
THE USE/APPLICATION OF MNEMONICS AS A PEDAGOGICAL TOOL IN AUDITING

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ABSTRACT

Mnemonic techniques are learning strategies which can enhance learning and improve recall of the information learned. Research has proven that mnemonics are effective aids in learning new, abstract, and/or complex concepts. Most auditing courses are conceptual in nature. Students often experience difficulty understanding auditing concepts, which may appear abstract due to the students' lack of an adequate frame of reference necessary to analyze and understand these concepts. This difficulty can be attributed to students' lack of exposure to real-world accounting systems, source documentation, evidence accumulation, or report writing. Although coursework cannot provide the frame of reference achieved through work experience, accounting educators can provide students with techniques that boost their recall of auditing concepts, thereby, equipping students with a significant advantage academically and in the marketplace. This paper presents mnemonic techniques which can be applied to teach basic auditing concepts more effectively and better prepare students for professional auditing careers.

INTRODUCTION

Auditing encompasses a comprehensive, complex body of knowledge. Auditing students must demonstrate a detailed knowledge of auditing concepts in order to pass the auditing section of the CPA exam and enter public practice; a good general knowledge is insufficient. These students must also demonstrate a detailed knowledge of other accounting and business concepts to pass remaining sections of the exam. Given the amount and complexity of information the accounting student is required to learn, accounting educators must assist their students with the methodological aspects of learning the subject matter as well as the content itself. In other words, we must help our students learn how to learn. Accounting educators must break down the content to be learned to make it easier to comprehend and remember.

The Accounting Education Change Commission and the American Accounting Association (Francis, Mulder, and Stark, 1995) call for "intentional learning in the accounting curriculum" whereby students are called upon to be active learners rather than passive listeners, and accounting educators called to create classroom environments and employ teaching strategies to promote intentional (active) learning. Educators have to replace staid teaching methods with techniques that

motivate students to practice and learn. One such teaching technique, which is the focus of this paper, is the use of mnemonics to teach auditing. Using mnemonic devices to teach new, complex, abstract material has a long track record of proven learning effectiveness (Hutton, 1987; Iza & Gil, 1995; Male, 1996; Stephens & Dwyer, 1997). While auditing education literature is sparse, and there is a dearth of information relating the use of mnemonic techniques to accounting education, prior research does indicate the effectiveness of mnemonic techniques for learning a variety of other subject areas.

MNEMONIC INSTRUCTION

Mnemonic devices are defined as memory-enhancing techniques that improve learning and information recall through the use of imagery. Bellezza (1981) defined mnemonics as a strategy that creates and uses a cognitive cuing structure to organize and encode information for the express purpose of making it more memorable. Mnemonics appear to work to circumvent the limitations of working memory by retrieving information directly from long-term memory via a single association with an existing memory code (Levin, 1993; Wang & Thomas, 1995). Dominic O'Brien, the 2000 winner of the World Memory Championships, explains that the three keys to good memory formation are "imagination, association, and location" (Butcher, 2000). The important features of mnemonics are (a) they require the learner to practice the targeted material in order to integrate it into an existing memory representation and (b) they provide an effective means of information retrieval (Levin, 1993; McDaniel & Einstein, 1986; Wang & Thomas, 1995).

Mnemonics are not new learning devices. The ancient Greeks and Romans employed mnemonic techniques to improve memory and enhance oratory skills. Psychologists believe that mnemonic techniques are so effective in learning because they impose meaning and structure to material that otherwise would be unstructured or less meaningful (Butcher, 2000). This is accomplished by making associations between items to be learned and items already stored in long-term memory. Mnemonics require the learner to pay attention to relevant features of the material and to process the material more deeply than by simply rehearsing or memorizing it. Mnemonics empower students to learn by cuing memory through association. Prior research has demonstrated the learning effectiveness achieved with mnemonic devices (Muha, 2000; Butcher, 2000; Mastropieri & Scruggs, 1989; Forness, Kavale, Blum & Floyd, 1997; Atkinson, 1975; Atkinson & Raugh, 1975; Levin, 1993; Wang, Thomas & Ouellette, 1992). VanSandt (2005) found significant increases in students' test scores after implementation of mnemonic techniques to teach business ethics.

