

Self-Directed Learning for Middle School Students

Brandi Allen
Johnston Middle School

*Philosophy is the childhood of the intellect, and a culture that
tries to skip it will never grow up.*

~ Thomas Nagel

INTRODUCTION

I am a middle school teacher and a graduate student studying Educational Psychology. In my studies, I read numerous research journals and articles that challenge common concerns of recent school reform efforts and solutions to their deficiencies. “Self-Regulation of Academic Learning in Middle Level Schools” by Dembo and Eaton (2000) argues that although many educational reform programs focus on the restructuring of school governance, smaller learning communities, and better teacher development, there are still insufficient findings that links these changes to improved student achievement. I think the authors’ argument is not only valid, but I’m especially inspired by their proposed solution to teaching students to be self-regulated learners via a process called Zimmerman’s four step self-regulation model. The four steps include self-observation and evaluation, goal setting and strategic planning, strategy implementation, and strategic outcome monitoring. It seems highly possible that if students are taught abbreviated methods of meta-cognition, information processing, goal setting, and motivation, it could have a considerable effect in bridging the gap between structural reform and increased student achievement.

Dembo and Eaton’s article inspired me to reflect on my own teaching, and in doing so I realized that my existing classroom practices are similar to self-regulated learning instruction. For example, my “Attack on TAKS” regimen begins the year with students retaking that previous year’s TAKS test. Sixth graders take the fifth grade test, seventh graders take the sixth grade test, and eight graders take the seventh grade test to reactivate students’ prior knowledge. We compare the new results with their earlier scores and proceed to take the current grade level practice test. This allows us to examine changes in difficulty and identify current strengths and weakness. Most students are pleased to see how well they can perform on both tests, even if their results on the grade-level test were below passing. From this assessment, we begin to map out what Dembo and Eaton call a “plan of attack.” We record exactly how long we have to make improvements before the actual test date in April, and students chart their progress with each practice test. Students are usually motivated when they see how much time they have to improve between the September and April test dates. From here we drill intermittently with short TAKS quizzes, practice numerous test taking strategies, and even learn to write test questions. Other times we take full-length versions of the test. Surprisingly, students’ performance is unexpectedly low the first time. I grade their answer document without giving the correct answers to missed questions and allow to them use the graded answer document when retaking the test. I guide students in analyzing the questions and their initial answers by answering the following questions for each test item: 1) Did I get the answer right? If so, was it a lucky guess or a skilled response? 2) Did I get the answer wrong? If so, was it due to lack of knowledge or a simple mistake? The second grading is always, remarkably, higher than the first, and during

review, students realize how many wrong answers were due to technical test-taking mistakes, such as bubbling incorrectly or rushing and not paying attention to details. This realization boosts their confidence and makes them understand the advantages of taking their time and double-checking their answers during tests.

UNIT BACKGROUND

As a result of all this, I am inspired to construct a customized curriculum unit combining years of teaching experience with research studies based in theories of philosophy of learning, educational psychology, and cognitive psychology that is intended to help students become self-regulated learners. Educational research lends relevant information useful to understanding why our middle school students show such a decline in performance and motivation, and how we can fix it.

Anderman and Midgley (1997) confirm that middle school teachers often teach many students over the course of a school day. Given the short period of time and brief encounters with so many students, it is easy to underestimate the influences that one's teaching practices can have on any one individual. Current moves to implement philosophy into a middle school curriculum may provide a more facilitative method for teachers to construct a learning environment that will promote the motivation of all students. This assumption has been challenged, however, by research that demonstrates that the nature of motivational change on entry to middle school depends on characteristics of the learning environment in which students find themselves. Although it is difficult to prescribe a "one size fits all" approach to motivating students, research suggests that some general patterns appear to hold true for a wide range of students.

