Enhancing Memory in Your Students: COMPOSE Yourself!

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Abstract

The essence of teaching is, in fact, creating new memories for your students. The teacher's role is to help students store the correct information (memories) in ways that make recall and future access and use likely. Therefore, choosing techniques to enhance memory is possibly the most critical aspect of instructional design. COMPOSE is an acronym designed to summarize the critical teaching skills which enhance student memory of information taught. By addressing the elements of COMPOSE, teachers can maximize the likelihood that the information they teach will be retained and stored in a manner which will optimize efficient recall for later application and exploration. COMPOSE stands for Connections, Odds of success, Meaningfulness of the materials, Practice, Organizational clarity, Strategies, and Emotional impact. Strategies to provide for each component are addressed.

Keywords
memory, learning strategies

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Memory is the mother of all wisdom. Samuel Johnson

We, as teachers can be so caught up in the task of instruction that we may forget the most essential issue of all: insuring adequate memory of the materials presented. Teachers present students with a seemingly endless supply of information, skills and concepts but this material is only truly learned if it can be efficiently recalled by the student when needed. Therefore, choosing methods to enhance memory and efficient recall is possibly the most critical aspect of your instructional design. Effective educators of students of every age must thoughtfully integrate techniques and strategies that will increase the likelihood that the content of their instruction will be remembered. Given that students with disabilities experience greater than average difficulties with memory, improving efficient memory and recall, teacher attention to the use of memory improving strategies is even more important.

COMPOSE is an acronym designed to summarize the critical teaching skills which improve student memory of information taught. By addressing the elements of COMPOSE, teachers can maximize the likelihood that the information they teach will be stored in a manner which will optimize the likelihood of efficient recall for later application and exploration. COMPOSE stands for Connections, Odds of Success, Meaningfulness of the Materials, Practice, Organizational Clarity, Strategies, and Emotional Impact. An explanation of each follows.

C: Connections

What we already know determines to a great extent what we will pay attention to, perceive, learn, remember, and forget. Anita Woolfolk

Ever experience that "tip of the tongue" memory lapse when trying to recall specific information? If so, you probably also experienced a feeling of searching through your "mental files" for the missing information. In doing this, it is likely that you often began by trying to associate the information with other known items. For example, if you have forgotten the name of a person approaching you, you might first try to recall where you know them from, who you both might share as friends, or some common interest. In all these cases, you are naturally (and strategically) seeking the connections that might assist in locating the elusive name.

Effective student memory involves the creation of multiple meaningful connections between bits of information (Finn & Metcalf, 2007). Much like storing files in your computer, if you can't recall the label you gave to the file, the search process may fail. Efficient memory requires storage of that information where it is likely to be found again.

It is first essential then that teachers create or emphasize connections between what is already known and what is to be learned. Isolated bits of information will not be memorized as effectively as those associated with existing information. Further, the more associations that are made between the known and the new information, the better it will be learned.

One simple method for connecting new information to known information is through elaboration to activate prior knowledge before any presentation of new information (King, 1992). Without this step, the creation of connections will be less likely to occur or the connections formed may not be useful for recall. The following are simple strategies for activating or "creating" prior knowledge:

- *Generated questioning strategy*: Use a student generated questioning strategy

to encourage personal, active exploration of the student's prior knowledge. Students pose and answer their own thought provoking questions about the material to be covered. They are assisted in developing their personal questions through the use of a generic list of questions such as, "What is a new example of ...." or "What would happen if…." (King, 1992).

- *Analogy:* Ask your students to make an analogy relating the new concepts to familiar items. (King, 1992). One way to accomplish this is to ask the students brainstorm and have each tell something related to the topic. Record their comments and then review for any new connections that the students have made.
- *Visualization:* Use visualization to elaborate on content (King, 1992). For example, students could be asked to close their eyes and envision the topic. Afterward, asked students to describe what they "saw." To excourage further elaboration, after the description has been given, ask the student, "How do you know that?" This explanation often can help other students form connections they were not aware of during the initial discussion. For example, when a class of students in an urban school was asked to envision anything from the "frontier" most of them were unable to "see" anything. One student tentatively asked if a musket might be part of the frontier. His teacher agreed and asked the important extension question, "How do you know that?" The student replied that he had seen it on "Little House on the Prairie." With this additional clue, the rest of the students asked if they could now attempt to envision the frontier. They closed their eyes again and now all were successful in identifying some aspect from their memory which would serve as a hook for future learning. Without this simple activity, in is extremely unlikely that these students would have benefitted at all from the lesson that followed.