Accounting educators employ many methodologies in addition to verbal memory, including "hands-on" learning, collecting and processing data, inferring, predicting, thinking critically, sequencing historical data, establishing criteria and making decisions, solving problems, classifying,

and summarizing. Empirical support indicates that mnemonic strategies have been effective in promoting verbal memory objectives without detracting from other important learning objectives (Mastropieri, Sweda, & Scruggs, 2000). Processes such as critical thinking are meaningless when students cannot recall primary information about which to think. The effectiveness of mnemonic strategies was demonstrated to be consistent across a diverse population of subject areas, ages, and instructional settings (Scruggs & Mastropieri, 1998). Medical students often use mnemonic techniques to commit anatomical terms to memory (Hayden, 1999). Professional programs of study, such as medicine, law, and accounting, require comprehension of a large, complex body of knowledge. Licensing boards, through the administration of uniform examinations, insure that a specific, detailed knowledge of the subjects to be mastered is achieved prior to entering professional, public practice. Therefore, educators teaching in professional programs should provide students with learning techniques that equip them to remember and recall academic content.

Some educators may eschew mnemonic strategies as being odd or nonsensical. Mnemonics do not trivialize the underlying content or promote learning by memory “tricks” vs. substantive studying of the meaning of the content. Such concerns assume incorrectly that memory and comprehension objectives are mutually exclusive. They also ignore that students often understand the meanings of academic content but forget the verbal labels of this content, rendering their understandings inaccessible and useless in particular contexts (e.g. on exams).

Research also indicates that students respond positively to the use of mnemonic learning strategies (Mastropieri, Sweda, & Scruggs, 2000; Muha, 2000). Students find that mnemonics can be fun to use and make learning and recalling critical content easier. Mnemonics provide students with a technique for taking a mental snapshot of information to be learned. Daniele Lapp, a Stanford University researcher and noted memory trainer says, “Anyone can train themselves to develop habits that will facilitate recall” (Muha, 2000). Bower (1976) found that superior students make more use of mnemonics than less talented students. Carlson, Kincaid, Lance & Hodgson (2001) found the use of mnemonics to be associated with academic performance as measured by grade point average. Mnemonic devices can be applied to auditing, other accounting subjects and to other disciplines as well. In view of the importance of learning strategies in academic studies, the use of mnemonics constitutes an important recall facilitation strategy.

THEORETICAL BASIS

Memory is essential for everything we do in our daily lives: perceiving the world around us, analyzing and synthesizing information, and applying knowledge to new situations. Weiss (2000) states that, “Learning is the making of memory, which is laid down in our brains in chemical form.” These chemical changes are created at the neuron level, and without them, there is no substance for our minds to work with.

According to the current model of memory, sensual input from our environment is processed through our perceptual memory in fractional seconds. If deemed important, either by the conscious or unconscious mind, the input is placed into short-term memory. One continual challenge for instructors is insuring that students perceive incoming information as important. From there, it is either discarded or transferred to long-term memory.

Eric Jensen, educator and author of *Teaching with the Brain in Mind*, notes that “learning and memory are two sides of a coin. You can’t talk about one without the other.” Ken Kosik, neurology professor at Harvard Medical School, explains that our brain changes with learning in functional ways. As we learn something new, each chemical message is laid down as a neuron chain called a neural network. Those connections become stronger the more often our brains access the network. New memories create new interconnecting pathways between neurons. When we learn something that stays with us for any length of time, it goes from short-term memory to long-term memory.

Because new information builds on prior existing information, making new linkages and new insights is crucial to building up useful long-term memory. Teaching directs the making of memory. As an instructor, you select different forms of memory and teach to the creation of those memories. For example, if teaching something in the form of visual recall, when assessing that learning, we must ask for performance related to something visual. It is essential to match the assessment with the types of memory used in instruction and practice. In short, we are teaching the student to access the memory.

