How to Teach Students to Learn: Techniques Used to Increase Student Capacity to Self-Direct Learning

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An important aim for educational institutions is to increase learner self-direction among students (Bolhuis, 2003; Guglielmino, 2008; Meichenbaum & Biemiller, 1998). Learner self-direction is defined as the ability to self-direct and self-regulate one’s own independent learning processes (see Brockett & Hiemstra, 1991; Candy, 1991). Graduates will need self-directed and self-regulated learning (SRL) skills to help them keep up in career, personal and academic settings (Guglielmino, 2008; Zimmerman, 1994). In the United States and other similar countries, graduates’ will enter an economy characterized by high career mobility (U. S. Bureau of Labor Statistics, 2008), and abundant information (Lyman & Varian, 2003), making learner self-direction both more possible and more necessary than it has been in the past. Yet concerns have been raised nationally in the United States about the ability of higher education institutions to prepare students with the skills necessary to learn independently and keep up with career changes (The Secretary of Education’s Commission on the Future of Higher Education, 2006; The Secretary’s Commission on Achieving Necessary Skills, 1991). In addition, preliminary studies at two different universities in the United States have found no significant increase in SDL skills among students from freshman to senior years using scales based in the SDL literature (Litzinger, Wise, Lee, & Bjorklund, 2003; Prezeworski, 1997).

U.S. higher education institutions have been challenged to develop new and innovative pedagogies to support previously neglected skills such as those needed for independent learning (The Secretary of Education’s Commission on the Future of Higher Education, 2006; The Secretary’s Commission on Achieving Necessary Skills, 1991). These types of outcomes have been advocated more particularly in science learning on the national stage by the National Science Education Standards of the National Research Council (1996). In this report, teachers are encouraged to foster learner self-direction by offering students the opportunity to take responsibility for personal learning, conduct self-assessments, and participate in the design of learning environments (see also Bransford & Donovan, 2005).

Similarly, institutions and governing bodies outside of the United States have long emphasized the importance of SDL and lifelong learning for education. Notable initiatives and educational implementations of SDL related activities have been implemented in European countries such as Belgium, The Netherlands, Switzerland, France, Italy, Greece and the United Kingdom with national reports focused on SDL from many of these countries (Straka, 1997). SDL-focused reports of research and advocacy have come from areas as diverse as Asia (Chu & Tsai, 2009; Mok et al., 2007), Australia (Candy, 2004), and South Africa (Lindh & Hugo, 2005). It is clear that many countries around the world believe that fostering SDL skills is vital in our global economy.

Partly in response to such mandates and challenges, higher education institutions in the United States and elsewhere have increasingly adopted language in mission statements indicating the importance of helping students self-direct, learn independently or become lifelong learners (Guglielmino, 2008). However, there is not wide agreement on how to best foster learner self-direction among students.

Much of the SDL literature from adult learning views learners as universally highly self-directed during learning activities; needing only the opportunity to take charge of their own learning. These highly self-directed individuals who initiate their own learning are hypothesized to learn more deeply and meaningfully (Knowles, 1975, 1980). Consequently, SDL models have advocated removing support and guidance for learning, placing the responsibility for learning squarely in the learner’s hands (e.g. Hammond & Collins, 1991; Knowles, 1975). Such approaches may be appropriate if certain assumptions about learners are met (Knowles, Holton, & Swanson, 1998). However, experience indicates not all adults are highly self-directing nor is self-directed learning always the best learning solution (Brockett, 1994). In formal education, for instance, learners may not be considered highly self-directed adults, and contextual factors such as curriculum requirements and standards usually affect the provision of SDL activities (Garrison, 1997). Students in formal education have been found to preliminarily need support and guidance for learning in the form of teacher-directed activities (Howland & Moore, 2002; Raidal & Volet, 2009). Thus, fostering learner self-direction in formal education involves more than simply reducing the amount of support and guidance given to learners (Brockett & Hiemstra, 1991; Candy, 1991; Merriam, Caffarella, & Baumgartner, 2007). Approaches to learning and instruction that simply reduce or remove learning support may also be highly detrimental to the acquisition of knowledge in long term memory (Kirschner, Sweller, & Clark, 2006).