It is first essential that teachers create or emphasize connections between what is already known and what is to be learned.

- *Limited Prior Knowledge:* Where students are likely to have limited prior knowledge, you must create that knowledge (Mastropieri & Scruggs, 1993). You can do this through the use of actual objects, experiences, field trips, speakers, or books. Popular videos and films also help students visualize that which they have not personally experienced. For example, one group of students in an urban setting was well able to brainstorm information on the Iditarod after learning that the movie "Sled Dog" was about that event.

Note: Teachers should never assume that students have the requisite background knowledge to make these connections on their own. When teaching, the author discovered that many of her students (who lived one half hour from the New Jersey shore) had never seen the ocean. These were middle class students who simply had no personal reference for a topic that one might assume they would know well.

Figure 1: COMPOSE Key Principles

COMPOSE IN ACTION!		
C	Connections	• Brainstorming • Visualize and describe, ask “How did you know that?” • Graphic organizers
O	Odds of success	• Shorter segments • Periodic checks for success • Offer tasks at varying difficulty levels with choice
M	Meaningfulness of material	• Explore use of lesson prior to beginning • Tie lessons to topics of high meaning to students • Provide choice to enhance likelihood of interest
P	Practice	• Use computer programs for reinforcement • Teach use of practice or flash cards • Consider issue of practices per minute
O	Organizational clarity	• Begin with outcome goals clearly stated • Content enhancement routines • Create study guides and partial notes formats
S	Strategies	• Use visuals to support recall • Directly teach specific strategies and when they are to be used • Have students model the strategies they use
E	Emotions	• Use novelty and humor • Focus on growth and effort • Use play like activities

Memory is not like a container that gradually fills up: it is more like a tree growing hooks onto which memories are hung. Peter Russell

Beyond activation of prior knowledge, teachers should provide many opportunities for students to create essential connections (Yates, 2005). Instructional techniques to do this include:

- *Graphic Organizers:* Use of graphic organizers as advance organizers (Bender, 2002). The graphic organizer (GO) is a visual representation of abstract or implicit information, that can show relationships, help to organize ideas, help to relate new information with prior knowledge. Many types of GOs are available including semantic feature analysis charts, story maps, Venn diagrams, character description maps, KWL (Know, Want to Know, Learned), an anticipation guide and cause/effect diagrams.
- *Concept Maps:* Creation of concepts maps (Friend & Bursack, 2008). Concept maps are a type of graphic organizer designed to highlight the relationships between information i.e. two or more concepts are linked by words that describe their relationship.
- *Team Challenges:* Use of classroom challenges to identify connections. Create teams and have each create their own analysis of how two topic areas are related (Sousa, 2001).

O: Odds of success

Memory is a way of holding on to the things you love, the things you are, the things you never want to lose. (Source Unknown)

Imagine you are attending a workshop and are asked memorize a list of 30 nonsense words. You are given two minutes to complete the task. Would you try? It is likely that some of you would play along just for fun but it is also likely that some of you would assess the task, deem it impossible and take the time to rest!

When presented with any new task students react in the same manner! They immediately calculate their chances of success in determining how much energy they will bring to the endeavor. Differences in effort expenditure therefore are related to differences in students' confidence in their ability to perform well in school (Silvia, 2008).

Students tend to avoid situations they believe exceed their capabilities.

Put another way, students tend to avoid situations they believe exceed their capabilities, but will work with assurance on those activities they judge themselves capable of accomplishing successfully. For students who have struggled in the past, this fact is particularly important since they will be more likely to deem the task impossible to complete successfully.