Creating personal linkages is an approach educator Jeb Schenck uses to create long-term memories (Weiss, 2000). These linkages are concept maps (visual maps) showing relationships between ideas---a concept also using in mnemonic techniques. Two methodologies are often used to enhance long-term memory. First, using multiple forms of review enhances long-term memory. Another strategy to enhance recall of stored information is to provide a framework of retrieval cues. Creating cuing structures is the essence of mnemonic techniques.

Mnemonic techniques are strategies for organizing and/or encoding information which can enhance learning and improve later recall of information through an imagery eliciting process (Bellezza, 1981). These strategies work by generating and using cognitive cuing structures during both learning and recall to organize and/or encode information for the sole purpose of making it more memorable. These cognitive cuing structures typically are composed of either visual images or of words and act as connectors between the signal to the learner to recall and the information to be remembered (Bellezza, 1981). The essence of learning with mnemonic techniques is to associate the information to be remembered with one or more cognitive cuing structures. These cuing structures are used later to facilitate recall by the learner through a self-cuing process.

All mnemonic techniques can be classified as either organizational or encoding. An organizational mnemonic associates in memory information that appears to be lacking any inherent structure. Therefore, a collection of separate items is stored in long-term memory as an integrated

whole. A system of self-cuing is used to facilitate recall. For example, acronyms aid recall by using the first letters of the words to be memorized as cues in retrieving the information. They integrate the information so that the cue to the item is contained in the mnemonic. The auditing mnemonics created in this paper use this type of mnemonic cuing structure. In encoding mnemonics, the learner recodes new information so that it becomes more associable.

Based on what we know about how people learn new, complex, and/or abstract material, two general approaches present themselves (Ausubel, 1968; Hutton, 1987; Iza & Gil, 1995; Male, 1996; Novak, 1991, 1993; Stephens & Dwyer, 1997). The first approach is to help students relate new concepts to things they already know. As Ausubel (1968) noted, the single most important factor in learning new material is what the student already knows. “Meaningful learning involves the assimilation of new concepts and propositions into existing cognitive structures” (Novak, 1993). “Not only has a consensus formed that students must choose to build their own meanings, but we also know that new meanings must be constructed on the basis of knowledge they already possess” (Novak, 1991). The second approach is the use of mnemonic devices to assist in remembering new material. Mnemonics enhance recall of stored information by providing a framework of retrieval cues associated with things the student already knows and understands. Facing the need to remember new, complex, and/or abstract material, the utilization of mnemonic techniques has been an effective, long-standing tool (Hutton, 1987; Iza & Gil, 1995; Male, 1996; Stephens & Dwyer, 1997; VanSandt, 2005). It is a well established principle in psychology that the ability to remember is dependent on a person’s employment of mnemonic strategies (Wellman, 1978), which is, in turn, related to the person’s knowledge of those strategies (Waters, 1982).

Thus, students must first be aware of the need for cognitive links and mnemonic aids and how to use them in order to effectively learn new material (VanSandt, 2005). Because our students are part of a generation reared in the information age characterized by computers, sound bites, iPods, information availability with the click of a mouse, and the discontinuity of visual images, their ability to remember has atrophied compared to previous generations (Hutton, 1987; Postman, 1985). Accordingly, our students may not be as adept at creating links connecting new material to existing cognitive structures, even if they recognize the need for mnemonics. As instructors, it is incumbent upon us to assist our students by not only providing content, but also assist in this methodological aspect of learning. Therefore, we must help our students learn how to learn (Novak, 1993).

