to support students' self-direction.

**Suggested Self-Directed Learning (SDL) Framework**

Our suggested framework is based on the critical perspectives of self-directed learning advocated in the previous parts of this chapter. It considers self-directed learning in a wider ecology of learning. We explore how self-directed learning can take place in and out of school when learning experiences can be structured or unstructured, resulting in varying degrees of learner autonomy. Although the boundary of the sites of self-directed learning appears to be binary, we stress that it is permeable in practice. Similarly, the binary of unstructured and structured learning experiences is not discretely divided. We acknowledge that in practice, these experiences exist in a continuum. We also need to stress that the salient features of self-directed learning can exist in the four broad contexts of learning posited in our framework (see Figure 2):

(a) School settings with structured learning experiences where learning processes and activities are mainly provided by teachers;

(b) Out-of-school settings with structured learning experiences where learning processes and activities are mainly provided by teachers;

(c) Out-of-school settings with unstructured learning experiences where the learning processes and activities are primarily determined by students;

(d) School settings with unstructured learning experiences where the learning processes and activities are primarily determined by students.
Figure 2. Suggested Self-Directed Learning Framework
**School Settings with Structured Learning Experiences**

This is the context where learning processes and activities are mainly provided by teachers. Within this context, the attention is drawn to the school settings with *school literacies* which are argued as “ideological practices characteristic of the specific ways of participating in literacy events in the routine school life” (Tan, 2010, p.17). When learning experiences are structured, they are pre-determined by the national syllabi with all the important learning outcomes clearly delineated. These learning experiences are framed by what Beinstein (1999) calls *the official knowledge*, otherwise known as “the educational knowledge which the state constructs and distributes in educational institutions” (p. 246). For example, in this context, self-directed learning can take place incidentally during a lecture when the students are taking their own notes while listening to a lecturer teaching a particular topic.

**Out-of-School Settings with Structured Learning Experiences**

The second context where self-directed learning can take place is in the out-of-school settings where learning experiences are structured. This is the context where learning processes and activities are mainly provided by teachers. These settings include the public and home domains such as the museum and at home where learning experiences are organised by teachers with the aim of achieving formal educational outcomes. While teachers largely provide the guidance for these learning activities, they structure some level of open-endedness into the activities where students are required to plan and manage some aspects of the learning process. For example, in this context, self-directed learning can take place when students are managing their field work, such as studying the types of rocks in Pulau Ubin, as part of their school project work.

**Out-of-School Settings with Unstructured Learning Experiences**

This is the context where the learning processes and activities are primarily determined by students and self-directed learning can occur in two forms. First, contrary to the school settings, self-directed learning can take place outside of school with *out-of-school literacies* which refer to “the ideological practices characteristic of the specific ways of participating in literacy events outside institutionalised settings and they tend to
focus on vernacular literacies that are not recognised in formal education” (Tan, 2010, p.17). For example, self-directed learning can take place when young people acquire technical competence as they teach themselves how to use a range of new media to create Do-It-Yourself productions. The earlier example on online fan fiction writing is also an example of how self-directed learning can take place in this context.

Second, in this context, self-directed learning can take place in the public institutions such as the Singapore Science Centre where the students learn formally sanctioned knowledge, such as astronomy, in informal approaches (Bradburne, as cited in Sefton-Green, 2004). In such contexts, the learning goals may not be necessarily set up in response to particular schoolwork, curriculum, or according to processes dictated by teachers. It is based entirely on the students’ volition. In other words, self-directed learning takes place in out-of-school settings such as in the public or home domains where the knowledge sought is socially valued and may be produced with the school curriculum in mind.

School Settings with Unstructured Learning Experiences

In this context, self-directed learning can take place in school when the students take part in activities that provide high student autonomy with little or no guidance from the teachers. For example, self-directed learning can take place when students work out their own plans to win a school-organised competition, such as “Best Young Innovator Award”, during the post-exam period. The plans are made by the students and the resources are prepared by the students, with or without support from home.

Facilitating Conditions for Designing SDL Experiences

As discussed in the earlier sections of this chapter, when facilitating self-directed learning in Singapore, we repudiate the assumption that such way of learning can only take place in schools and is restricted to formal learning only. In some instances, self-directed learning may start in school and continue outside of school, with varying degrees of structure, and vice versa. We argue that self-directed learning can take place in various contexts. What is key is the teacher’s design for self-directed learning to take place in these contexts.
In our framework, we suggest the guideposts necessary for teachers to facilitate self-directed learning. We perceive these guideposts as a form of design processes which suggest that teachers can undertake three essential phases when designing a self-directed learning learning experience: Phase 1 requires teachers to plan activities that can develop students’ ownership of learning, Phase 2 involve teaches scaffolding students to engage in self-monitoring and management whereas in Phase 3, teachers develop scaffolds to help students reflect and extend their learning. These phases correspond to the salient features of self-directed learning but are elaborated with specific actions that teachers can implement when designing a self-directed learning experience.

**Phase 1 - Develop students’ ownership of learning.** When conceptualising a self-directed learning experience, teachers need to start by asking, “What kinds of learning activities can I design so that students are allowed to develop a sense of ownership for their own learning?” As explained in the earlier parts of this chapter, it is important to note that self-directed learning is not necessarily equivalent to independent learning. Within a self-directed learning experience, students need to derive a sense of autonomy, which essentially means a sense of self-governance over the activities they are engaged in throughout the learning experience. It is important for students to develop a sense of autonomy about their learning experiences because many empirical studies have found this to have positive effects on developing students’ intrinsic motivation for learning (Hardre & Reeve, 2003; Standage, Duda, & Ntoumanis, 2005; Valas & Sovik, 1993).

Therefore, in Phase 1, we suggest three conditions that can be incorporated into teachers’ design of the learning task in order to develop students’ sense of autonomy or self-governance of their actions. These are intended to provide students with autonomy in task design, involve students in identifying learning gaps, as well as to support them as they engage in investigative inquiry, goal setting and planning. Providing students with autonomy in task design can be done by providing students with what Stefanou, Preencevich, DiCintio, and Turner (2004) term as organisational autonomy and procedural autonomy. The former refers to allowing students choice to manage their learning environment, such as where to learn, and with whom to learn with. The latter
refers to allowing students choice to manage the form of their work, for example, how to present their project or the materials and resources to use. Stefanou et al. (2004) also emphasise the need to provide students with cognitive autonomy, that is, the ownership of the learning process where they can ask questions and solve problems independently. In terms of self-directed learning, this takes the form of facilitating students towards asking questions about their own learning gaps so that learning goals can be established and students can conceptualise their task designs towards their learning gaps.

While the first two conditions are designed to engage students in self-directed learning so that they in turn help to foster their intrinsic motivation, the third condition emphasises the need for teachers’ scaffolds as the students engage in the self-directed learning experience. This may involve teachers setting the ground rules to facilitate learning in a way that provides adequate guidance, yet not be overly prescriptive about the task processes that students are to undertake. This may also involve teachers in planning activities to facilitate personal goal-setting and project planning. Depending on student level and student profile, teachers may need to develop rubrics, activity instructions, and templates to facilitate students’ planning. Supporting student autonomy does not mean the lack of teacher control (Koh & Frick, 2010). Rather, it involves teachers in careful planning to delicately balance autonomy and control in such a way that they build up the intrinsic motivation of students to engage in the self-directed learning experience.