Some strategies for enhancing student expectation for success are:

- *Segmenting Tasks:* Presenting tasks in shorter segments (fewer items appear less daunting than larger numbers of items to complete) - simply cutting a worksheet in half and having student turn in one half before starting the next can increase effort! (Bender, 2002: Lavoie, 2007).
- *Checks for Success:* Structuring tasks so that there are periodic checks for success (in this way students do not need to expend as much effort before receiving confirmation of success or direction/ correction to success) (Arends, 2004).
- *Scaffolding:* Scaffolding support for students who have experienced failure in the past so that their experiences with your classroom materials will be successful every time (scaffolding requires providing the necessary support to ensure success and systematically removing that support as the student improves his performance) (Bender, 2002).
- *Varying Difficulty Level:* Presenting tasks for various difficulty levels and allowing students their choice of level (Sylwester, 2000).
- *Encouragement:* Encouraging what Yates (2005) terms a "Can do" attitude. Avoid references to possibilities of failure. Never use the possibility of failure as a threat in an attempt to get a student to finish his or her work.
- *Encourage Positive Attributions:* Help students attribute their successes to their own efforts. At every opportunity, point out how their effort has resulted in success. Discourage attributions of success which are outside the control of the pupil such as, "Oh, I only did well because the test was easy." (Lerner & Johns, 2009).

- *Controlling Task Difficulty:* Designing assignments to ensure that students experience success and persist in learning activities has long been recognized as a critical feature of effective instruction for students with LD (Gersten, Carnine, & White, 1984).

M: Meaningfulness, value

In general, we forget the meaningless…and retain the meaningful. Rebecca Rupp

Imagine you are traveling for several weeks and changing hotels as you move from town to town. In each hotel you will have a new room number and a new floor plan to recall. Are you likely to remember these facts while you are in the hotel? Of course! Are you likely to immediately forget them as you move on? Absolutely! This is because we are all more likely to remember information that has a high level of value or meaningfulness to us personally and to forget or lose that information as soon as it loses that value.

Students are no different! As Sousa (2001) states, "Relevancy is one of the major factors affecting retention." While they may not voice the question aloud, all students are continually assessing what value or use the information presented will have for them. For example, rarely, if ever, do students fail to accurately memorize the drivers license manual, for this one text has possibly one of the highest meaning/value factors for young teens.

Excellent students may find the value in every activity simply because you ask them to do it. They associate teacher direction with success and success now with future goals. Weaker students do not necessarily see the value in tasks as clearly or easily. Why learn what happened during the Civil War when it was so long ago? Or, as one high school student asked in his class, "When would I ever need to know how to multiply fractions?"

Teachers can enhance the meaningfulness/value of materials to be learned by using the following strategies:

- *Careful Choice of Goals:* Give careful thought to the value of each instructional goal prior to teaching the lesson, especially with regard to answering the student questions, "What does this mean to me?" or "Why should I learn this?" If you as the teacher cannot answer these questions easily, consider choosing different instructional goals (Arends, 2004).
- *Open with Value Statement:* Start each lesson with a brief exploration of the use of the information which will be covered. Encourage students to explain how the materials might be useful to them in the future (Arends, 2004). When information to be taught is essential but not immediately and obviously of value to the students, develop long term usefulness charts with your class. Develop a relational or timeline chart to demonstrate the future use/value of the information. In this manner students can be focused on how current information will fit into future valuable knowledge visually and quickly.
- *Provide Choices:* Whenever possible, provide choices in learning activities to allow students to pick those activities which have greater value to them personally (Arends, 2004).
- *Relate to Students' Lives:* Relate lessons to students' lives (Arends, 2004).

Link current information with items of high value to the students. For example, a student who sees little value in math often develops an increased interest when the topic relates to future pay and decimals can become far more fascinating to some students when presented as sports statistics.

P: Practice, repetition

We're creating those memories that will last. You remember the things that you did, not the thing that you learned. Susan Hilyer

Not everything we have to learn in school can be made fascinating or fun. Some skills must be acquired through long periods of reinforcement and while teachers should do everything they can to ensure that the other principles of COMPOSE are used in all lessons, practice and repetition are also essential (Yates, 2005). The goal of this practice is to achieve automaticity where the learner acquires the ability to move information quickly and efficiently between short term and long term memory without extraordinary effort. This leaves energy for higher level thinking (Samuels & Flor, 1997).

All students are continually assessing what value or use the information presented will have for them.

Experts have acquired automaticity in their field. This gives them an advantage over novices in that they not only can more process information more quickly with less energy but they can also more easily add new information to that which they have already learned. The sad truth is that in the case of experts, "the rich get richer and the poor get poorer" with regard to the material in which they are experts. Children who fail to reach automaticity at the lower grades will not only work much harder than their "expert" peers just to produce the same or lesser level of work but will have more difficulty creating necessary connections for higher order work.