Consequently, some guidance and support for learning may be needed with the aim of helping learners become more self-directed over time. In addition, the shift from teaching only for subject matter acquisition toward higher order skills such as learner self-direction is a formidable challenge for many teachers (Bolhuis, 2003). There is a need for
realistic guidance on how to foster learner self-direction within the contextual constraints of formal educational settings and among students who may not be universally highly self-directed.

To meet this aim, this paper synthesizes literature from SDL and SRL for principles for fostering learner self-direction in formal education and describes a learning environment based on these principles. The learning environment is illustrated using examples from science learning. The definition of SDL in this paper encompasses SRL elements (see Loyens, Magda, & Rikers, 2008; Pilling-Cormick & Garrison, 2007).

**Principles for Fostering Learner Self-Direction**

Four main prescriptive principles for fostering learner self-direction in formal education can be extracted from SDL theory, models and research;

- Match the level of self-directed learning required to learner readiness
- Progress from teacher to learner direction of learning over time
- Support the acquisition of subject matter knowledge and learner self-direction together
- Have learners practice self-directed learning in the context of learning tasks

These principles will be discussed and supported with relevant theoretical and empirical literature.

The first principle for fostering learner self-direction involves matching the level of SDL required in learning activities to learner readiness (Bolhuis, 2003; Brockett & Hiemstra, 1991; Grow, 1991; Hammond & Collins, 1991; Knowles, 1975). Adult learning literature acknowledges that individuals may be highly self-directing in some situations and not in others, or that they may be somewhere in-between high and low on the self-directing continuum (Candy, 1991; Knowles, 1980; Knowles et al., 1998). A learner’s level of relevant domain knowledge and self-directed learning experience will affect whether they are able to self-direct learning in a given situation (Candy, 1991; Grow, 1991). SDL activities that this principle applies to may include allowing learners to set learning goals, specify what will be learned, determine the pace of learning, and evaluate learning outcomes (Hiemstra, 1994). If a learner is required to do these activities without regard to readiness, he or she may fail to learn or increase in learner self-direction (Brockett & Hiemstra, 1991; Candy, 1991).

Findings from studies of SDL and SRL indicate that many learners are not ready to completely control a learning situation, and may need to first experience teacher-directed learning (Howland & Moore, 2002; Raidal & Volet, 2009). Dynan, Cate and Rhee (2008) found that students whose SDL readiness is matched to a requisite learning structure (structured learning or unstructured learning) increased in self-direction over the course of a semester to a greater degree than those who were not matched. Bhat, Rajashekar and Kamath (2007) found that a high level of SDL activities helped high performing students learn while these activities did not benefit lower performing students. These findings suggest that matching the level of SDL activities required to learner readiness may be important for helping students learn and increase self-direction.

The second principle advocates progressing from teacher to learner direction of learning over time (Bolhuis, 2003; Brockett & Hiemstra, 1991; Candy, 1991; Grow, 1991; Meichenbaum & Biemiller, 1998). This principle takes a learner from his or her current level (as suggested in principle one) toward higher self-direction over time. Prescriptive models of SDL offer practices for gradually increasing learner direction of the learning process. For example learners can be increasingly allowed to set learning goals, specify what will be learned, choose learning resources and evaluate learning outcomes as a learning experience progresses (Grow, 1991; Hiemstra, 1994). Such an approach should take into account the first principle and provide learners SDL activities that match their readiness. Learners’ abilities to self-direct may increase as opportunities to self-direct learning are increasingly provided (Bolhuis, 2003; Grow, 1991).

Azevedo, Cromley and Seibert (2004) suggest that shifting learning responsibility toward learners over time by scaffolding and fading support for SRL and SDL skills is vital for the teaching of self-direction. Hadwin, Wozny and Pontin (2005) followed the SRL development of graduate students in a research methods class for several months. They found that the general process in this setting involved teacher-direction that progressed to co-direction and finally student-direction of the learning process. This shift toward student direction of the learning process was also found in elementary school classrooms considered high in SRL (Perry, VandeKamp, Mercer, & Nordby, 2002). Schunk and Rice (1993) found that fading self-regulatory instructions were superior to self-regulatory instructions that were not faded in helping students with reading problems to self-regulate their learning. These studies suggest that gradually increasing learner direction of the learning process may foster learner self-direction.
The third principle for fostering learner self-direction involves supporting the acquisition of subject matter knowledge along with learner self-direction. Cognitive strategies (such as those required for SRL and SDL) are thought to require the use of intellectual skills (concepts, rules, etc. of a discipline) which require basic knowledge of subject matter (Gagné, 1985). Theoretical models of SDL have recognized that some domain knowledge is necessary for learners to be able to take responsibility for learning (Bolhuis, 2003; Grow, 1991). Learners should be introduced to relevant domain knowledge including underlying principles, procedures for knowledge acquisition, and generalizability of knowledge and practices, as they practice self-direction (Bolhuis, 2003; Vermunt & Verschaffel, 2000).