Phase 1 Example: The Case of the Flipped Classroom

In recent years, many teachers have been interested in the flipped classroom. It is an instructional approach whereby the teacher flips the order of his/her instruction, i.e. teacher’s instruction is accessed at home through the use of videos or podcast ahead of class (Fulton, 2013; Tucker, 2012; Ullman, 2013). Through this approach, class time is spent on engaging students in collaborative learning, differentiated instruction, more in-depth discussions, group projects, individual interventions and so forth. More importantly, proponents of the flipped classroom note that this instructional approach is capable of covering what needs to be learnt when time is a constraint.
Locally, there are also teachers who are keen to explore how the flipped classroom is useful in promoting self-directed learning. In this example, we pay attention to a group of teachers who were at the beginning stage of implementing the flipped classroom to teach Mathematics to their Primary 5 students. Their main aim was to develop a sense of ownership of learning by these students. The flipped classroom was an appropriate choice to provide students with the autonomy in learning, such as identifying learning gaps, engaging students in investigative inquiry, goal setting and planning when the students were watching the teacher-created videos at home. However, the teachers realised that the following skills were needed when the flipped classroom was used to develop students’ ownership of learning:

- Teach students how to control their pace of learning, such as pause the video to take notes or replay the video for review
- Create ‘Think Time’ by spending time to think deeply about the questions posed by the teacher in the video
- Equip students with self-study skills, such as penning down questions that they have, including those that reflect their learning gaps
- Teach students how to ask a repertoire of questions
- Active learning such as by setting the purpose of watching the video, writing down what they would like to learn about a topic from the video and what they have learnt after watching the video
- Teach help-seeking strategies

Without these skills, the purpose of adopting the flipped classroom would be defeated and developing students’ ownership of learning using this approach would be futile too. It would be another familiar incidence where the teacher was directing the learning experience and the students remained passive in doing their homework.

**Phase 2 - Develop Students Self-Management and Self-Monitoring.** Once teachers have planned the kinds of activities to elicit students’ learning goals and plans about their learning processes in Phase 1, teachers need to move on to Phase 2 whereby they make provisions for the kinds of support necessary when students are
executing the learning plans. In Phase 2, we suggest two kinds of conditions that teachers need to set up. The first are conditions for monitoring students’ learning so that teachers can provide just-in-time assistance. Teachers can help students progress in their learning enterprise by setting up checkpoints where students’ learning and development are being monitored. This can be done, for example, by breaking up the final product for a project into progressive deliverables that are due at different points throughout the project period. At each milestone, teachers monitor students’ learning progress and provide feedback for them to make improvements. Each milestone can also be used as a means for teachers to evaluate students’ misconceptions and learning difficulties, and provide just-in-time assistance. This can take the form of teachers re-teaching or recommending resources for students. In this way, students are able to revisit concepts that they have problems understanding, ask questions to better understand their conceptions of the project or the content they are working with, or brainstorm ideas with their peers to further develop their projects.

When monitoring students' learning and providing just-in-time assistance, it is important for teachers to correct errors of understanding with respect to understanding of content; yet provide sufficient autonomy for students to explore their project conceptions and project plans. This is because students' perception of teacher control can influence their sense of autonomy with respect to their learning experience, and subsequently, their intrinsic motivation for continuing with the learning task. Examples of teacher behaviours perceived as “controlling” become teachers’ imposition of goals on students, frequent directives, interference with students’ preferred pace of learning, as well as not allowing students’ independent opinions (Ryan & Deci, 2002; Assor, Kaplan, Kanat-Maymon, & Roth, 2005). On the other hand, autonomy-supportive teachers are those perceived by students to be listening more to their opinions, give them fewer directives, soliciting their feedback about learning tasks, responding to their questions, and encouraging them to think independently (Assor et al., 2002; Manouchehri, 2004; Reeve, Bolt, & Cai, 1999). Teachers therefore need to handle progress monitoring and assistance with such kinds of autonomy-supportive behaviours.

Besides teachers engaging in monitoring, teachers should also provide scaffolds to help students engage in self-monitoring throughout the process of self-directed
learning. Garrison and Archer (2000) assert that "self-monitoring is a metacognitive and motivational process and responsibility, which includes understanding the task, accessing a repertoire of learning strategies, and having a general ‘awareness of, and an ability to think about, our thinking (plan and modify thinking according to the learning task/goal)’" (p. 97). Teachers cannot assume that students can be naturally adept at self-monitoring. This is a process that requires much practice and it can be challenging especially for younger students. Teachers can facilitate the process by setting up and teaching rubrics of performance to students, as well as leading them to make improvements using the rubrics. Such kinds of processes can be reinforced during the periodic monitoring of students' performance by teachers. As students become more adept at self-monitoring and improvement, teachers can gradually allow students to take over these processes independently.

**Phase 2 Example: Self-Management Activities for Students with Special Needs**

In this example, we focus on how two allied educators (Learning and Behavioural Support) concentrated on teaching Primary 2 to 4 students self-management skills with the aim of improving their self-direction. These students had special needs such as dyslexia or autism and they went to these teachers to learn social skills, organisation skills, remediation to improve one’s confidence, self-awareness as well as learning skills related to English and Mathematics. Interviews on their teaching resources show that the teachers were paying a lot of attention on developing students' self-management skills which were congruent with Thomas, Strage and Curley’s (1988) types of self-management activities, namely:

(a) Time management activities that provide the opportunity to learn e.g.

- establishing sufficient time to complete activities
- keeping track of time
- scheduling time
- meeting time commitments
- distributing time over tasks

(b) Effort management activities that serve to promote and maintain the disposition to learn e.g.
• establishing a productive study environment
• setting learning and achievement goals
• initiating effort
• securing the necessary materials
• maintaining attention and avoiding distractions
• providing incentives to learn

(c) Volitional monitoring activities that serve to monitor and evaluate the productivity of one’s study habits

• keeping track of the adequacy of time and effort management activities
• monitoring attention
• assessing strengths and weaknesses in study habits

To cite an example of how the teachers taught the students to stay attentive during their lessons, they taught these students a technique called “Switching off internal dialogue”. Internal dialogues are things the students were thinking about and when they had internal dialogues, they were not listening to another speaker or paying attention to what they should be doing. The teachers overtly taught these students ways of switching off their internal dialogue and explained to them the benefits of doing so. Figure 3 shows some ways of switching off the internal dialogue on one of the teaching resources prepared by the teachers.

Figure 3. Switching Off the Internal Dialogue

<table>
<thead>
<tr>
<th>Name: ____________________</th>
<th>Date: ________________</th>
</tr>
</thead>
</table>

What to do if the internal dialogue is switch on?

✔ the suitable answer

☐ Enjoy the internal dialogue
☐ Redirect focus
☐ Continue humming
☐ Eye Gaze for information
☐ Switch off
Phase 3 - Provide Opportunities for Students to Extend Their Learning. The first two phases focus on how teachers can facilitate students to set directions and manage their learning. The third phase focuses on what teachers can do to enhance the authenticity of students’ learning by helping students make connections between what they have learnt and their personal lives. Howland, Jonassen, and Marra (2012), when explicating their dimensions of meaningful learning with ICT, emphasise the importance of anchoring learning in authentic contexts and problems. This ensures that students are able to make real-world connections of their knowledge. Students’ experience of authentic learning can be further enhanced through activities that help them to construct personal meaning of their knowledge, especially to find personal applications of the knowledge learnt (Koh, 2013; Ellis, Barrett, Higa, & Bliuc, 2011). When planning the SDL experience, teachers need to create opportunities for students to find connections between knowledge gained from the classroom, books, and resources to their personal lives. This is the focus of the activities designed to help students extend their learning.

We suggest three ways that teachers can go about doing so. First, it is crucial for teachers to engage their students in the reflection of learning. In classrooms, teachers typically focus on students’ content knowledge. For example, teachers may use the K-W-L format where students reflect on what they know, what they want to know and what they have learnt. To strengthen the authenticity of learning, teachers can incorporate questions requiring students to think about what they have experienced about concepts related to the content to be learnt and the questions they still have about applying these concepts. At the end of the self-directed learning experience, teachers can ask students to provide examples of how they may apply these concepts in their lives. Therefore, reflection of learning goes beyond factual knowledge but focuses on the transfer of the knowledge to real-life applications. Opportunities to consider how learning experiences can be transferred to real-life usage is one of the principles of effective instruction suggested by Merrill (2002).

The engagement of students in reflection invariably involves the use of their prior knowledge. The self-directed learning experience should not be learnt in vacuum.
Teachers should provide opportunities for students to think about what they currently know and how the new content to be learnt may enhance its depth and scope.