Today's curriculum, with its quick pacing, has inadvertently left some pupils without the necessary automaticity needed to be efficient in the material. These students get "stuck" constantly working at a lower level of processing, working harder yet getting less results. For teachers at the upper grades, where you may receive pupils who lack automaticity, it is essential that you build in opportunities for those students to practice the lower level skills as well as presenting the new curriculum.

Once you have identified the information and skills requiring practice, the following strategies may be helpful:

- *Technology:* Use computerized programs for practice when possible. Students like using the computer and many programs have been developed specifically for practice (Sousa, 2001).
- *Rehearsal Instruction:* Teach students how to rehearse information effectively (Rief, 1997). For example, teach students how to develop their own practice cards. Model how the items for the cards should be chosen or create competitions to see which of your students can create cards that most closely match your own. Ask various students to demonstrate how they use their cards and what works for them thus providing multiple models to those students who have not identified a successful method for their use.

- *Team Practice:* Encourage the use of teams and social activities to reach automaticity as students are likely to work longer with better focus when practicing with others. Form pairs to review cards on a regular basis. Have one student play the role of teacher, then reverse roles (Lerner & Johns, 2009; Sousa, 2001).
- *Charting and Celebrating Success***:** Celebrate each student's success (Sousa, 2001). In lower grades for example, charting each child's progress in reaching automaticity can be motivating as long as the charts are personal and not publicly posted.
- *Provide Focus***:** Choose a small set of information or skill to be practiced to mastery thus adding to the student's likelihood of success and desire to continue (Friend & Bursack, 2008). For example, have student work on the one's times tables first and only until they have achieved automaticity. Using worksheets with multiple types of problems, no matter how often the child completes them, often just leads to frustration and a confirmed belief in the child that they are stupid and will never learn the materials.
- *Maximize Practice Time:* Maximize academic learning time which is highly related to student success (Arends, 2004). Evaluate the games and other activities you use in class to practice any skill for the "practice per minutes" it provides to each individual student. Many games, while entertaining, do not provide much practice to each child (unless they are able to pay attention to the other students for long periods of time, which they are not likely to be!) For example, dividing the class into two teams where each student takes a turn answering a review question does not provide sustained practice to the individual. Pairing students to review the practice sheet or cards provides a much higher "practice per minute" for each student and enhances the likelihood of reading automaticity.
- *Demonstrate Efficient Techniques:* Demonstrate procedures which have been found to be efficient, such as organizing items into meaningful groups while memorizing, using cumulative rehearsal or using vivid imagery (Sousa, 2001).
- *Vary Formats:* Use a variety of formats when practicing (Sousa, 2001). Have students practice on white boards or using various colors of fine tipped markers.
- *Plan for Success:* Design practices to provide a high level of success. For the struggling learner, a 90% success rate is recommended. (Good & Brophy, 2007).

O: Organizational clarity

Simplicity, clarity, singleness: These are the attributes that give our lives power and vividness and joy as they are also the marks of great art. Richard Holloway

Imagine you are in a graduate class. You have a choice of two professors. One assigned the text and tells you that the final exam will be taken from that book and her lectures. The other has assigned the same text and will use the same exam but will also provide study guides for the exam at the outset of

the semester. Which professor would you prefer? Assuming that you choose the later, the question is why?

Simply put, minds tend to remember content that is structured (Jensen, 1998). To effectively remember instructional information, one must know what it is that needs to be remembered. While this is, on the face of it is so obvious as to be almost silly, many teachers still simply teach their lessons then expect the students to identify the crucial information to be learned for the test. This approach is not likely to be successful because many students are simply not good at picking out the information you intend to test. Imagine their frustration; taking full notes, studying what they think will be on the test and failing because they chose the wrong material. The result is that some of your hardest working students will fail.

Today's curriculum, with its quick pacing, has inadvertently left some pupils without the necessary automaticity needed to be efficient in the material.