Radloff, Harpe, and Wright (2002) of Curtin University of Technology's Centre for Educational Advancement define self-directed learning as "the ability to identify and achieve learning goals through effective use of learning strategies and to understand, monitor, manage, evaluate and reflect on own learning - essential skills necessary for effective lifelong learning." More recent research suggests that support for encouraging self-regulated learning is best provided by academic staff as an integral part of discipline study (Hattie, Biggs, and Purdie, 1996). Radloff, Harpe, and Wright (2002) outline a number of reasons why teachers need to encourage and foster the development of self directed learning in all students. First, self-directed learners are known to be self-starters, adaptable, flexible, willing to continue learning, and able to work independently as well as part of a team (Australian Association of Graduate Employers, 1993; Candy, Crebert and O'Leary, 1994; Sinclair, 1997). Second, they must be able to plan, monitor, adapt, and evaluate their learning and to manage time, themselves and learning resources effectively. This is especially important in the face of increasing student numbers leading to large classes which will require learners to have skills to undertake independent learning (Green and Bigum, 1997). Third, students who are self-directed learners are more likely to be effective and successful learners in such settings (Chalmers and Fuller, 1995; Thomas, 1988; Winne, 1995; Zimmerman and Paulsen, 1995). Fourth, many students, recognize the need to be self directed but find it difficult to self direct or self regulate their learning (Boulton-Lewis, Wilss and Mutch, 1996; Brookfield, 1986; Pressley, 1995; Zimmerman, 1994; Zimmerman & Bandura, 1994). Radloff, Harpe, and Wright (2002) emphasize that for all these reasons, teachers need to include opportunities and explicit instruction in their courses to help students be self directed learners. Faculty generally acknowledge the need to provide such opportunities, but may be unsure of how best to go about helping their students become self directed learners as part of their regular teaching. Moreover, there is very little in the way of guidance and practical strategies for staff wishing to foster self-directed learning.

OVERVIEW OF CONCEPTS

To understand and help students achieve the many traits characteristic of a self-directed learner, I plan to introduce to students simple disciplines of motivational psychology and educational psychology. Teachers, parents, administrators, and students will benefit from understanding the concepts of student motivation, meta-cognition, self-efficacy, self-regulation, locus of control, and goal orientation. These concepts provide the foundation for a student seeking to become a self-directed learner. Although a student can become a self-directed learner without explicit instruction and development of these traits, it is more likely to occur when teachers and administrators understand and foster them at the classroom or school level (Lumsden, 1999; Renchler, 1992; Biemiller & Meichenbaum, 1992). These concepts can be taught directly through expository texts articles and illustrates followed by discussions of related personal experiences.

Meta-Cognition

Meta-cognition is the ability of the student to analyze, reflect on, and understand his or her own cognitive and learning processes. Students who identify appropriate learning strategies in the right context are using meta-cognition. For example, a student may know that he or she has trouble picking out the main idea in a reading passage. If the student has been taught a simple graphic organizer—such as webbing—to identify the main idea, and then chooses on his or her own to map out the passage in a web, then that student has used meta-cognition to complete the task. Students who are aware of their own cognitive strengths and weaknesses are more likely to be able to adjust and compensate for them.

Motivation

Few educators would argue with the premise that student motivation is an important influence on learning. Motivation is of particular importance for those who work with young adolescents. Student motivation is complex and multidimensional (Lumsden, 1994; 1999). Fundamentally, it comprises the various situational reasons why students choose whether or not to engage in academic tasks. Student motivation is a slippery concept, in that a student may be intrinsically motivated to perform a particular task (e.g., "I want to do well on this for my own satisfaction") but extrinsically motivated to perform another (e.g., "I want to do well on this task to increase my grade point average"). There are many cultural factors that come into play here: attitudes toward education, individualism versus collectivism, and the role of the teacher.

Goal Orientation

Goal orientation is a narrower concept than student motivation. Defined by Caraway, Tucker, Reinke, and Hall (2003) as the individual's ability to make plans and set goals, it works in conjunction with people's beliefs about their capabilities, often referred to as self-efficacy, to increase motivation. Goal-oriented individuals set challenging goals for themselves and maintain high levels of commitment to those goals despite encountering obstacles or challenges.

Goal Setting

One of the most widely used approaches to goal setting is the SMART model, which was developed and popularized by Stephen Covey. The SMART model below includes adaptations for all learners.

- S** = Specific – Goals should be specified in terms of long term goals and sub-goals.
- M** = Measurable – Monitor progress, and recognize when sub-goals have been achieved.
- A** = Achievable – Impossible goals are very demotivating, be sure goals are attainable.
- R** = Resourced – Students should be aware of resources needed to be achieve their goals.
- T** = Time-based – Develop realistic time frames, with short-term and long-term goals.

Self-Regulation

Self-regulation is the ability of the learner to control interest, attitude, and effort toward a task or a goal. The key to self-regulation is the ability of the learner to understand the requirements of the task or goal, and then to monitor and adjust his effort without reminders, deadlines, or cues from others such as teachers, peers, or parents. A student who has a clear understanding of an academic task (e.g., "I must write a five-paragraph paper tonight") can then implement self-regulation to meet the requirements of the task (e.g., "If I write an outline first and then utilize the writing strategies I have been taught, I can get a draft done in 90 minutes").