Extensive domain knowledge may enable learners to free up working memory for processes related to self-regulation and self-direction of learning (Sweller, Van Merrienboer, & Paas, 1998). Experts have elaborate mental knowledge structures that enable them to monitor progress, choose appropriate strategies, and decide on appropriate solutions to problems (Chi, 2006). Within the self-regulated learning literature, Glaser and Brunstein (2007) found that providing instruction on both subject matter and SRL skills was more effective for helping students to control their learning than simply teaching subject matter. Cotterall and Murray (2009) provided SDL opportunities to students in a language learning course including allowing students to decide what to learn and choose resources to use for learning. The authors conclude that these elements of the course structure along with subject matter acquisition contributed to an increase in learner self-direction.

The fourth principle for fostering learner self-direction advocates practicing SDL in the context of learning tasks. Studies of self-directed learners describe these learners as task-oriented, with the practical aim of applying learning to a specific task (Houle, 1961; Tough, 1979). Consequently, models of SDL have advocated providing learning that is centered on tasks that learners are likely to encounter in the future (Bolhuis, 2003; Hammond & Collins, 1991). As learners engage in these tasks, they may be required to do such SDL activities as: (a) choosing a learning path; (b) finding, evaluating, and applying information to complete tasks and solve problems (Bolhuis, 2003; Candy, 1991); (c) monitoring and adjusting personal learning as needed (Butler & Winne, 1995; Garrison, 1997) and; (d) determining ways in which personal performance should be improved (Bolhuis, 2003; van Merriënboer & Sluijsmans, 2009). Practicing SDL in the context of tasks may foster learner self-direction while increasing the relevance and usefulness of learning activities.

Conceptual connections have been made between regulation of one’s own learning processes and problem-solving and experimentation activities (Mayer, 1998; Winne, 1997). For instance, Winne (1997) hypothesizes that students will “bootstrap” self-regulated learning skills from experiences in which they are engaged in goal-directed learning tasks. Connections have also been made in the literature from the implementation of problem-based and task-centered learning to self-direction (Gurses, Acikyildiz, Dogar, & Sozbilir, 2007; Hung, Jonassen, & Liu, 2008; van Merriënboer & Kester, 2008; Stewart, 2007). Woods (1996) found that student self-perception of SDL ability increased over time in a problem-based learning environment. Blumberg and Michael (1992) implemented a partially teacher directed and problem-based curriculum and observed increases in students’ SDL activities as measured by self-reports, program evaluations and library circulation data. Sungur and Tekkaya (2006) found that a problem-based learning environment enhances SRL skills more than a traditional lecture based environment. Findings from these studies support the hypothesis that centering learning on realistic tasks or problems provides an environment in which learner self-direction can increase.

A Learning Environment Designed to Foster Learner Self-Direction

Four principles for fostering learner self-direction have been presented;
- Match the level of self-directed learning required to learner readiness
- Progress from teacher to learner direction of learning over time
- Support the acquisition of subject matter knowledge and learner self-direction together
- Have learners practice self-directed learning in the context of learning tasks

These principles have implications for the design of learning environments and can be implemented in a variety of settings. In this section, a description of what a learning environment focused on fostering learner self-direction might look like is given using examples from science learning in higher education. The practices presented in this paper are based on SDL research and theory (e.g. Bolhuis, 2003; Brockett & Hiemstra, 1991; Garrison, 1997; Knowles, 1975; Tough, 1979), and task-centered models of instruction (Collins, Brown, & Newman, 1989; van Merriënboer & Kirschner, 2007; Merrill, 2002a).