Teachers often state that they provide clear "clues" to their students as to the critical information for evaluation. While good students are again likely to pick up on these "clues" an informal study of the relationship between teacher "clues" during lecturing and the actual content of the exam suggested that the relationship was weak at best. In this study, various teachers were observed lecturing for a week. Their use of the generally accepted "clues" such as underlining material on the board, saying "this important," saying "write this down," and repeating the information more than once was recorded with the content related to that clue. The exam was then reviewed to determine if the clues did in fact identify the actual content of the evaluation. Little relationship was found between any of the "clues" and the ultimate content of the exam. What the teachers hinted would matter, did not, in fact matter that much at all (Rotter, 2000). This scenario can be avoided with a straight forward presentation of critical information to be learned.

Strategies that support organizational clarity include:

- *Start with the Goals:* Begin each unit and lesson with a presentation of the outcome goals which are specific (Hativa, 1998). To continue with such clarity, for each lesson specify which goal you are addressing and make clear what portion of the lesson is critical to learn for future evaluation.
- *Tie Goals to Evaluation:* Ensure that the goals lead directly to the evaluation process as well. In other words, tell students what you are going to teach them; teach them what you said you would teach them; then test them on what you told them you would teach them (Yates, 2005).
- *Graphics:* Sousa (2001) suggests that teachers "Go for the big picture" using graphics to show how lessons relate to the overall outcome goals. Consider creating a large wall chart for your class specifying the goals for each unit and refer to the chart frequently. Provide a copy of the chart for students as well.
- *Content Enhancement Routines:* Use content enhancement routines (CERs) to support your instruction. These are a set of well researched graphic organizers developed at the Center for Research on Learning at the University

of Kansas. These strategies include teaching routines for planning, explaining text, teaching concepts and increasing student performance. For more information on the use and research supporting CERs, refer to http://www.ku-crl.org/library/publist.shtml .

- *Study Guides:* Create study guides which identify the critical information for the evaluation process (Rief, 1997). These guides can be different from student notes which address all information presented. Think of them as summary sheets to be completed occasionally. Create a periodic review day for completion of these sheets. This review will also allow you to determine how your students are progressing and what additional steps you may need to take to better teach the material.

S: Strategies

What do you want to achieve or avoid? The answers to this question are objectives. How will you go about achieving your desired results? The answer to this, you can call strategy. William Rothschild

Strategies are techniques you can use to organize or practice materials for learning or memory. While your best students probably automatically generate and use strategies, pupils with learning difficulties do not (Hock, Schumaker, & Deshler, 2001). Students may lack effective strategies, not know when a strategy should be used, or not recognize the value of strategy use. Teacher then should not only teach various memory strategies but to also teach the appropriate times for their use and to model their effectiveness (Cox, 1994).

Teacher strategies which encourage the development and use of memory strategies in children include:

- *Strategy Instruction:* Provide direct instruction in basic strategies. Encourage students to identify situations where the strategy would be helpful. Stop mid lesson and ask, “How can we remember this?” to initiate discussions on strategy use (Scruggs & Mastropieri, 1992).
- *Visuals Mnemonics:* Encourage students to use visual depictions as mnemonic devices whenever possible (Rief, 1997). Students with learning differences are more likely to recall visual information.
- *A Focus on Independence:* Encourage students to use strategies independently (Friend & Bursack, 2008). For example, prior to beginning any assessment, give students a moment to write down their strategy clues. Assist those who do not have a strategy identified. Give points on any evaluation for the use of a strategy to recall information.
- *Reduction Mnemonics:* Teach students to develop reduction mnemonics where a large body of information is reduced to a shorter form and a letter is used to represent each shortened piece. Common examples of reduction mnemonics include: ROY G BIV for the colors on the spectrum and HOMES for the Great Lakes. Sentences can also be used in reduction mnemonics such as “Please excuse my dear aunt Sally” for the order for solving algebraic equations (Mastropieri & Scruggs, 1998).

- *Student Generated Mnemonics:* Encourage students to create their own mnemonic devices independently (Mastropieri & Scruggs, 1992). The sillier these are; the better! One class observed by the author developed their own acronym for the steps in long division with carrying (D=divide, M=multiply, S=subtract, B=bring down). The class chose: Dead Monkeys Smell Bad! It is almost guaranteed that they will never forget this cue!
- *Generalization:* Encourage students to use strategies in other classrooms as well as in yours (Friend & Bursack, 2008). For example, have students develop a set of strategy cards for personal reference. These can then be printed on credit card weight and size paper, laminated, hole punched and added them to a key ring. You can alert other teachers to encourage the students to use their "credit cards" for reference during appropriate tasks.