Cognitive dissonance provides the basis for students to extend their learning as it requires them to explore and integrating ideas as well as resolve dilemmas among conflicting ideas. These are mental processes characterising deep learning that requires learners to:

(a) relate new ideas and concepts to previous knowledge and experience;
(b) integrate their knowledge into interrelated conceptual systems;
(c) evaluate new ideas, and relate them to conclusions;
(d) understand the process of dialogue through which knowledge is created, and they examine the logic of an argument critically;
(e) reflect on their own understanding and their own process of learning. (Sawyer, 2006, p.4).

Therefore, a second aspect that teachers need to take note of when facilitating extension of learning is to engage students' prior knowledge and create opportunities for suitable cognitive dissonance and resolution of differences between what they know and what they have learnt. In this respect, extension of learning involves the deepening and widening of one’s current knowledge. This can also take the form of making connections of a content area across different subjects.

A third way that teachers can extend students’ learning is to facilitate students to make connections between what they learn in and out of school. Note that in our framework, we recognize that students may learn about a concept through exploration out of personal interest. This may not have been part of school work assigned by teachers. Teachers can break the divide between learning within and outside school by encouraging students to make connections between the two. This can be done, for example, by encouraging students to share their personal portfolios or research as well as suggest ways they can extend this work through their self-directed learning experience.

Phase 3 Example: Self-Directed Learning in Product Design

This example focuses on how a group of Design & Technology teachers
promoted design thinking processes which placed a lot of emphasis on developing students’ extension of learning in their self-direction. As argued earlier, effective instruction takes place when there are opportunities for students to transfer their school learning experiences to real-life contexts (Merrill, 2002). In this example, the teachers situated the Secondary 2 (Express and Normal Streams) students’ project work in the context of serving the needs of the elderly in the community.

For a semester, the students were engaged in a non-linear process of design work whereby they engaged in understanding and addressing complex real-world issues and higher order thinking skills that emphasised application, integration and co-construction of knowledge. as they self-directed their learning in this project work. When they were identifying the goal of the project, the teachers and students co-identified the elderly as the targeted beneficiary for their design work. All of the students had interactions with the elderly in their daily lives and by situating their design work in the needs of the elderly, they would be able to reflect and draw on their prior experience and knowledge. Extension of learning took place when they applied their design knowledge and skills in the complex real-world issues.

To guide the students in their self-direction, the teachers engaged the students in the following iterative processes:
(a) Design situation: Students set the learning goal and gaps by identifying the situation (opportunities for their design work), end users (beneficiary of their design work) and design problems (the needs to be addressed in their design work).
(b) Design brief: Students had to develop a brief which served like a learning contract whereby they provided a short statement that identified the need or problem to be solved. In the design brief, the students would indicate the product to be made, its purpose, its end users and the context of use.
(c) Research: Students generated survey and interview questions to find out the needs of the elderly. Just-in-time interview skills were also taught during this phase of the project. During this phase, students also created videos to inform their teachers of their progress. The teachers gave feedback on their learning directions, processes and work, such as the quality of the interview questions and their social skills when
approaching the elderly.

(d) Development: Once the learning direction and goal were set, students used a mnemonic known as SCAMPER (substitute, combine, adapt, modify, put to another use, eliminate, reverse) to ask questions about existing products in order to improve them or develop new ones. Through SCAMPER, the students were able to understand the products available, find out the design features and functions required for their product and suggest improvements to be made. During this phase, students would generate ideas by considering design factors and develop an image board of the current product linked to the design situation and design brief. The image board consisted of pictures about the end users and pictures of a lifestyle of the end users.

(e) Reflection and evaluation in further development: Students reflected on their own work and think of how realistic and viable their idea would be. The teachers made use of gallery walk and questioning exercise to help the students review their own works. For instance, the teachers made use of another mnemonic known as PMI (plus, minus, interesting) to involve the students in listing all positive (plus) and negative (minus) aspects as well as interesting points of their design.

(f) Planning: Once the students’ ideas were finalised, they tested out their ideas by creating a cardboard model. They had to prepare a material list to determine the types of materials to be used. During this phase of the project, they could consult the teachers on the decisions to be made, such as methods to join the parts and materials.

(g) Implementation: The students were equipped with the necessary technical knowledge and skills to create their artefacts to be used in the real-world contexts.

The guideposts or design processes necessary for facilitating the three salient features of self-directed learning suggest the conditions that teachers need to be cognizant of when planning a self-directed learning experience. Teachers can use this process as a starting point for designing structured experiences within and outside school contexts. These experiences should provide students with opportunities to practice the key processes of self-directed learning, as well as encourage them to
transfer these skills to design their own unstructured learning experiences both within and outside school. In the next chapter, we present more worked examples from Singapore schools to further explain how these conditions can be put into practice.
CHAPTER THREE
WORKED EXAMPLES

“You learn at your best when you have something you care about and can get pleasure in being engaged in.” – Howard Gardner

Introduction
In this chapter, we present worked examples of how self-directed learning has taken place locally. These worked examples are provided by our local teachers who have tried out designing opportunities for self-directed learning. Using their experiences as worked examples, they serve as reference points from which to try variations that best suit the specific context of teaching and learning in each school.

Self-Directed Learning in School Settings with Structured Learning Experiences
In this context, it is a common practice to observe teachers teaching their students independent thinking in their endeavours to develop students’ self direction. This is the second stage of self-directed learning, based on Gibbons’ (2002) spectrum of self-direction. According to Gibbons (2002), in this stage, self-directed learning involves the teacher directing the students in their learning activities and leading them in the thinking process. From the teacher’s guidance, the students learn to answer the questions presented to them by themselves. Not only are the learning outcomes stipulated by the syllabi attained, the processes necessary to search for the answers are mastered to develop independent learning. We cite an example from a Chinese class in a primary school whereby the teacher is interested in teaching his Primary 5 students how to learn Chinese independently. We focus on metacognition as the key skill the teacher is developing when attempting to improve self-direction among the students. This is not to say that the teacher has not taught the content and language skills demanded by the Chinese syllabus, but rather, we cite this example to highlight the design processes necessary to facilitate students’ independent thinking. In this example, the teacher created a website, using Google Sites (http://www.google.com/sites/overview.html), to structure his design processes, which we describe below.
Targeted level of SDL: Teaching students to think independently  
Highlight: Metacognition  
Topic: Reading Comprehension in Chinese  
Level: Primary 5

Phase 1: Develop students’ ownership of learning

- **Provide learner autonomy in task design**

During the Chinese period, the Chinese teacher took his class of students to the computer laboratory. He instructed the class to visit the online canvas that he created using *Lino* ([http://en.linoit.com/](http://en.linoit.com/)) or better known as *Linoit* among our local teachers. The children were asked to post what they would like to learn by the end of the unit. Students’ responses included learning new vocabulary, pronunciation and usage of new words learnt, reading and writing new vocabulary, learning how to write a good essay and so forth. Before the unit was formally taught, the teacher briefly described what would be taught so that the students could manage their expectations. The teacher also prepared the students mentally that they would be given the responsibility to take charge of their learning, starting from the identification of their learning gaps.

- **Involve students in identifying learning gaps**

Instead of teaching from the Chinese textbook, the teacher instructed the students to first complete a worksheet to assess if they could write some of the new vocabulary introduced in the unit, use them to construct a sentence and in a cloze passage. He also asked them to read one of the passages in the unit and then answer some comprehension questions to assess their level of understanding of the text. From the teacher’s marking of the worksheet, each student had an idea of what they had yet to master. This was his strategy for helping his students identify their learning gaps.

- **Facilitate students’ investigative inquiry, goal setting and planning**

As a follow-up to the discussion of answers to the worksheet, the teacher asked each student to use online journals or blogs ([http://www.blogger.com/home](http://www.blogger.com/home)) to create a daily study plan that included:

(a) The learning goal: What is my learning goal? What do I want to learn?
Whether it was the daily study plan or other homework, the teacher made a conscious effort to explain what should be learnt from the task and the intent of the assigned task. He did this to provide the goal for doing the assigned task to his students so that it would be purposeful work, rather than busy work.