A student in a learning environment designed to foster self-direction does tasks that represent activities done in the professional world outside of school (principle four) and follows a process similar to those described in
studies of the SDL experience (e.g. Brockett & Hiemstra, 1991; Knowles, 1975; Spear & Mocker, 1984; Tough, 1979). The SDL process can be described as having four phases; initiation, acquisition, performance and assessment (see figure 1).

The overall approach to fostering learner self-direction involves repeatedly showing students a learning task, presenting core concepts that are relevant to the task, modeling how to apply the core concepts to the task, having students perform the task, and assessing student performance of the task. The process repeats within the class in task sequences, and over time, responsibility for initiation, acquisition, performance and assessment is shifted from teacher to student.

Figure 1. Phases of the self-directed learning process that occur within a learning task. Students initiate a learning task, acquire knowledge relevant to the task, perform the task and receive feedback on their task performance. The responsibility for these activities is shifted toward students over time.

The Initiation Phase – Introducing Students to the Learning Task

At the start of a unit, students are introduced to a challenging learning task (principle four; see table 1). Learning tasks are activities that students do that require them to apply knowledge from the course content to perform activities (cognitively and/or physically) that require the use of skills similar to those used in professional practice outside of school. Learning tasks should be based on the activities that students are expected to do with knowledge and skills after they finish the class (see the "determining learning tasks" section below; van Merriënboer & Kirschner, 2007; Merrill, 2002a). In the initiation phase of learning, students also make preliminary plans for how to accomplish the learning task and decide on a general plan to apply information to the task (Butler & Winne, 1995). At this stage in the process, however, students likely lack the required knowledge and experience to complete the learning task. This approach may help motivate students to mindfully process course materials in search of information relevant to the learning task (e.g. Piaget, 1977). In addition to introducing the task, a teacher should also activate students’ prior knowledge by having them relate what they already know to the learning task (Merrill, 2002a).

As students become more knowledgeable and self-directed, they are given more opportunities to choose tasks to learn and perform. Students are also increasingly required to choose appropriate learning resources and plan how to approach learning tasks over time (principle two; see table 2).

An example of how the initiation and other phases of the learning processes are implemented can be provided from a learning task within a biology class genetics unit. The Learning task is centered on a case study called, “Those old Kentucky Blues (Leander & Huskey, 2008),” that requires students to determine the origin of a patient’s blue skin using genetics knowledge. The teacher introduces the learning task to students in a presentation
that sets up the case, explaining that a clinic patient with blue skin presents herself and that students must determine
the source of her skin discoloration. The teacher also assigns students to read a short paper explaining the problem.
As students first learn about the task, they lack the genetics knowledge necessary to complete it, but they begin to
determine what knowledge and skills they lack and think about how to approach the task. In this example, the
teacher has chosen “Those Old Kentucky Blues” as a learning task for students to do, however, if students are ready
for more SDL opportunities, a teacher can allow students to choose the tasks they wish to be engaged in (see table
2).

The Acquisition Phase – Acquiring Domain Knowledge and Modeling Application

In the learning phase, students acquire the knowledge that they need to perform the learning task (principle
three). Students learn two main types of knowledge in the learning phase, knowledge from the core concepts of the
discipline, and knowledge about how to apply core concepts to the learning task. A teacher can use a variety of
techniques to present core concept information including lectures, textbook readings, online presentations, etc.
Learning how to apply knowledge of core concepts to a learning task is best done through teacher modeling and
repeated student experience (Bandura, 1991; Collins et al., 1989). Student experience is provided in the performance
phase, while modeling is provided in the current (learning) phase. A teacher models a learning task by showing
students how to do it while calling attention to important performance aspects, discussing reasons why the task is
done in a certain way and explaining the thought processes that are needed to complete it (Collins et al., 1989).
Modeling particularly supports SDL skills when the model makes some mistakes and later corrects these mistakes
(Kitsantas, Zimmerman, & Cleary, 2000).

Table 1.