Self-Directed Learner

According to Abdullah (2001), self-directed learners are "responsible owners and managers of their own learning process" (1). Such individuals have the skills to access and process the information they need for a specific purpose. Self-directed learning integrates self-management (management of the context, including social setting, resources, and actions) with self-monitoring (the process whereby learners monitor, evaluate, and regulate their cognitive learning strategies). It is important to note that being a self-directed learner is a trait or disposition we want students to develop, rather than a laundry list of observable behaviors we wish students to exhibit.

Richard Boyatzis (2004) defines self-directed learning as intentionally developing or strengthening an aspect of whom you are or who you want to be, or both. This requires first getting a strong image of your ideal self, as well as an accurate picture of your real self – who you are now. Such self-directed learning is most effective and sustainable when you understand the process of change – and the steps to achieve it as you go through it. Self-directed learning involves five discoveries, each representing a discontinuity. The goal, of course, is to use each discovery as a tool for making the changes needed to continue the lifelong process of growth and adaptation.

The terms self-regulated and self-directed are used interchangeably in this unit as they both describe the process of an individual who understands, monitors, manages, and evaluates their own learning.

Attribution Theory

Attribution theory describes how the students' perception of their educational experience influences their motivation more than the actual, objective reality of those experiences. Students' beliefs about the reasons for their successes and failures are important influences on their motivation. Students who believe that their poor performance is caused by factors out of their control are unlikely to see any reason to hope for an improvement. In contrast, if students attribute their poor performance to factors that can be changed such as better study habits, they are more likely to persist in the future. Implications for teaching revolve around understanding what students believe about the reasons for their academic performance and helping students properly attribute their success and failures in ways that will aid motivation.

Locus of Control

Locus of control is defined by Rotter as "the tendency students have to ascribe achievements and failures to either internal factors that they control (effort, ability, motivation) or external factors that are beyond control (chance, luck, others' actions)" (Miller, Fitch, and Marshall 548). A self-directed learner would have a higher internal locus of control than an external one. This simply applies to the middle school syndrome of "good luck vs. bad luck." Often times, students will attribute their report card grades or test scores to what emotions they perceive from the teacher. For example, "She got an 'A' because the teacher likes her but I failed because I have bad luck." Rarely do they properly attribute their success or failure to the amount of effort or

hours studying they applied to achieving high scores. My assumption is that once students understand that they are in control of their own success and not the teacher, their reputation, or luck, they will begin to apply better learning strategies to accomplish their goals.

Information Processing

In cognitive psychology, memory is usually divided into three stores: the sensory, the short-term, and the long-term. The progress of information through these stores is often referred to as the Information Processing Model:

Sensory Memory

The sensory memory retains an exact copy of what is seen or heard (visual and auditory). It only lasts for only a few seconds, some believe it lasts only 300 milliseconds. It has a limited capacity.

Short-Term Memory (STM)

Selective attention determines what information moves from *sensory memory* to *short-term memory*. STM is most often stored as sounds, especially in recalling words, but may be stored as images. Information storage works best when incoming information is chunked into 7 bits in length, such as a telephone number (713-555-1212) or a list of grocery items. STM is vulnerable to interruption or interference.

STM is characterized by:

- A limited capacity of up to seven pieces of independent information.
- The brief duration of these items last from 3 to 20 seconds.
- Decay appears to be the primary mechanism of memory loss.

After entering sensory memory, a limited amount of information is transferred into short-term memory. Within STM, there are three basic operations:

Working Memory

An active process to keep it until it is put to use (think of a phone number you'll repeat to yourself until you can dial it on the phone). Note that the goal is not really to move the information from STM to LTM, but merely put the information to immediate use.

The process of transferring information from STM to LTM involves the encoding or consolidation of information. This is not a function of time, that is, the longer a memory stayed in STM, the more likely it was to be placed into LTM, but on organizing complex information in STM before it can be encoded into LTM. In this process of organization, the meaningfulness or emotional content of an item may play a greater role in its retention into LTM. As teachers, we must find ways to make learning relevant and meaningful enough for the learner to make the important transfer of information to long-term memory.

The use of chunking has been proven to be a significant aid for enhancing the STM transfer to LTM. Remember, STM's capacity is limited to seven items, regardless of the complexity of those items. Chunking allows the brain to automatically group certain items together.

Long-Term Memory (LTM)

This is relatively permanent storage. Information is stored on the basis of meaning and importance.

The knowledge we store in LTM affects our perceptions of the world, and influences what information in the environment we attend to. LTM provides the framework to which we attach

new knowledge. It contrasts with short-term and perceptual memory in that information can be stored for extended periods of time and the limits of its capacity are not known.