Mnemonic devices are effective teaching tools because they provide assistance in both learning how to learn and in grasping new concepts. Higbee (1988) listed four properties leading to effective mnemonic systems: meaningfulness, organization, association, and visualization. Mnemonic strategies are firmly based in psychological theory (Mastropieri, Scruggs, & Levine, 1985). Mnemonic strategies are based on the roles of meaningfulness (Underwood & Schultz, 1960) and concreteness (Paivio, 1971) in promoting recall. Mnemonics are effective because they transform nonmeaningful information into concrete, meaningful proxies. Information is retrievable because it is explicitly elaborated. The mnemonic creates an association between the content to be

learned and a cue---keyword, phrase, or image with which the student is already familiar. This cue allows the student to visualize the critical content, which makes it more memorable. Mnemonics provide students with a technique for taking a mental snapshot of the information to be learned.

In the following section, we illustrate how first letter mnemonics in the form of acronyms can be used in teaching auditing. First letter mnemonics are the most popular form of mnemonics (Gruneberg & Morris, 1979). First letter cuing can be used as a combined encoding and retrieval system. Empirical studies demonstrating the effectiveness of first letter mnemonics include McKenzie and Sawyer (1986), Nelson and Archer (1972), Malhotra (1991), and Perewiznyk and Blick (1978). First letter mnemonics are a type of organizational mnemonic. As discussed earlier, organizational mnemonics facilitate learning and recall of information that appears to be lacking structure. This type of mnemonic is well suited to enhance learning of information that is inherently complex or highly abstract. Therefore, we have found it particularly suited to teaching auditing; an accounting class which is entirely conceptual in nature and for which students typically have no prior framework of knowledge or experience to relate to. As a result, for most students, the auditing concepts seem very abstract and have little, if any, connection to other things they already know. This lack of a connection can be a serious impediment to learning (Ausubel, 1968). We have found the use of mnemonic techniques to be effective learning tools for our auditing students.

AUDITING MNEMONICS---DEVELOPMENT AND APPLICATION

We developed our unique mnemonics for teaching basic auditing concepts by reviewing textbooks and selecting critical content that students must learn in satisfying course objectives as well as meeting CPA exam requirements. We also examined this body of critical content and tried to identify concepts that typically pose a problem for students. In this way, we were able to prioritize items for mnemonic development. For each critical content component, we developed mnemonics by associating the critical content with a word, phrase, or image with which the student is already familiar. Sometimes this was accomplished by linking the first letter of each component of content to a new word or phrase. Often, by looking at the spelling and sound of the concept, one can derive an easy, familiar word or phrase to be the keyword. The mnemonic device creates a cue or association which in turn makes the information more memorable. Presented below are examples of the mnemonics we have created for teaching auditing concepts.

To teach the ten Generally Accepted Auditing Standards, we developed the mnemonic:

T I P P I T O V E R

General Standards:

- T** The auditor must have adequate technical **Training** and proficiency to perform the audit.
- I** The auditor must maintain an **Independence** in mental attitude.
- P** The auditor must exercise due **Professional** care in the **Performance** of the audit and the **Preparation** of the report.

Standards of fieldwork:

- P** The auditor must adequately **Plan** the work and properly supervise assistants.
- I** The auditor must obtain a sufficient understanding of the entity and its environment, including, its **Internal** control, to assess the risk of material misstatement of the financial statements, whether due to error or fraud, and to design the nature, timing, and extent of further audit procedures.
- T** The **Third** standard of fieldwork requires the auditor to obtain sufficient appropriate audit evidence by performing audit procedures and **Tests** to afford an opinion regarding the financial statements.

Standards of Reporting:

- O** In expressing an **Opinion**, the auditor must state whether the financial statements are presented in accordance with generally accepted accounting principles (GAAP).
- V** The auditor must **Verify** that GAAP has been consistently applied in the current period in relation to the preceding period and identify inconsistencies.
- E** The auditor must **Evaluate** the financial statements to determine if informative disclosures are not adequate and so note in the auditor's report.
- R** The auditor must either express an opinion regarding the financial statements, taken as a whole, or state that an opinion cannot be expressed in the auditor's **Report**. When the auditor cannot express an overall opinion, **Reasons** should be stated in

the auditor's **Report**. In all cases where an auditor's name is associated with the financial statements, the auditor should clearly indicate the character of the auditor's work, if any, and the degree of **Responsibility** the auditor is taking in the auditor's **Report**.