<table>
<thead>
<tr>
<th>Learning Phase</th>
<th>What a teacher does</th>
<th>What students do</th>
<th>Cognitive activities important for SDL/SRL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation</td>
<td>• Present a new learning task</td>
<td>• Make learning task plans</td>
<td>• Motivation</td>
</tr>
<tr>
<td></td>
<td>• Activate student prior knowledge</td>
<td>• Choose learning resources</td>
<td>• Activation of prior knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Goal-setting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Strategic planning</td>
</tr>
<tr>
<td>Learning</td>
<td>• Present core concepts that are relevant to the learning task</td>
<td>• Actively determine relevant aspects of information for task completion</td>
<td>• Subject matter acquisition</td>
</tr>
<tr>
<td></td>
<td>• Model application of core concepts to the learning task</td>
<td>• Learn strategies that could be used for task completion</td>
<td>• Strategy knowledge acquisition</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance</td>
<td>• Provide coaching and feedback as needed</td>
<td>• Final selection of task strategy</td>
<td>• Self-management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Perform/complete the task</td>
<td>• Self-monitoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use relevant domain knowledge</td>
<td>• Motivation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Induction</td>
</tr>
<tr>
<td>Assessment</td>
<td>• Provide task-oriented feedback on task performance</td>
<td>• Assess a peers task performance</td>
<td>• Self-reflection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Self-assess personal task performance</td>
<td>• Self-evaluation and assessment</td>
</tr>
</tbody>
</table>

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Following principle two, student acquisition of core concepts is supported through more teacher-directed methods at the beginning of the learning process. Modeling showing how to apply core concepts is also provided in teacher-directed ways. However, teacher-directed instruction is faded over time, giving students an opportunity to carry out and adjust their information gathering processes with increasing independence. Highly self-directed students may be required to find, study and apply all knowledge on their own and complete learning tasks without a model (see table 2).

In the “Those Old Kentucky Blues” learning task, after being introduced to the problem, students begin to learn about relevant topics within the biology field such as dominant, recessive, co-dominant, and sex-linked genes, and other topics. Students learn about these topics through lectures, textbook readings, media presentations and SDL activities. As students learn the material, they actively search for ways that the information can be used to determine why a person might have blue skin. At the beginning of the genetics unit a teacher introduces the major concepts of genetics to students through more teacher-directed methods (including lecture, one on one instruction and readings). Later, students are required to find some or all of their own learning resources to complete genetics learning tasks (e.g. by searching through the textbook or looking online). When students have finished learning about core concepts from genetics, the teacher takes students through the process of applying these concepts to the learning task. To model the process, the teacher takes on the role of a coping model, making the mistake of applying an incorrect inheritance pattern and realizing that, based on family tree information, this pattern does not fully account for the blue skin. Next, the teacher explains his or her thinking process for applying the correct inheritance pattern while pointing out how and why this pattern applies to the problem. The teacher does not completely solve the problem, requiring students to finish solving it independently. Later in the genetics unit, students must complete learning tasks with minimal modeling and must determine how best to use relevant biology concepts to do this.

The Performance Phase – Applying Knowledge and Completing the Learning Task

In the performance phase, students apply their recently learned knowledge to complete the learning task. In a higher education science classroom, students can complete a learning task as part of a class assignment and then provide evidence that they completed it. This evidence might take the form of a written paragraph, an artifact resulting from task completion, or performance of the task with the teacher watching. Along with evidence of task completion, students should be required to explain what strategies were used to complete it and why. Learning task performance requires students to practice vital SDL skills including self-monitoring, self-management and motivation to stay engaged in a task (Garrison, 1997; Zimmerman, 2002). In self-monitoring, students observe, judge and react to the learning task, adjusting learning strategies that are not working (Butler & Winne, 1995; Zimmerman, 1998). Self-management refers to student management of the task performance process as they take the steps necessary to complete the task (Garrison, 1997). Early in the learning experience a teacher provides coaching and feedback to help students self-monitor, self-manage and stay motivated. Later in the learning experience, or if students are highly self-directed, support for task completion is reduced (principle two).

In the “Those Old Kentucky Blues” learning task, students are required to determine the genetic source of the blue skin after learning about how traits are inherited (core concepts) and being shown how inheritance patterns might be applied to the problem. In this case students must hand in a short paper indicating what the source of the blue skin might be, how they came to this solution, what strategies they used and what genetics knowledge was relevant to the problem. If students need help while working on the learning task, they contact the teacher, who provides guidance and feedback. During the task completion process, students learn how to apply genetics concepts effectively as they discover the ways genetics knowledge can be used. In addition, students gain SDL experience selecting learning strategies to complete tasks. Later in the genetics unit, students must independently complete other tasks without teacher help. They will continue to use knowledge of inherited traits and more advanced genetics concepts to do this.