**Phase 2: Develop students’ self-management and self-monitoring**

- **Provide scaffolds for students’ self-monitoring**
  
  During the allocated class time, instead of a recitation, the teacher gave the students time to read the texts from the textbook. He allowed them to study the texts in groups. After reading the textbook, the teacher asked the students how they would like to be assessed. The teacher allowed the students to represent their understanding of the texts they read in any way, using any technological tools they were familiar with. For instance, some students used a Web 2.0 tool for creating comics and cartoons known as *ToonDoo* (http://www.toondoo.com/) to create the main ideas of the passage they read. By doing so, the students were indirectly assessing their understanding of the text on their own. While they were creating artefacts to represent their understanding, they could review or check with their peers what they did not understand. They could also use their self-selected resources such as an electronic dictionary to find out the meaning of a key vocabulary introduced in the chapter. As part of their daily blogs, the students were also asked to reflect upon how they could assess their learning goals and whether they had achieved them.

- **Monitor students’ learning and provide just-in-time assistance**
  
  The teacher also monitored the students’ understanding by assessing their artefacts of learning, such as their comics. He specifically looked out for his student's ability to demonstrate their comprehension of texts and application of reading and writing strategies previously taught. He would make use of different students’ artefacts to clarify students’ misconceptions such as wrong usage of a vocabulary. Based on the students’ works, he would emphasise what was important and had been left out in the
students’ reading and discussions of the texts they read. His teaching was contextualised and at the same time covering what was stipulated by the syllabus.

**Phase 3: Provide opportunities for students to extend their learning**

- **Engage students’ prior knowledge and allow students to make connections of what they learn in and out of school**

  In the unit, the teacher concentrated on metacognitive skills so that his students would know how to expand their vocabulary. More importantly, his aim was to teach them how to learn the Chinese language so that they knew how to make meaning with the Chinese texts they encountered both in school and out of school. He also involved his students in situational writing so that they could apply what they had learnt in the unit on a situation that the students were likely to encounter in the real-world contexts.

- **Engage students in reflection of learning**

  The teacher instructed his students to blog daily to develop reflective thinking and metacognition to support the learning of the language. As described earlier, he guided them in their reflection by directing them to reflect upon:

  (a) **Their progress**: What have I learnt? What am I learning now?

  (b) **Their processes**: How do I know I have learnt a skill or topic? How do I best learn a topic or skill? What gets into my way? What could have helped me learn?

  (c) **Their achievement**: How do I feel about my achievement?

---

**Highlight: Strategies for Developing Metacognition in SDL**

- Teach students to improve their learning through goal setting, planning and monitoring and provide opportunities for student practice

- Help students to be aware of they know about the topic, the goal of the lesson, the resources available to them

- Model the thinking processes in teacher-led discussions

- Engage students’ prior knowledge when learning a new topic

- Create an advanced organiser to let students know what will be taught and
enable students to make an alignment between their personal and academic learning goals

- Make clear the purpose of an assigned task to the students
- Provide students with resources, including technology, to help students learn when teaching a topic
- Equip them with help-seeking and study strategies
- Monitor students' progress, process and product of learning and help students reflect upon them

**The Teacher's Reflection**

For students who were less ready to self-direct themselves, I should have provided more guidance and support. To start with, it’d be more reasonable to start from a lower level of self-direction. Those student who were less ready to self-direct themselves were not able to articulate their learning goals. I could have suggested some to them and allowed them to choose which learning goals were more achievable for them. I would have continued guiding my students with thinking questions to model the desired thinking processes and provide them with a range of learning tools for differentiated instruction. I would also have continued with close observation and monitoring so that I could provide just-in-time assistance.

I believe if my students are able to own their learning, they will be more engaged in their learning which is necessary for achieving good results in school examinations. In Singapore, almost all self-directed learning activities must include concrete subject-based learning objectives, which is one of the main purposes of learning. The skill of a teacher lies in developing self-direction, skills such as metacognition and those related to using technology and at the same time, covering the content areas stipulated by the national syllabi.
Self-Directed Learning in Out-of-School Settings with Structured Learning Experiences

This is a context where the learning processes and activities were provided by the teacher even though they took place outside of school. In this example, we present a teacher’s use of WebQuest (http://webquest.org/), an inquiry-oriented unit that involves students in searching the Web for the relevant information they need. His intent was to involve his students in learning the topic of Mensuration before it was officially taught. In this example, we focus on how the teacher designed opportunities for his students to manage some aspects of the learning processes. Although the same WebQuest was used for the students from the Express and Normal streams, the teacher featured in this worked example was teaching the students from the Normal stream. The activities designed were online and they were intended to be done outside of school. In this example, we find Thomas, Strage and Curley’s (1988) classes of self-directed learning activities relevant in illuminating the students’ cognitive, time and effort management. Below is the case description of how the teacher designed opportunities for the students to self-manage their learning as part of his efforts to develop self-directed learning among them.

**Targeted level of SDL: Self-managed learning**

**Highlight:** Self-management - cognitive, time and effort management

**Topic:** Mensuration

**Level:** Secondary 2 (Normal Stream)

**Phase 1: Develop students’ ownership of learning**

- **Provide learner autonomy in task design**

  The teacher created a WebQuest (see Figure 4) to teach the topic of Mensuration to the Secondary 2 students. The students were given one month to complete the activities in the WebQuest before the topic was taught in school. In this WebQuest, the students were given a scenario where the government had set up a committee to evaluate the different geometrical designs of shopping malls with the aim of maximising the land space in Singapore. In the scenario, the head of the advisory...
committee recommended that all the shopping malls should adopt the geometrical design of a cube. In groups of four, the students were instructed to:

(a) Investigate the properties of different geometrical designs.
(b) Decide if the recommendation made by the head of the advisory committee was better than theirs
(c) Choose the best geometrical design which should be adopted by the Singapore government.

- **Involve students in identifying learning gaps and facilitate students’ investigative inquiry, goal setting and planning**

   The WebQuest was created to facilitate guided inquiry. The teacher designed three broad phases of activities (see Figure 4). The first activity involved the students in choosing or setting their learning goal. Each member of the group must decide on the geometrical design for their investigative inquiry, based on the list provided by the teacher. In the second activity, it was necessary for each student to carry out their independent research and study. Although the teacher did not instruct the students to articulate their learning gaps overtly, the students were indirectly identifying their learning gaps when they were asked to draw on their prior knowledge to answer the questions related to the geometrical design they had selected for their investigative inquiry. When the students were stuck with answering the questions, they were given the necessary resources from the Mathematics e-learning system, *Ace-Learning*, that the school subscribed to. The last activity involved the students to work with one another to determine the relationships between the total surface area and total base area of a geometrical shape and its volume. Based on their understanding of these relationships, each group must make an informed and justified reason for the best geometrical design, given the scenario presented to them in the WebQuest.
Figure 4. Key Activities in the WebQuest on Mensuration

![WebQuest Diagram](image)

**Phase 2: Develop students’ self-management and self-monitoring**

- *Monitor students’ learning and provide just-in-time assistance and scaffolds for students’ self-monitoring*

  The teacher instructed each group to report to him their progress but he allowed them to decide how often and how best this could be done. As a result of his consultative style, some groups chose to send him instant messages or emails with screenshots of their project progress and group discussions on phones and desktops. To help his students proceed with their WebQuest, he would email or text them to answer their questions. Although the WebQuest was intended for online learning at home, there were students who requested for just-in-time help from the teacher when they met him in school. Those students who were less ready to self-direct themselves were dependent on the teacher’s just-in-time feedback to locate resources, comprehend the questions in the WebQuest and identify the relevant concepts and formulae to solve the problems posed in the WebQuest. For those who were more ready to self-direct themselves, the teachers’ choice of questions already served as scaffolds for them to better understand the key concepts in mensuration. For instance, in order to determine the best geometrical design that maximise land space in Singapore, the students must know how to measure each shape, how to calculate the amount of land space occupied by each design, the amount of material required to construct it and its total capacity. In
other words, the teacher was guiding them to seek and select relevant information that could help them solve the main problem posted to them in the WebQuest.