Schemas are mental models of the world. Information in LTM is stored in interrelated networks of these schemas. These, in turn, form intricate knowledge structures. Related schemas are linked together, and information that activates one schema also activates others that are closely linked. This is how we recall relevant knowledge when similar information is presented. These schemas guide us by diverting our attention to relevant information and allow us to disregard what is not important.

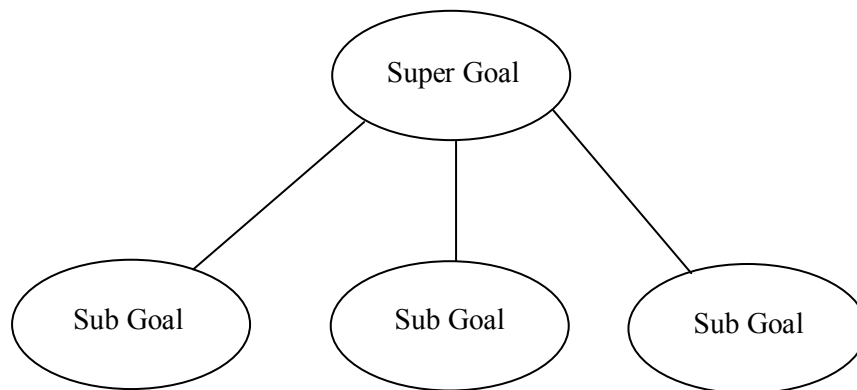
Since LTM storage is organized into schemas, instructional designers should activate existing schemas before presenting new information. This can be done in a variety of ways, including graphic organizers, curiosity-arousing questions, movies, etc.

LTM also has a strong influence on perception through top-down processing – our prior knowledge affects how we perceive sensory information. Our expectations regarding a particular sensory experience influence how we interpret it. This is how we develop bias. Also, most optical illusions take advantage of this fact.

An important factor for retention of learned information in LTM is rehearsal that provides transfer of learning.

Information Processing Model for Problem Solving

The discipline of artificial intelligence lends us a model of problem solving referred to as a goal tree (Winston, 1992). The goal tree is represented by a graphic organizer that outlines and connects simpler sub-goals to the more difficult super-goal. Students can use this organizer as a strategy in planning how they are achieve certain academic goals by first solving one or more sub-goals:



IMPLEMENTATION OF UNIT

As mentioned earlier, Dembo and Eaton (2000) report research findings that structural changes in middle schools such as smaller learning clusters and team teaching has resulted in a more personal, intimate learning environment. This is true for our campus, teachers, and students, but I agree that there is little evidence to show its effect on improved student achievement. Johnston has made considerable strides as a result of participating in Houston A+'s school reform initiative. We try new tactics each year to enhance the effects of our structural school reform and their direct connection to quality student learning. One tactic may in fact be the beginnings of a campus-initiated curriculum reform. This year we have added a new thirty-minute period where students are taught a school-wide customized study skills/character education curriculum, consisting of several strategies to help students become more successful in

their academic classes. I chair the committee that authored this curriculum, and we are continuing to prepare new and improved curriculum for next year. In our school-based study skills curriculum, it could prove advantageous to include lessons plans from my unit with activities that guide students to be self-regulated learners in addition to lessons related to character education, leadership development, and problem-solving. I propose that applying a systematic process of teaching self-regulation to middle school students will show considerable progress in their overall achievement not only on standardized tests, but in quality life-long learning. I intend to utilize specific knowledge, resources, and expertise from Dr. Garson's Ethics seminar to build an interactive curriculum unit that will guide and facilitates students' acquisition of these meta-cognitive skills.

Objectives

Literature (see, for example, Biggs and Moore, 1993; Ford and Nichols, 1987; Long, 1990; Pressley, 1995; Schunk and Zimmerman, 1994) suggests that self directed learners are characterized by their capacity to:

- discover, develop and apply their own strengths and capabilities;
- identify and set personally meaningful goals for their own learning;
- work independently and/or with others to achieve their learning goals;
- develop and use a wide range of learning strategies appropriate to different learning tasks;
- understand, plan, monitor and evaluate their own learning;
- access and apply knowledge sources and information systems;
- persist and overcome obstacles to achieve their learning goals; and apply new skills and knowledge appropriately in practice.