Students may lack effective strategies, not know when a strategy should be used, or not recognize the value of strategy use.

- *Research Supported Strategies:* Familiarize yourself with a wide variety of strategies that work. *Including Students with Special Needs*, by Marilyn Friend and William Bursack (2008) provides an extensive list of research supported strategies for your use.

E: Emotional impact

What we learn with pleasure we never forget. Alfred Mercier

Think back to your one of your earliest memories from your school days. It is likely that the event you recalled was either a very positive or negative experience. Further, it is likely that the event recalled included something novel or intriguing to you. This is an example of how emotions contribute to long term retention of memories.

Emotion influences what we remember (Levine and Pizarro, 2004). Information that contains an emotional "hook" is more likely to be attended to and remembered. Information that is acquired in a positive emotional setting is also more likely to be positively recalled. For students who have experienced previous failures, it is especially important to break the relationship between learning and previous negative emotional experiences (Hallahan, Kauffman & Lloyd, 1999).

Among the strategies that can be used to provide encourage positive emotional experiences are:

•*Novelty and Humor:* Use novelty and humor in lessons to engage curiosity (Silvia, 2008). Bring in odd objects to support the lesson. Teach from the back of the classroom. Wear a silly tie. Do the unexpected.

- *Avoidance of Sarcasm:* Avoid the use of sarcasm (Sousa, 2001). While humor and the resulting laughter help create a warm classroom climate, sarcasm can be destructive. As Sousa states, "there is so much good humor available that there should be no need for sarcasm."

- *Mark the Progress:* Arends (2004) states that effective teachers "create learning situations with positive feeling tones." Throw away your red pen for grading. Mark the correct answers! Keep records of growth, not failures. Focus on the positives of the students' work.
- *Focus on "You" Statements:* Demonstrate care and respect for your students. Use genuine praise, with "You" statements, such as "You should be so proud of the work you did on this project." (Sousa, 2001).
- *Make it Play:* Use formats that encourage a positive "play like" environment such as role playing, games, music, drama, debates, and reenactments. Encourage students to explore and create. Value the unusual view and the unusual product for its uniqueness (Arends, 2004).
- *Celebrate Learning:* Create an environment of relaxed alertness (Caine & Caine, 2006). Give shows to other classes. Create displays for the library. Conduct a project to help others. Make something for your school.
- *Use the Responsibility Strategy:* Use the "responsibility strategy" (Bender, 2002). This strategy involves finding ways to give students with learning differences meaningful responsibility in the classroom. Have these students tutor younger students or provide a service to the class based on their personal strengths. For example, if a student is artistic, have them develop graphic representations of materials for use by the whole class.

In closing

Memory is a child walking along a seashore. You never can tell what small pebble it will pick up and store away among its treasured things.
Pierce Harris

Every teacher strives to provide information, skills and concepts instruction which their students will choose to "pick up and store among their treasured things" for future use. Thoughtful consideration of the COMPOSE strategies during lesson planning and delivery will greatly increase the likelihood that your critical content and concepts will become a part of each of your students' treasures.

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Appendix: Additional Resources

Web Based Resources to Support COMPOSE	
Graphic organizers	• Houghton Mifflin Education Place (free) http://www.eduplace.com/graphicorganizer/ • Enchanted Learning – Explanation of various formats (free, although subscription required to download actual graphic organizers) http://www.enchantedlearning.com/graphicorganizers/index.shtml
Content enhancement routines	• Kansas University Center for Research on Learning http://www.ku-crl.org/sim/content.shtml
Strategies training	• Kansas University Center for Research on Learning (lists strategies but each must be purchased) http://www.kucrl.org/sim/strategies.shtml
Mnemonic devices	• LD Online variety of strategies http://www.ldonline.org/article/5736 • LD Online strategies including keyword and pegword http://www.ldonline.org/article/5912
Play-like activities	• Webquests http://bestwebquests.com/
Advance organizers	• NETnet Creating Advance Organizers http://www.netnet.org/instructors/design/goalsobjectives/advance.htm