The Assessment Phase – Assessing Learning Task Performance

After the learning task has been completed, the teacher gives a grade and feedback telling how well students did. The teacher also indicates which aspects of students’ task performance were high and low quality and why (Shute, 2008). Students are also required to assess a peer’s or group’s work, providing similar feedback. Finally students might be required to self-assess their own work indicating strengths and weaknesses of personal task completion. Students who concentrate on specific aspects of task performance and self-assess may continually improve personal performance efforts (Butler & Winne, 1995; Ericsson, Krampe, & Tesch-Römer, 1993).
highly self-directed students, a teacher can require students to self-assess learning task performance through a comparison to course criteria or a peer’s performance (Garrison, 1997; Zimmerman, 2002).

In the “Those Old Kentucky Blues” learning task, students receive informative feedback from a teacher assessment, peer-assessment and self-assessment. Students assess a peer’s (or peer group’s) write-up after handing in their own using a rubric provided by the teacher. Later in the learning experience students may also be required to self-assess their task completion, using a similar rubric. In this problem, there is not necessarily one correct answer, so grading does not focus on whether the task solution was right or wrong. Through reflection on peer and personal performance, students gain a greater understanding of how genetics knowledge can be applied and transferred to different situations (van Merriënboer, 1997; Merrill, 2002a).

Table 2.

Teacher-directed, moderate and student-directed approaches to learning activities within each phase of the learning process.

<table>
<thead>
<tr>
<th>Course element</th>
<th>Teacher-directed approach</th>
<th>Moderate approach</th>
<th>Student-directed approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning task choice (initiation phase)</td>
<td>Teacher chooses and provides all learning tasks</td>
<td>Teacher provides a list of learning tasks for students to choose from</td>
<td>Students choose learning tasks to engage in</td>
</tr>
<tr>
<td>Learning resources for core concepts (Learning phase)</td>
<td>Teacher provides all learning resources (lecture, textbook, online etc.)</td>
<td>Teacher provides some learning resources and asks students to find and apply additional resources</td>
<td>Students find, evaluate and apply learning resources independently</td>
</tr>
<tr>
<td>Modeling application of core concepts to the learning task (Learning phase)</td>
<td>Teacher provides extensive and specific modeling showing how to apply core concepts to learning tasks</td>
<td>Teacher only models a part of the application process</td>
<td>Students apply core concepts independently without a model</td>
</tr>
<tr>
<td>Learning task performance (Performance phase)</td>
<td>Teacher provides extensive coaching and feedback for task performance</td>
<td>Teacher provides coaching and feedback when students request it</td>
<td>Students provide own coaching and feedback</td>
</tr>
<tr>
<td>Assessment of learning (Assessment phase)</td>
<td>Teacher assesses student performance</td>
<td>Students assess personal and peer performance and a teacher also provides assessment</td>
<td>Students assess personal and peer performance</td>
</tr>
</tbody>
</table>

Note. Ideally, a learning experience gradually shifts from teacher-directed to student-directed approaches over time.

This process of initiation, acquisition, performance and assessment repeats in the genetics unit and continues in other units of the class. Repeated tasks that require students to apply similar information help students develop a conceptual knowledge of the principles involved (e.g. genetics) and transfer this knowledge to other situations when needed (van Merriënboer, 1997). SDL skills are fostered in this process through learning tasks that require students to apply knowledge and through a gradual shift of responsibility for learning toward students. By the end of the class students are required to direct many aspects of their own learning processes (see table 2). They must choose learning resources, plan how to complete learning tasks, monitor and adjust their task performance, and self-assess their learning.

The Design of a Learning Environment to Support Learner Self-Direction

The process above involves students in learning tasks and shifts responsibility for learning toward students over time. The creation of this learning environment takes some careful planning, design and implementation activities. General guidelines for the design of the learning environment described above will now be given
including guidelines for determining learning tasks, finding out about students, designing the learning experience, developing course materials, and adjusting the learning experience.