**Phase 3: Provide opportunities for students to extend their learning**

- Engage students’ prior knowledge, engage them in reflection of learning, and allow them to make connections of what they learn in and out of school

Through the use of WebQuest, the teacher was able to engage the students’ prior knowledge on geometrical shapes to learn a new topic, without having to teach them in a teacher-didactic method. The WebQuest was designed so that the Secondary 2 students were able to reflect upon the application of Mathematical concepts in the real-world context. Specifically, in this case, they were able to apply the mensuration of geometrical shapes to determine how land-space efficiency and cost-effectiveness affect the shape and size of shopping malls in Singapore. In this way, they were able to extend their learning by making connections between what they learnt in school and experienced outside of school (see Figure 5).

**Figure 5. Extension of Learning in Mathematics**

---

**Highlight: Strategies for Developing Cognitive, Time and Effort Management**

Cognitive Management
• Guide students in seeking out relevant information and differentiating important from unimportant information
• Teach students to consult resources and references when previewing/reviewing a set of material so that they can enhance their understanding of the resources given to them
• Design activities that allow the students to synthesize and construct relationships across concepts or topics learnt
• Design activities that allow students to relate the concepts or topics to be learnt to their prior knowledge
• Design activities to enable the students to develop an awareness of what they had yet to master

**Time Management**
• Provide sufficient time for students to complete the assigned task
• Allow students to spread out tasks over time
• Establish monitoring means for students to account how they have kept track of time for task completion at different phases

**Effort Management**
• Establish a productive and supportive learning environment, such as online WebQuest
• Guide students in setting learning goals, initiating efforts and sustaining attention

**The Teacher’s Reflection**

Generally, the difference between the rigour of tasks between the high-ability (HA), middle-ability (MA) and low-ability (LA) students would lie upon the degree of scaffolding and assistance rendered. For instance, the HA students were able to complete a given task without further guidance from the teacher. They could do without the list of resources and generate solutions solely from external resources they sought on their own. For the MA students, they were given access a list of guided resources to help them in their research process so that they could be supported when evaluating the significance of their solutions. For the LA student, they
had to be monitored and guided more closely, such as showing them examples on how to complete a task.

Self-directed learning exposes learners to various avenues of information research. This exposure equips them with the capacity to take the first step in problem-solving, as opposed to waiting for the right answers from their teachers. The constant engagement of students in SDL gradually leads to the development of an inquisitive mind that helps them in unpacking a problem to varying degrees. This will benefit the students greatly in terms of handling high-stake exams that include a wide range of questions from simple knowledge-based materials to application-based questions.

Self-Directed Learning in Out-of-school Settings with Unstructured Learning Experiences

In this context, the learning processes and activities are determined by students. It is a context where the teacher either has little or no autonomy or chooses not to prescribe processes for students’ learning. In this example, a Junior College Literature teacher aimed to develop students’ skills in critical reading and writing through the use of eportfolio. Eportfolios allow “students to collect and organize portfolio artifacts in many media types (audio, video, graphics, and text) and to use hypertext links to organize the material, connecting evidence to appropriate outcomes, goals or standards” (Barrett, 2006, p.1). The use of the eportfolio was intended to support the students’ self-study by providing them with detailed feedback on their work and discussions with their peers (Wong & Ho, 2013). The teacher also intended to conduct formative assessment using the eportfolio to guide her students towards developing more robust A-level style essay responses.

In this example, we pay attention to students’ self-monitoring whereby they were given the opportunity to practise observing and documenting their own reading and writing processes. Although the teacher set very broad guidelines on the expectations from students, the learning processes remain largely unstructured. In this example, unstructured learning experiences do not mean that there was no clear directions for
learning. They were unstructured because the students had autonomy to select their own resources to extend their understanding of the texts they had to study for examination purpose. These resources might include the teacher’s notes and teaching resources as well but they were largely curated and appropriated based on the inquiry they had instituted while studying the texts by themselves and with their peers outside of school.

Targeted level of SDL: Self-directed learning (fullest extent)

Highlight: Self-monitoring

Topic: Individual and society - Topic paper for H2 Literature

Level: JC 1 (mixed abilities)

Phase 1: Develop students’ ownership of learning

- Provide learner autonomy in task design, involve them in identifying learning gaps and facilitate their investigative inquiry, goal setting and planning

For two semesters, the students were studying *Death and the King’s Horseman* by Wole Soyinka, and *All by Sons* by Arthur Miller. Involving students in selecting and identifying a target behaviour is the first step in developing self-monitoring among the students (Vaughn, Bos, & Schumm, 2000). For these students, it was communicated to them that they were expected to use literary devices and practical criticism to deconstruct poetry and prose extracts. They were also expected to be able to interpret essay questions and write argumentative responses with well-developed ideas using self-questioning triggers. These learning outcomes were the targeted behaviours expected of them as JC 1 Literature students.

The second step to develop self-monitoring was to engage students in documenting and providing instances of the targeted behaviours or endeavours to achieve them, including evidence of any learning problem and its frequency (Vaughn, Bos, & Schumm, 2000). Towards these targeted behaviours, the teacher requested each student to create a personal eportfolio to organise their learning resources and work in progress as well as to solicit feedback on their works over time. In their
eportfolios, the students were required to demonstrate their developing competence in applying the reading and writing strategies they were taught to analyse the texts they read and synthesize the knowledge they learnt in Literature.

The teacher provided a certain extent of learner autonomy in task design when she allowed them to choose their articles for extended reading. They also identified their learning goals to close their learning gaps when they were required to ask questions about the texts they studied and search for resources to help them answer their own self-generated questions. Participating in group discussions was also a way of involving peers as resources to help them meet their learning goals. All these learning activities had to be planned and managed by the students themselves but the required deliverables must be submitted to the teacher as a form of accountability and they consisted of the following tasks:
(a) Curate at least one article every week;
(b) Pose questions about the texts read and search for answers to these questions every week;
(c) Participate in group discussions with at least one group topic in each term;
(d) Choose an essay from the list given by the teacher and write one essay of about 1000 to 1200 words. (The students were asked to write 2 essays for each text they studied.)

The students were also given the autonomy to decide on their choice of technological tools to help them best represent their ideas and complete their deliverables. Examples included the use of online note-taking tools like Evernote (https://evernote.com/) and online storage space like Google Drive (http://www.google.com/drive/about.html) to share their writing ideas and solicit feedback from their teacher and peers. The eportfolio was self-managed and had to be submitted to the teacher in the second week of Term 3.

Phase 2: Develop students' self-management and self-monitoring

- Monitor students’ learning, provide just-in-time assistance and scaffolds for students’ self-monitoring
When the students were curating their learning resources, the teacher provided them with just-in-time assistance to build up their metacognitive, reading and writing skills. She reminded them to take note of new words and find their meanings, highlight important ideas or paraphrase them in their own notes, write down any questions after reading their self-selected resources and briefly write down their personal opinions on why they agree or disagreed on certain ideas.

The teacher also provided feedback on her students' drafts when they were writing their essays. Her feedback included suggestions on how some self-formulated questions could be broadened. When the arguments and evidence did not cohere in her students' writing, she would highlight their faulty reasoning to them. She also asked questions to prompt them to think further when the arguments they made were simplistic. Other feedback included prompting the students to approach a topic from different perspectives. She also gave feedback on the organisation of the essays to ensure that students were able to write cohesively and coherently.

Similarly, when they were engaging in their online group discussions, the teacher provided them with just-in-time rules of engagement, such as:
(a) Provide relevant responses to the question or statement for discussion;
(b) Be respectful and open to views that are different from yours;
(c) Seek to provide reasons for why you agree or disagree with your peers;
(d) Be clear and organize your ideas clearly.
(e) Use the S.P.I.C.E.S. approach (self-questioning triggers that encourage the students to pay attention to significance, problem, inference, cause, effect and style found in a text) to develop their responses.