These too, are my expected outcomes of the unit. I plan to synthesize these goals with the five discoveries of Richard Boyatzis' theory of self-directed learning in this unit. The Self Directed Learning theory developed by Boyatzis states that people can use a process to help them successfully change themselves. The first discovery (as he calls it) comes from asking, "Who do I want to be?" or "What is my ideal self?" The second discovery comes from asking, "Who am I?" or "What are my strengths and gaps?" The third discovery comes from asking, "How can I build on my strengths while reducing my 'gaps'?" or "What is my learning agenda?" The fourth discovery comes from experimenting with and practicing new behaviors until there is mastery. The fifth discovery comes from maintaining or developing supportive and trusting relationships that can make change possible (Goleman 109-112).

Sequence of Activities

If this program is to be a five part introduction to self-regulated learning, then we can expect there to be quality reinforcement of the concepts throughout the entire school year. Hopefully these learned concepts and life-long strategies will continue upon throughout the educational career of the student.

The First Discovery: My Ideal Self – Who Do I Want to Be?

The introduction of the unit begins with attempting to have students address the question of "Who do I want to be?" This phase should reveal students idealistic views of themselves and their future aspirations. Although student responses should remain realistic, there is a great advantage to encourage high self-expectations and levels of achievement.

Boyatzis' manual of *Leadership Development and Personal Effectiveness* states, "Being true to me means being true to my own originality, and that is something only I can articulate and discover. In articulating it, I am also defining myself" (10).

Exercises and activities posed during this first phase of self-discovery will address the following questions:

- What metaphors and images do you use to describe your ideal self?
- Where do you see yourself 2, 5, 10 years from now?
- Compare and Contrast your public self and your ideal self.
- In your 8th grade graduation party speech, what aspects of your life will you highlight as giving you the most satisfaction? In your 12th grade graduation party speech?
- What do you want your legacy to be?

The Second Discovery: My Real Self - Who am I? - What Are My Strengths and Gaps?

The second phase of self-discovery will reveal student's public personalities. Middle school students will easily grasp the concept that they present different versions of themselves in different situations.

- How do others see you?
- What would your closest friends describe as our strengths and weaknesses?
- What are you really good at – where do you make the greatest impact?
- Do you include spiritual, social, and moral aspects in your self-image?
- Do you like yourself?
- How did you become the person you are?

The Third Discovery: My Learning Agenda - How Can I Build on My Strengths while Reducing My Gaps?

For many the concept of learning implies what a student does in response to teaching. This third phase of discovery attempts to incite meaningful dialogue among teachers and students about the learning process and its outcomes. It is in this phase that the above mentioned concepts of motivation, self-regulation, goal setting and others are introduced. Students will be enlightened on the differences between shallow learning that involves simple memorization and deep learning that creates understanding.

- How well do you understand yourself as a learner?
- What specific strategies do you use to promote deep and profound learning?
- How well do you understand your dreams and/or goals?
- How do you celebrate your strengths and successes?
- How well aligned are your aspirations, values, and personal practices?
- How do you maintain hope in your life?

The Fourth Discovery: Experiment with New Behaviors, Thoughts, and Feelings to the Point of Mastery. What Actions do I Need to Take?

At this point students have diagnosed their ideal self, their real self, and are beginning to understand how they learn and the possible entities that help them be successful in their goals. The fourth phase of self-discovery is to enhance intrinsic motivation and build confidence to support these actions. Students will explore modeling appropriate behaviors conducive to success as well as how to build social relationships that aid in fostering person development. Lev Vygotsky's concept of the 'zone of proximal development' states that any person's potential to grow learn and develop depends on a social relationship. Vygotsky supports the statement of the basis that the central characteristic of any relationship is confidence, which is based on trust and which in turn creates confidence in the learner (Boyatzis 35).

- What criteria do you use to judge your effectiveness?
- Are you comfortable experimenting with new approaches and strategies?
- Do you have a long-term mentoring relationship as part of your learning strategy?
- How confident are you in reflecting on your learning?

- How comfortable are you in getting feedback from others?
- Are you comfortable with risk taking?
- Do you like challenges?

The Fifth Discovery: Develop Trusting Relationships That Help, Support, and Encourage Each Step in the Process. Who Can Help Me?

The last phase of Boyatzis' Leadership Development and Personal Effectiveness through Self-Regulated Learning discusses how authentic relationships are the basis of all learning, a statement Vygotsky would be proud to hear. This phase instructs the notion of interpersonal relationships, our interaction with immediate family, friends, coaches, advisors, mentors, and even those informal contacts we encounter in our daily routine: classmates, store attendants, etc. Students will understand that each of these relationships contributes to their social learning. Research shows that students who form connections with their peers will be more successful in college. The structure of a class environment, with peer editing, collaborative work, discussion and debate on social issues, helps more students trust and rely on friends and tutors.