Determining Learning Tasks

The question, “what should student’s learn?” usually guides a teacher/designer in making curriculum decisions. Within formal education, the subject domain is usually specified (e.g. biology) along with specific units of items that should be learned (e.g. genetics, evolution, ecology). In contrast, task-centered models and SDL theory suggest that what students learn should be based on a task analysis, or an analysis of what students will likely be required to do after they are finished with the learning experience (Hammond & Collins, 1991; Knowles, 1980; van Merriënboer & Kirschner, 2007; Merrill, 2002a). This changes the question from, “what should students learn,” to, “what will students do after this class is over?” This thinking is consistent with the fourth principle, centering learning on tasks. These learning tasks are based on the activities that students are expected to do once they are finished with a class. For example, in a writing class, students should do writing tasks that are typically performed in business situations (i.e. writing a proposal for action, communicating clearly by email, creating meeting agendas) if students are likely to seek out a career in business.

Finding out about Students

The above example also implies that a teacher/designer needs to gather information about students before class. Typical student aspects that are important to the design of learning experiences include how much students already know about a subject, what motivation students have to learn, and what professional activities students are likely to do in the future (Dick, Carey, & Carey, 2005; Gagne, Wager, Golas, & Keller, 2005). Principle one indicates that teachers must also know how ready students are to self-direct their own learning. A teacher/designer can find this out through a class discussion, an instrument designed to measure SDL or SRL readiness (e.g. Guglielmino, 1977; Pintrich, Smith, Garcia, & McKeachie, 1993; Stockdale, 2003), a questionnaire, or other pretests. At the very least, a teacher/designer should estimate the SDL readiness of students using past teaching experience as a guide. Knowing about students’ readiness to take charge of their own learning activities can guide a teacher/designer in determining the level of control to give to students during the learning experience. For instance, if in the past students have shown low levels of successful engagement in SDL activities, the teacher should start with a lot of teacher control and then gradually move toward student control of the learning process (principle two).

A teacher may also benefit from finding out what students want to learn and adjusting course items based on this input (Hammond & Collins, 1991). This approach to education has been advocated by authors in adult learning and SDL theory for learners who are highly self-directed (Knowles, 1975, 1980; Knowles et al., 1998), but may be very difficult to implement when course content is tightly controlled or when students do not know what they want to learn.

Designing the Learning Experience

The design of the learning experience should start with the identification and ordering of learning tasks (principle four; van Merriënboer & Kirschner, 2007; Merrill, 2002b, 2007). These tasks should be ordered from easy to difficult and provide a conquerable challenge for students. In classes where the subject matter is already specified and controlled, a teacher will have little room to change what is taught. In these cases, however, it is still possible to use tasks. For instance, a basic course in electrical engineering may have required units such as electrical circuits, motors, generators, and computer systems. A teacher/designer can create a sequence of tasks for students to do within each of these areas based on professional engineering practice. For example, a teacher/designer can design two or three learning tasks that will require students to apply their knowledge of electrical circuits for the electrical circuits unit. An approach to the sequencing of tasks that moves toward student direction of the learning process (principle two) might involve creating a list of learning tasks for students to choose from and providing advice on which tasks to choose (Kicken, Brand-Gruwel, & van Merriënboer, 2008; van Merriënboer & Sluijsmans, 2009). Ultimately students might be given the opportunity to independently choose all learning tasks (see table 2).

When specifying learning tasks, a teacher/designer must also determine the types of knowledge students will need to have in order to complete the tasks (principle three). Two types of knowledge should be provided to students. The first is knowledge about the domain(s) in which the task resides (core concepts) that is relevant to the completion of a learning task. In the engineering example, this is knowledge about engineering concepts relevant to
electrical circuits including knowledge about the different types of circuits, Ohms law, Kirchhoff’s laws, how circuits are built, etc. According to principle two, this knowledge should be provided with more teacher-directed instruction at first and then gradually a teacher/designer should shift the responsibility of finding and evaluating this knowledge toward students (see table 2).

The second type of knowledge shows students how to apply core concept knowledge to a learning task. In the electrical engineering example, this information might include how to apply laws of current to the creation of an analog electrical circuit. This information is best provided through modeling that shows students how to complete a learning task and explains the thought processes leading to actions (Collins et al., 1989). To increase student direction of the learning process over time (principle two), the responsibility for modeling and application of concept knowledge should be gradually shifted toward students.