Phase 3: Provide opportunity for students to extend their learning

- Engage students’ prior knowledge, engage them in reflection of learning and allow them to make connections of what they learn in and out of school

The use of the eportfolio was intended to engage the students in critical reading and writing. Instead of waiting for the teacher to pose questions to the students to answer like a comprehension exercise, the students themselves must be responsible for
their reflections by drawing upon their prior knowledge of the texts they read, making sense of the texts and establish the text-to-world meanings, i.e. they had to look for resources that helped them relate big ideas of the texts to themes they could relate to when thinking about the individuals and the society. By engaging in group discussions, they had the opportunities to further their thoughts, deepen their reflections and broaden their perspectives from the exchange of ideas. Purposeful reflections would not have been possible without the teacher’s just-in-time assistance and feedback. When needed, instructional support was provided when she modelled for the students the kinds of questions they should be asking. Although the teacher encouraged her students to generate their own questions about the texts they studied, she was mindful to guide them on scoping their questions to better align with the rigour of the A-level questions.

<table>
<thead>
<tr>
<th>Highlight: Strategies for Facilitating Students’ Self-monitoring in SDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Establish a purpose that is meaningful to the student so that their buy in will be high</td>
</tr>
<tr>
<td>● Harness students’ competence and constantly draw on their artefacts of learning to describe what needs to be done</td>
</tr>
<tr>
<td>● Make clear of the targeted behaviour or learning outcome and describe them in accessible language, using examples and non-examples</td>
</tr>
<tr>
<td>● Present rubrics or other guidelines to help students monitor their self-documentation of their progress and performance</td>
</tr>
<tr>
<td>● Provide and model high levels of thinking skills and reflections as just-in-time assistance and support to the students</td>
</tr>
</tbody>
</table>

**The Teacher’s Reflection**

Based on a students’ feedback that the portfolio assessment should focus on quality instead of quantity, and the fact that students would be more goal-oriented in JC2, it might be better for each student to set a realistic goal of the essay score they would like to attain (in Semester 1 and Term 3), and work towards this score. In other words, if the first submission was below the target score, students should redraft soon.
after they had received feedback, or defer the correction draft and work on the revised version before a major exam.

Stakes are high in an examination and students therefore need to articulate their ideas clearly, eschew preformulated responses (common issue raised in Cambridge Examiners' Report), be able to stay calm and have the confidence to address new perspectives implied in questions, and have full control of the structural and argumentative requirements of an essay. The SDL activities I designed have helped to address all these.

Some measures of freedom in directing their own learning certainly help some students to feel empowered and develop a greater sense of ownership. When they are encouraged to curate their own resources, they can better understand and relate to what they have found, perhaps simply because they are less complex and they are charged with deciding what's useful for themselves, according to their readiness.

**Self-Directed Learning in School Settings with Unstructured Learning Experiences**

In this context, the learning processes and activities are determined by students and teachers choose to have minimal control over the process. In this example, we focus on how self-directed learning is facilitated as a whole school approach. The school's aim is to develop students self-directed learning by enhancing their confidence to undertake learning independently and to identify their own learning gaps. Online learning games were chosen because they provided students with a fun and interactive way to learn independently with immediate feedback on their performance. The school chose to focus on Mathematics as this was an area where students lacked confidence in. The portal was implemented both within and outside the school as the school needed to cater for students who did not have computer access.

*Targeted level of SDL: Self-directed learning (fullest extent)*

*Highlight: Systems to Scaffold Ownership of learning*
Phase 1 - Develop students’ ownership of learning

- Provide learner autonomy in task design
  - To enhance students’ confidence and proficiency in Maths, the school subscribes to an online learning portal that has a series of Maths games designed for different topics and levels of difficulty. For group motivation to increase their House points, the scores attained by the students in each game contribute towards the points of the House which the students belong to under the House System. These House points are shared with the students at scheduled intervals and they are displayed prominently near the canteen. Students have the autonomy to log-in to the portal at any time and choose to play games in any topic or at any level. For students without access to computers at home, they can use the computers at the free access areas and in the computer laboratories on Wednesdays and Fridays if they would like to access the portal after school.
  - Involve students in identifying learning gaps

  Students receive instant feedback for the questions attempted correctly. Besides that, they are each affirmed individually for their successes through the stars awarded to them. These accrue ranks such as “Junior Master”, “Senior Master” and “Grand Master”. In addition, the scores given help the students identify their learning gaps for them to self-determine how they want to plan the concepts they would like to relearn as well as those they would like to try. Students are also able to self-check against any misconceptions they may have through the worked solutions provided.

- Facilitate students’ investigative inquiry, goal setting and planning

  By reviewing their scores after each game against those of their classmates’, students set personal targets of the kinds of practice they want to engage in so as to challenge their classmates to be the top scorer for the class, level or school. For the weaker classes, teachers also use the portal resources to conduct organized review sessions and prescribe the levels and games within the students’ comfort level to build their confidence.

Phase 2 - Develop students’ self management and monitoring

- Monitor students’ learning and provide just-in-time assistance
Students’ use of the portal resources provides information for their teachers in review sessions with their students. With the students’ scores after they had completed a level, teachers may decide to reteach the concepts or use this time to answer any questions that students might have.

- Provide scaffolds for students’ self-monitoring

Students’ self-monitoring is done through the feedback and scores provided by the portal system. However, this can be further enhanced by teachers reviewing the system feedback with students to help them engage in more detailed monitoring of their problem-solving processes.

**Phase 3 - Provide opportunities for students to extend their learning**

- Engage students in reflection of learning

This aspect is not evident in the planning of this experience, largely because it is largely an SDL experience that is left to the students’ initiative. More opportunities could be present for engaging students’ reflection when teachers use the portal in review sessions. Students could be asked to reflect about the Math concepts and skills and the game they have played, and to suggest situations of how they might apply these concepts in their lives. For example, in a game on fractions, students could be asked to suggest or describe from their experiences of how they have observed the concept of addition of fractions being used.

- Engage students’ prior knowledge

Gameplay naturally engaged the students’ prior knowledge of the concepts they learnt in Mathematics as these had to be applied when students chose the games they wanted to play as well as the levels of gameplay to engage in.

- Allow students to make connections of what they learn in and out of school

Students’ engagement in gameplay was used as a means to build their confidence level for solving Mathematics problems before they practised solving them on teacher-generated worksheets. This approach was especially important for the weaker students who typically found the worksheets difficult. The use of this portal provided students with what they perceived to be a relatively non-threatening way of doing Mathematics, as compared to failing in their attempts with worksheets. Their
success in gameplay during out-of-school experiences served as a way to connect students to the in-school Mathematics experiences which they tended to perceive negatively. The ability to contribute to the point score of their House further encouraged them as it affirmed them of the positive outcomes of their efforts at Mathematics practice.

Other strategies

To promote collaborative learning and peer coaching, students are given the opportunity to work in groups. Higher-ability students create and share videos using an app to explain their solutions and to teach the concepts. Weaker students can play these videos with worked solutions if they require help to solve the word problems when learning on their own.

Highlight: Systems to Scaffold Ownership of Learning

- Set-up a programme that provides students with autonomy to choose where and how they want to go about the task
- Select appropriate ICT tools that can generate feedback to students about their performance throughout the task
- Ensure easy access to the ICT tools both within and out of school
- Provide opportunities for easy success on the task even for the weaker students
- Link students' personal success with the task to the attainment of a group goal
- Provide students with opportunities to transfer their success with the task to success with an academic task

The Teacher’s Reflection

“Students are excited when they achieve a star for each question they have attempted correctly and that motivates them to learn and practise more questions. Through this non-threatening platform, students gain more confidence in problem-solving. For more targeted practice, it will be good for teachers to narrow down the skills that students need to spend more time to work on.”

– Mrs Wong Soo Ching (HOD, Mathematics)
CHAPTER FOUR

ROLES OF TECHNOLOGY IN FACILITATING SELF-DIRECTED LEARNING

“Do not confine your children to your own learning, for they were born in another time” – A Chinese Proverb

In the previous chapters, we have articulated examples of self-directed learning in different contexts, some structured and others unstructured. In this chapter, we further examine the affordances of technology in supporting pertinent conditions of self-directed learning and articulate various examples of the kinds of technological tools that can be used. Specifically, we pay more attention to the use of digital media which are electronic media that operate on numerical representations or digital codes (Manovich, 2001). We also attend to the use of digital media that is characterised by the range of authoring technologies which enable teachers and their students to become both consumers and producers of their own multimedia and multimodal texts (Carrington & Robinson, 2009; Davies & Merchant, 2009). In this chapter, we have recommended some digital media tools for teacher and student use. It is important to note that the list of these tools and their perceived affordances are not exhaustive and definitive and the URLs of these digital media tools are correct only at the point of writing.