- What have been the most significant relationships in your life?
- How would you describe the most powerful influences on your successful relationships?
- What are the practical manifestations of a relationship built on trust?
- Consider all of your friendships and relationships – do they support your success?
- Are there any gaps in your friendships and support needs?
- How do you contribute to the growth and development of those who support you?

CONCLUSION

I think students can become more aware of self-directed learning, and this unit can be the first step in helping them become self-directed learners. If students go into a class and are required to set goals, create action plans, and develop learning agendas, they will develop these skills and automatically apply them in all areas of learning. It is not expected that one semester or one year of self-regulated instruction will bring miraculously results. However, if reinforced continually year after year, students will begin to take more responsibility for the learning and care about being better students.

LESSON PLANS

Lesson #1 - Academic Self- Regulation Questionnaire (SRQ-A)

Purpose

This questionnaire concerns the reasons why children do their school work. The questionnaire is developed for students in late elementary and middle school. Students should be guided to become increasingly aware of their personal learning styles and their source of motivation to complete academic tasks. Once students are cognizant of these internal factors, they can begin to apply this knowledge to achieve pre-set goals.

Administering the SRQ-A

SRQ-A is a questionnaire that is used in many studies of school children. It asks four questions about why students do various school related behaviours. Each question is followed by several responses: Very true is scored 4; Sort of true is scored 3; Not very true is scored 2; and Not at all true is scored 1.

Scoring the SRQ-A.

Scoring information for First, you calculate the subscale score for each of the four subscales by averaging the items that make up that subscale. Very true is scored 4; Sort of true is scored 3;

Not very true is scored 2; and Not at all true is scored 1. The four subscales are: external regulation, introjected regulation, identified regulation, and intrinsic motivation. Listed below are the item numbers associated with each of the four subscales:

- Extrinsic Motivation: 2, 6, 9, 14, 20, 24, 25, 28, 32
- Self-Determination: 1, 4, 10, 12, 17, 18, 26, 29, 31
- Personally Meaningful: 5, 8, 11, 16, 21, 23, 30
- Intrinsic Motivation: 3, 7, 13, 15, 19, 22, 27

Self-Regulation Questionnaire

Below is a brief overview of the main topics surveyed in the SRQ-A. A full version of the SRQ-A can be found at <http://www.psych.rochester.edu/SDT/measures/selfreg_acad.html>.

Why I Do Things

- A. Why do I do my homework?
- B. Why do I work on my class work?
- C. Why do I try to answer hard questions in class?
- D. Why do I try to do well in school?

Lesson #2 - Learning Contract Form

Purpose

These discussion questions and graphic organizer are used to facilitate student's understanding of goal setting. The contract will help students address the principle steps in monitoring their progress and identify sub-goals related to their main goal. Students will also learn to evaluate their process and recognize when it is necessary to restructure their plans.

1. What are your goals for this coming academic year?
2. What are the things you need to do in order to accomplish this year's goals?
3. Make a "to-do list" of the things you will do this week, and the things you will do today that relate to your goals for this year. These may be specific course assignments, talking to your teacher, or scheduling individual and group homework /studying sessions.

Once students discuss their goals possible ways to achieve them, they can begin personalizing their learning contract. This contract will help students reduce a super-goal into sub-goals. It also guides students through a process of monitoring their progress, assessing the outcome and reflecting on the process in the end.

Learning Contract Form

Learner: _____ Course: _____

Instructor: _____ Contract Grade: _____

What are you going to learn (objectives)	How are you going to learn it (resources/strategies)	Target date for completion	How are you going to know that you learned it (evidence)	How are you going to prove you learned (verification)

Lesson #3- Puzzles in Deductive Reasoning

Purpose

Students will exercise their logic and deductive reasoning by attempting to solve these fun puzzles. These activities are exercises in learning the problem solving process. While attempting to find solutions, students will employ tactics used by self- directed learners.

Notes

The goal is not to find a solution. The goal is to track the problem solving process. Students will become meta-cognitive about the processes they’re using while solving problems and breaking them down in to sub-problems.

Ham Yesterday, Pork Today

When Adrian, Buford, and Carter eat out, each orders either ham or pork.

1. If Adrian orders ham, Buford orders pork.
2. Either Adrian or Carter orders ham, but not both.
3. Buford and Carter do not both order pork.

Who could have ordered ham yesterday, pork today?

Hint: Determine the men whose orders never change.