In addition to designing learning tasks and the knowledge needed to complete a learning task, a teacher/designer will also need to design assessment instruments. Most higher education courses require a final assessment and mid-term tests, but assessment for fostering learner self-direction is much more. For each task students perform, they should receive a grade and feedback indicating what was done well and what could have been done better (Shute, 2008). The design of assessments should also follow principle two and gradually shift from teacher to student assessment. Findings have indicated that, if implemented correctly, self-assessment and group assessment by students tend to have high validity when compared to teacher assessments (Cho, Schunn, & Wilson, 2006; Kilic & Cakan, 2007; Ryan, Marshall, Porter, & Jia, 2007).

In addition to the above task design activities, a teacher/designer needs to determine in what order and how tasks should be presented to students. Overall, learning tasks should be designed to go from easy to difficult or from high to low support (van Merriënboer & Kirschner, 2007; Merrill, 2002a). Students can also do learning tasks individually or in groups with differing levels of support (Merrill & Gilbert, 2008). The sequencing of tasks can support a gradual shift from teacher to student direction of the learning process (principle two). For instance a design can feature a high amount of guidance and modeling when students are asked to perform a task at the beginning of class and fade this guidance and modeling later.

Developing Class Materials

After analyzing aspects of the learning situation and designing a learning experience, a teacher/designer must develop materials, media and tasks for student use (Dick et al., 2005; Gagne et al., 2005). Development includes the creation of media for student involvement in the learning tasks and the final selection of learning materials from which students will learn. Development also involves making decisions about how to best provide guidance and feedback to students as they perform tasks. Different media that can be used to present knowledge include in-class presentations, textbook readings, videos, web pages etc. Students should be increasingly given the opportunity to choose learning resources to use over time. For example at the beginning of a class, a teacher might provide a list of resources to students and suggest that they also look up further resources as needed to complete a task. In later tasks, the teacher could suggest fewer resources for learning and ask students to find additional resources themselves. Care should be taken, however, to assure that students know how to identify reliable resources.

Making Needed Adjustments to the Learning Experience

Constant effort is needed to determine the effectiveness of the learning experience and to revise it to better support learning and self-direction. Information that can guide the revision efforts can include informal student feedback, assessment data, classroom observations etc. (Dick et al., 2005). A chance for revising and improving a class occurs after students have viewed each learning resource, completed each learning task, and interacted with other course elements. Information about student experiences in doing SDL activities and interacting with tasks can help guide efforts to improve a class.

When the newly-redesigned class is “tried out” with students, some of the most important discoveries are made. Experience in class might indicate a needed adjustment in learning task difficulty, amount of student direction required, amount of support and guidance given, amount of resources students must look up, and level of self-assessment required of students. For instance, students may find that a learning task is too easy or too difficult to perform with the provided support. They may be unable to self-regulate and self-direct learning to the degree that is required in the class. Such issues are an indication that adjustments need to be made to the learning experience to increase its effectiveness.
Conclusion

Higher education is a means by which students prepare for lifelong learning and career performance. Increasing students’ ability to learn on their own should be an important goal for higher education learning experiences (Bolhuis, 1996; Grow, 1991; Guglielmino, 2008). Learner self-direction continues to be necessitated by increases in career mobility rates (U. S. Bureau of Labor Statistics, 2008), in which graduates will have to use SDL skills to keep up (Guglielmino, 2008). This paper presented and supported four principles for fostering learner self-direction in formal education from the SDL and SRL literature. The four principles can guide the design of learning environments intended to foster learner self-direction. The learning environment presented in this paper involves students in four phases of the SDL process while completing tasks. Throughout this process, responsibility for key processes such as choosing a task, acquiring knowledge, applying knowledge, monitoring performance and assessing performance is shifted toward students. It is hoped that the model presented above presents salient guidance to educators and instructional designers for providing learning experiences that foster learner self-direction.

Based on preliminary studies (e.g. Litzinger et al., 2003; Preczewski, 1997), it may be that, at present, higher education is overly focused on creating “good students” who are able to acquire knowledge only in the most teacher-directed situations. Instead, we can prepare students to be “intelligent engineers” who know how and when to independently acquire more knowledge, and apply this knowledge to accomplish useful tasks. As we move forward, we will need to move away from creating “good students,” and toward creating “intelligent engineers.”

References


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