Technology Supporting Phase 1 - Develop Students’ Ownership of Learning

In this phase, the focus is to support students in their identification of learning gaps so as to facilitate their goal-setting and task design. One way that teachers can do so is through the use of flipped classrooms where videos can be posted with guiding questions that guide students to reflect upon and surface their learning gaps. Teachers can use tools such as Jing and VoiceThread to record videos of their presentations. Teachers can use the subsequent discussion in class to help students set goals and strategies to address these students’ learning gaps.

For the learning of facts, procedures and process skills, the use of online learning portals, such as Khan Academy and Learnology, can be one way of developing students’ ownership of learning because such kinds of portals typically provide different levels of practice problems, hints to problem solutions, adaptive scaffolds as well as
performance feedback. As these kinds of feedback are automated, it allows students to have immediate performance feedback. Students can take charge of the analysis and understanding of their personal learning gaps without having to depend on their teacher. It also supports students to engage in task analysis which supports the setting of their learning goals as well as their planning of strategies to approach their learning tasks. Besides the use of readily available portals, teachers can also design their own quizzes using engines such as Hot Potatoes, ProProfs, Quibblo, and Google Forms, which is one of the online tools available in Google Drive. However, not all of these quiz engines allow teachers to input feedback to quiz questions. In such cases, teachers need to find alternative ways of providing feedback to students and to scaffold their analysis of learning gaps.

While quiz engines may be useful for helping students identify learning gaps in subjects such as Mathematics and Science, the identification of learning gaps in subjects such as Languages and Humanities need to be supported with different kinds of tools such as Google Docs, which is available in Google Drive. In this tool, peers or teachers can provide comments and feedback. Students can also track the history of their writing. These are features that can be used to help students identify the changes across iterations as well as to understand their personal learning gaps and to set goals for improvement.

When students are involved in tasks such as project work, or product design, their goal setting and task design are intertwined with how they envision their work process. Digital tools, such as Microsoft Project and Ganttter, provide simple interface for students to plan and schedule the activities to complete their task. Simple Gantt charts can also be created on Microsoft Excel or Google Spreadsheets, which is another tool in Google Drive. These tools provide the means for students to update their project progress, as well as to monitor and refine their project plans. These digital tools support students’ goal setting as they allow them to externalise and articulate their processes for the completion of learning tasks.
Technology to Support Phase 1 - Develop Students’ Ownership of Learning

Flip Classroom tools
- Jing: [http://www.techsmith.com/jing.html](http://www.techsmith.com/jing.html)

Online Learning portals
- Khan Academy: [https://www.khanacademy.org](https://www.khanacademy.org)

Tools for producing online quizzes
- Hot Potatoes: [http://hotpot.uvic.ca/](http://hotpot.uvic.ca/)

Project Management

Technology Supporting Phase 2 - Develop Students’ Self-Management and Monitoring

Howland et al. (2012) emphasised that digital media play the function of cognitive tools that can help students articulate and externalise their internal cognitive processes. The authors assert that digital media better supports deep learning when students are given opportunities to learn with the tools, rather than from the tools. Therefore, when considering digital tools for supporting self-management and monitoring, we have focused on tools with affordances to support students in the externalisation of their internal cognitive processes. Tools that facilitate note taking such as Evernote, Sciblink, Stormboard, and Padlet help students to construct and archive their ideas digitally. Online mindmapping tools such as bubbl.us, Mindmeister, Mind42, and Popplet allow students to structure their ideas whereas social bookmarking sites such as del.icio.us and Symbaloo allow students to collect and manage online resources. The use of these ICT tools allow easy archival and retrieval of ideas and resources. It supports self-management and monitoring by making it easy for students to revisit their past work as well as the comments and discussion with peers and teachers that have been
constructed socially. This is an important process to support students’ review and reflection as they strategize how they can improve upon their learning gaps.

Where teachers aim to play an active role in supporting students’ self-management and monitoring, the use of web-based tools becomes more critical. For example, where Gantt charts are created in shareable formats such as *Gantter* or *Google Spreadsheets*, teachers can also use these tools as a means to monitor student progress. More importantly, these web-based tools also facilitate social interaction through chat functions. They facilitate communication and discussion amongst teachers, students, and their peers, which can also be used as means to support students’ self-management and monitoring of progress.

Teachers’ scaffolding of self-management and monitoring can also take place by providing just-in-time instruction or learning resources to students. Social learning networks such as *Edmodo*, or *Schoology* can be used to support these processes as these systems allow teachers to create individual and shared spaces. Teachers can use individual spaces for students to post their work as well as for teachers to comment on their work, or make use of synchronous chat for discussions. In the online space, teachers can also provide specific resources that are pertinent to closing the learning gaps of particular students. These are examples of how teachers can use digital media to support just-in-time instruction.

**ICT Tools to support Phase 2 - Develop Students’ Self-Management and Monitoring**

**Notetaking**
- Evernote: https://evernote.com
- Scriblink: http://www.scriblink.com/
- Stormboard: http://www.stormboard.com/
- Padlet: http://padlet.com/

**Mindmapping**
- Bubbl.us: https://bubbl.us/
- Mindmeister: http://www.mindmeister.com/
- Mind42: http://mind42.com/
- Popplet: http://popplet.com/
Social Bookmarking
- Del.icio.us: https://delicious.com/
- Symbaloo: http://www.symbaloo.com/

Project Management
- Gantter: http://gantter.com/

Learning Management Systems
- Edmodo: https://www.edmodo.com/
- Schoology: https://www.schoology.com/home.php

Technology for Supporting Phase 3 - Providing Students with Opportunities to Extend Their Learning

In this phase, technology that support students in reflecting on their learning experiences can be used. Examples of such tools are blogging engines such as Blogger, Wordpress, and LiveJournal. These engines provide ready templates for students to create their online space as well as to make posts. Another feature of blogs is that it archives entries chronologically and facilitates the assignment of tags to blogs.

Using these engines, students can review their reflection of learning across time, as well as organise their postings by different tags in order to analyze different categories of postings. Blogs facilitate the social construction of knowledge within a community as it allows teachers and peers to post comments for each blog post. Another feature of blogs is that it allows students to articulate their knowledge in multiple media formats such as pictures, words, as well as audio. In recent years, audio blogs (e.g. PodBean) allow users to use voice recordings rather than text as a medium of expression. Teachers can have students engage in reflection by analysing their blog posts and comments; to identify what they have learnt and how it can be connected to their personal experiences.

Of late, microblogging has emerged as an alternative to the earlier forms of blogging. Engines, such as Twitter and Tumblr, allow users to compose short messages known as tweets that are limited to 140 characters. While blogs have been used mostly as a form of online journal, tweets have the potential for quick and short reflections of
learning while students are on the go. Students can also engage in collective reflection by forming communities of people whose interests are similar to theirs.

While blogging and microblogging encourage students to share their thoughts or reflections, tools such as ScoopIt allow them to curate their resources for deeper thinking. Students use curation tools to mobilise resources for further use and get connected with other people who share their interests. The resources “scooped” are shared and can be compared and evaluated for reliability and credibility. It is an intelligent way for the students to extend their learning through collective intelligence (Jenkins, 2007) when they expand their learning resources, connect themselves to a community of people who share the same learning interests and socially construct their knowledge in the self-selected interests.