Solution

- From 1 and 2, if Adrian orders ham, Buford orders pork and Carter orders pork. This situation contradicts 3. So Adrian orders only pork.
- Then, from 2, Carter orders only ham.
- *So only Buford could have ordered ham yesterday and pork today.*

This activity and others like it can be found in *Test Your Logic: 50 Puzzles in Deductive Reasoning* (Summers, 1972).

BIBLIOGRAPHY

Works Cited

- Abdullah, M.H. *Self-directed Learning* [ERIC digest No. 169]. Bloomington, IN: ERIC Clearinghouse on Reading, English, and Communication, 2001.
- Anderman, L.H., and C. Midgley. "Motivation And Middle School Students." In Judith (Ed.) *What Current Research Says To The Middle Level Practitioner*. Columbus, OH: National Middle School Association, 1997: 41-48.
- Australian Association of Graduate Employers. *National Survey of Graduate Employers*. Sydney, 1993.
- Biemiller, A., and D. Meichenbaum. "The Nature and Nurture of the Self-directed." *Learner. Educational Leadership*, 50.2 (2002):75-80.
- Biggs, J. B., and P. J. Moore. *The Process of Learning*. Sydney: Prentice-Hall, 1993.
- Boulton-Lewis, G. M., L. Wilss, and S. Mutch. "Teachers as Adult Learners: Their Knowledge of Their Own Learning." *Higher Education* (1996): 32, 89-106.
- Boyatzis, Richard. *Leadership Development and Personal Effectiveness*. National College for School Leadership, 2004.
- Brookfield, S, ed. *Self-directed Learning: From Theory to Practice*. San Francisco: Jossey-Bass, 1986.
- Candy, P. C., Crebert, G., and J. O'Leary. *Developing Lifelong Learners through Undergraduate Education*. (Commissioned Report 28). Canberra: National Board of Employment, Education and Training Australian Government Publishing Service, 1994.
- Caraway, K., C. M. Tucker, W. M. Reinke, and C. Hall. "Self-efficacy, Goal Orientation, and Fear of Failure as Predictors of School Engagement in High School Students." *Psychology in the Schools* 40.4 (2003):417-427.
- Chalmers, D., and R. Fuller. *Teaching for Learning at University*. Perth, WA: Edit Cowan University, 1995.
- Dembo, Myron H. and Eaton, M. J. "Self-Regulation of Academic Learning in Middle-Level Schools." *The Elementary School Journal* 100.5 (2000):473-490.
- Ford, M. E., and C. W. Nichols, eds. *Humans as Self-constructing Living Systems: Putting the Framework to Work*. Hillsdale, New Jersey: Lawrence Erlbaum and Associates, 1987.
- Goleman, D., R. Boyatzis, and A. McKee. *Primal Leadership: Learning to Lead with Emotional Intelligence*. Harvard Business School Press, 2002: 109-110.
- Green, B., and C. Bigum. *Re-Tooling Schooling? Information Technology, Cultural Change, and the Future(s) of Australian Education* (paper). Adelaide: Flinders University, 1997.
- Hattie, J., J. Biggs, and N. Purdie. "Effects of Learning Skills Interventions on Student Learning: A Meta-Analysis." *Review of Educational Research* 66.2 (2006): 99-136.
- Long, H. B. "Psychological Control in Self-Directed Learning." *International Journal of Lifelong Education* 9.4 (1990): 331-338.
- Lumsden, L. *Student Motivation to Learn* [ERIC digest No. 92]. Eugene, OR: ERIC Clearinghouse on Educational Management, 1994.
- Lumsden, L. *Student Motivation: Cultivating a Love of Learning*. Eugene, OR: ERIC Clearinghouse on Educational Management, 1999.
- Miller, C.A., T. Fitch, and J. L. Marshall. "Locus of Control and At-Risk Youth: A Comparison of Regular Education High School Students and Students in Alternative Schools." *Education* 123.3 (2003): 548-552.
- Ngeow, K., and Y. Kong. *Learning to Learn: Preparing Teachers and Students for Problem-Based Learning* [ERIC digest]. Bloomington, IN: ERIC Clearinghouse on Reading, English, and Communication, 2001. (ERIC Document Reproduction Service No. ED457524)
- Pressley, M. "More about the Development of Self-Regulation: Complex, Long-Term, and Thoroughly Social." *Educational Psychologist* 30.4 (1995):207-212.
- Radloff, A., B. de la Harpe, and L. Wright. "A Professional Development Program to Help Academic Staff to Foster Student Self-Directed Learning." In A. Herrmann and M.M. Kulski (Eds), *Flexible Futures in Tertiary Teaching*. Proceedings of the 9th Annual Teaching Learning Forum, 2-4 February 2000. Perth: Curtin University of Technology. <<http://lsn.curtin.edu.au/tlf/tlf2000/radloff.html>>.