The creation of e-portfolios is also another way where students can use the archived products of their learning process to engage in reflection. In learning contexts, e-portfolios can be used as a means for students to store and organize the evidences of their learning in digital forms. E-portfolios can be used for showcasing students’ learning in a specific topics, subject areas, or across an entire programme. To create an e-portfolio, students need to collect appropriate evidences and organize them in such a way that it presents a clear flow of their learning. A strong e-portfolio is one where the themes of learning are clearly articulated, supported with the appropriate kinds of digital artifacts. The production of a credible e-portfolio requires students to reflect and synthesize their broad areas of learning as well as engage in careful selection of the kinds of artifacts that can strongly support their claims of knowledge. It goes beyond the mere collection and summary of one’s learning experiences. Digital platforms tools such as ePortfolio.org provide students with a digital space to archive as well as construct their e-portfolio.

<table>
<thead>
<tr>
<th>ICT Tools to Support Phase 3 - Providing Students with Opportunities to Extend Their Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blogging/Microblogging &amp; Audio Blogging</strong></td>
</tr>
<tr>
<td>• Blogger - <a href="http://www.blogger.com">http://www.blogger.com</a></td>
</tr>
<tr>
<td>• Wordpress - <a href="http://wordpress.com">http://wordpress.com</a></td>
</tr>
<tr>
<td>• LiveJournal - <a href="http://www.livejournal.com">http://www.livejournal.com</a></td>
</tr>
</tbody>
</table>
Worked Example: The Use of *VoiceThread* and *Edmodo* to develop Oracy Skills

In this example, we illustrate how a Chinese teacher made use of *VoiceThread* and *Edmodo* for about a year to develop Primary 3 students’ self-direction when developing their oracy skills. Through the use of *VoiceThread* and *Edmodo*, every student was able to work on oracy techniques like articulation, pronunciation, expression and accuracy. As mentioned earlier, the affordances of technology are not prescriptive and definitive in nature. Earlier, we have recommended the use of *VoiceThread* for Phase 1 (Developing Students’ Ownership of Learning) and *Edmodo* for Phase 2 (Developing Students’ Self-Management and Self-Monitoring), in this worked example, we illustrate how both these digital media tools can be used for all phases to facilitate all three salient features of self-directed learning.

**Developing Students’ Ownership of Learning**

At the beginning, the teacher taught his students how to use *VoiceThread* and access it during their Chinese lessons in school. The teacher set the desired standard of oracy skills by recording his own example of how his students should read a passage, engage in a picture discussion and converse with the oral examiner on *VoiceThread*. His students were instructed to re-listen to his *VoiceThread* tutorials during the March school vacation. As the students were only nine years of age and new to the use of *VoiceThread*, the teacher started developing their ownership of learning by first involving them to practise their oracy skills on their own during the March school vacation. Once the students had put up their own *VoiceThread* recordings, the teacher would give them his feedback and a score on their oral practice. Figure 6 shows a screen shot of the teacher’s initial use of *VoiceThread* to develop students’ ownership of learning.
**Developing Students’ Self-Management and Monitoring**

Although it was school policy not to disclose the child’s oral marks to them, the teacher indicated his students’ oral performance by giving them badges on *Edmodo*. For instance, students who received a gold badge knew they had scored at least 25 marks out of 30 for their oral and those who had a silver badge scored between 22 and 24 marks and finally, those who received a bronze badge scored 21 marks and below.

**Figure 6. Use of VoiceThread to Develop Students’ Ownership of Learning**

The teacher also set up groups on *Edmodo*, based on the badges the children received, so that peer critique and differentiated comments for improvements by the teacher could be facilitated. When prompt feedback was given by the teacher and peers, this did not mean that the students would be notified. As a result, the teacher also re-posted his comments on *Edmodo* which provided email alerts to these students. When the students re-visited *VoiceThread*, they would read the comments received by their peers and the teacher and respond to them. *Edmodo* served as a platform to re-
post comments that were already published on *VoiceThread*. The teacher also used it to facilitate further discussions on the students’ oral performance on *Edmodo*.

**Providing Students with Opportunities to Extend Their Learning**

Towards the middle of the year, the students were very familiar with oral practice on *VoiceThread* and *Edmodo*. The teacher began to involve the students in uploading their own texts on *VoiceThread*. For those who were less ready for self-directed learning, the teacher instructed them to re-read any reading passage from their Primary 3B Chinese textbooks and find suitable images that they could relate to the passages they had read from the textbooks. The students uploaded these images and described the images they uploaded. For those who were more ready for self-direction, they were given the autonomy to choose any text from storybooks or other reading resources for the reading practice. They then searched for images to illustrate the text and uploaded them on *VoiceThread* for both the reading practice and picture discussion. Students who were more self-directed even created their own texts for purposes related to the oral practice. For instance, one of the students created a *VoiceThread* presentation on tips for reading a Chinese passage in the oral examination on her own accord. By the second semester, the students had shifted from responding to the oral practices on *VoiceThread* to creating their own texts for oral practices on the platform.

By the end of the year, using *VoiceThread* and *Edmodo* had become a part and parcel of the students’ Chinese learning. Their responses to their teacher’s and peers’ comments, the increasing number of oral practices and self-generated presentations on *VoiceThread* were strong indications of their self-direction when developing their Chinese oracy skills. It was also heartening to observe students’ self-initiated posting of their reflections on *Edmodo* about what they learnt, especially when some posts showed students’ reflections and self-monitoring of what they could do at the start and end of the year. When the students began to interact with one another on *Edmodo* on their own using the Chinese language, they had already extended their learning by using the written mode to communicate with one another online when *Edmodo* was first set up to facilitate peer critique for the development of oracy skills.
The Teacher’s Reflection

All students were more motivated to read aloud with VoiceThread, compared to the typical classroom reading aloud sessions. Students became more self-directed to improve their oracy skills when they were able to evaluate their own reading and learn from their peers. Using Edmodo had empowered shy students to ‘speak up’ and form personal learning networks with their peers in a virtual space.

I constantly assessed students’ learning using VoiceThread for oracy practice. I was able to hear each and every child’s reading aloud on the platform and constantly provided feedback especially to the weaker students. Using VoiceThread and Edmodo, I provided timely feedback in the form of voice or text comments. This informal assessment mode greatly improved the interaction between my students and me.

As the importance of oral examinations was getting more significant in PSLE, digital media tools like VoiceThread provided more learning opportunities for students to develop their oracy skills and extend their learning. Based on my observation, my students were able to transfer their online learning on VoiceThread and Edmodo to good performance in the school oral examinations. Nevertheless, I could have created Edmodo groups with a good mix of varying oral abilities to better facilitate peer learning. I could have spent more time to model how peer critique could take place.
Chapter 5
Conclusions

“None of the world’s problems will have a solution until the world’s individuals become thoroughly self-educated.” – Buckminster Fuller

In this book, we have posited self-directed learning as a key 21st century skill. Regardless of the new thrust in Singapore’s Masterplan for ICT in Education, this is a necessary skill to teach and develop in our students in order for Singapore to stay competitive and adaptive to the constantly changing global economy. The key benefits of self-directed learning lie in the types of learners it develops and the dispositions that it emphasises, such as motivated and goal-oriented learners, learners with high self-efficacy and internal locus of control, learners who are metacognitive and self-regulated (Gibbons, 2002; Northwest Regional Educational Laboratory, 1999).

Instructional approaches in schools, therefore, should be broadened to better facilitate self-directed learning. In this book, we have included examples such as blended learning, flipped classroom, game-based learning, online learning with the use of digital media. Teachers are also encouraged to extend the sites of self-directed learning when designing for such experience to take place within the sphere of their influence. The boundary of school and out-of-school literacy learning is permeable in this digital age. In this book, we argue that self-directed learning can take place in and out of school as long as the three salient features of self-directed learning are present. Although the extent of self-directed learning may not be the same in all contexts, we have provided teachers with guideposts to support their design processes when planning for a self-directed learning experience to take place among their students.

Finally, we do not believe in one-size-fits-all approach. Although we have provided worked examples to guide teachers in their instructional design, these worked examples are intended to inspire more viable instruction and design processes that are contextualised and relevant to each school, each class and each student. We hope that this purpose will be met as teachers self-direct themselves in this area of their work.
BIBLIOGRAPHY


(Eds.), *Assessment and teaching of 21st century skills* (pp. 17 – 66). New York, NY: Springer.