- Renchler, R. *Student Motivation, School Culture, and Academic Achievement: What School Leaders Can Do* [Trends and issues paper]. Eugene, OR: ERIC Clearinghouse on Educational Management, 1992. (ERIC Document Reproduction Service No. ED351741)
- Schunk, D. H and B. J. Zimmerman, eds. *Self-Regulation of Learning and Performance: Issues and Educational Applications*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1994.
- “The Self-Regulation Questionnaires (SRQ-A).” 16 March 2005. *Self-Determination Theory: An Approach to Human Motivation and Personality*. <http://www.psych.rochester.edu/SDT/measures/selfreg_acad.html>.
- Sinclair, K. E. *The Transition of Graduates from Universities to the Workplace*. Paper presented at the 7th European Conference for Research on Learning and Instruction, Athens, Greece: August 1997.
- Summers, George J. *Test You Logic: 50 Puzzles in Deductive Reasoning*. Dover Publications, Inc., 1972: 1, 55).
- Thomas, J.W. “Promoting Independent Learning in the Middle Grades: The Role of Instructional Support Practices.” *Elementary School Journal* 93.5 (1993): 575–591.
- Winne, P. H. “Inherent Details in Self-Regulated Learning.” *Educational Psychologist* 30.4 (1995): 173-187.
- Winston, Patrick Henry. “Artificial Intelligence.” New York: Addison-Wesley 1992: 15- 60.
- Zimmerman, B. J. “Dimensions of Academic Self-Regulation: A Conceptual Framework for Education.” In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of Learning and Performance: Issues and Educational Applications*. Hillsdale, New Jersey: Lawrence Erlbaum Associates, 1994: 3-21.
- Zimmerman, B. J., & A. Bandura. “Impact of Self-Regulatory Influences on Writing Course Attainment.” *American Educational Research Journal* 31.4 (1994): 845-862.
- Zimmerman, B. J., & A. S. Paulsen. (1995). “Self-Monitoring During Collegiate Studying: An Invaluable Tool for Academic Self-Regulation.” *New Directions for Teaching and Learning* 63 (1995): 13-27.
- Zimmerman, B.J. “Becoming a Self-Regulated Learner: An Overview.” *Theory into Practice* 41.2 (2002): 64–70.
- Supplemental Resources**
- Deci, E.L., and R. M. Ryan. “The Paradox of Achievement: The Harder You Push, the Worse It Gets.” In J. Aronson (Ed.) *Improving Academic Achievement: Contributions of Social Psychology*. New York: Academic Press, 2002: 59-85.
- Nichols, W. D., J. P. Jones, and D. R. Hancock. “Teachers' Influence on Goal Orientation: Exploring the Relationship Between Eighth Graders' Goal Orientation, Their Emotional Development, Their Perceptions of Learning, and Their Teachers' Instructional Strategies.” *Reading Psychology* 24.1 (2003): 57–85.
- Ryan, R. M., and J. G. La Guardia. “Achievement Motivation within a Pressured Society: Intrinsic and Extrinsic Motivations to Learn and the Politics of School Reform.” In T. Urdan (Ed.) *Advances in Motivation and Achievement: Vol 11*. Greenwich, CT: JAI Press, 1999: 45-85
- Ryan, R. M., and M. F. Lynch. “Philosophies of Motivation and Classroom Management.” In R. Curren (Ed.) *Blackwell Companions to Philosophy: A Companion to the Philosophy of Education*. New York, NY: Blackwell, 2003: 260-271.
- Ryan, R. M., and J. Stiller. “The Social Contexts of Internalization: Parent and Teacher Influences on Autonomy, Motivation and Learning.” In P.R. Pintrich and M.L. Maehr (Eds.), *Advances in Motivation and Achievement: Vol. 7. Goals and Self-regulatory Processes*. Greenwich, CT: JAI Press, 1991: 115-149.
- Scheidt, R.A. “Improving Student Achievement by Infusing a Web-Based Curriculum into Global History.” *Journal of Research on Technology in Education* 36.1 (2003): 77–94.
- Schillereff, M. “Using Inquiry-Based Science to Help Gifted Students Become More Self-Directed.” *Primary Voices K–6*, 10.1 (2001): 28–32.
- Schwartz, W. *Closing the Achievement Gap: Principles for Improving the Educational Success of All Students* [ERIC digest]. New York, NY: ERIC Clearinghouse on Urban Education, 2001. (ERIC Document Reproduction Service No. ED460191).