In some cases, it may be helpful to combine double or triple mnemonic devices for related content. For example, the second standard of fieldwork requires the auditor to acquire a sufficient understanding of the entity and its environment, including its internal control system. We developed a second mnemonic to provide the students with cues about what this standard requires to be a "sufficient understanding." The auditor must "know" the business entity, therefore:

N E U M E

- N** Understanding the **Nature** of the client, including the client's application of accounting policies.
- E** The industry, regulatory, and other **External** factors affecting the client
- U** **Understanding** the client's strategies and objectives and related risks.
- M** **Methods** used to **Measure** and review performance.
- E** **Evaluating** the client's system of internal control.

This leads the student to the objective of a knowledge of the components of internal control, for which we developed the following mnemonic:

5 Components of Internal Control

C R E A M

- C** **Control** Activities
- R** **Risk** Assessment
- E** The Control **Environment**

A The **Accounting** Information and Communication System

M **Monitoring**

Another critical content area is “audit risk.” We developed two mnemonics for audit risk.

3 Components of Audit Risk

C I D

C **Control Risk:** The risk of material misstatement (RMM) will not be prevented or detected on a timely basis by the client’s internal control.

I **Inherent Risk:** The RMM before considering the client’s internal control --- misstatements likely to occur in the client’s financial statements.

D **Detection Risk:** The risk that the auditor will fail to detect a material misstatement.

or

A C I D

$$AR = CR \times IR \times DR$$

AR = **Audit** Risk equals

CR **Control** Risk x

IR **Inherent** Risk x

DR **Detection** Risk

Audit evidence is another critical content area. The two mnemonics we have developed relating to audit evidence are:

AGE = ARMM'd

A <u>Auditors</u>		A <u>Assess</u> the
G <u>Gather</u>	To	R <u>Risk</u> of
E <u>Evidence</u>		M <u>Material Misstatement</u>

There is a cliché that says “with age, comes wisdom.” This mnemonic derives from that. Auditors are armed with evidence gathered from the audit process and procedures. One objective of the audit is to assess the risk of material misstatement; the evidence gathered during the audit enables the auditor to make that assessment and determine accordingly if additional audit procedures/tests are needed.

The discussion segues right into a discussion of the types of audit evidence, for which we developed the following mnemonic:

Types of Audit Evidence

- D** **Documentary Evidence**
- A** **The Accounting Information System**
- T** **Third-Party Representations**
- A** **Arithmetic Computations**
- D** **Data Interrelationships**
- O** **Observation --- Physical**
- C** **Client Representations**

Class discussion includes examples of each type of evidence, the quality of the evidence based on the assertion being tested, and when it should be used.

Another area of critical interest is audit reports. There are 4 basic audit reports; therefore, we use the mnemonic **Q U A D** (meaning four) to facilitate recall of the four basic types of audit reports.

Q U A D

Qualified opinion
Unqualified opinion
Adverse opinion
Disclaimer of opinion

Auditors issue an audit report to express an opinion on the financial statements of the company taken as whole. Auditors may issue an unqualified opinion, a qualified opinion, or an adverse opinion to attest to whether the financial statements were presented fairly in accordance with GAAP and to note any material exceptions, qualifications, or limitations, if applicable. The auditor may issue a disclaimer of opinion if he/she feels an opinion cannot be made due to limitations to the audit.

The study of audit reporting has many layers. If the auditor is compelled to issue an opinion other than a standard, unqualified opinion, special circumstances apply for each type of exception. The following mnemonic was developed to facilitate remembering the specific circumstances justifying a departure from the standard report, a serious issue for management:

S E R I O U S

Substantial doubt --- GC
Emphasis of a matter
Required SEC quarterly data
Inconsistency of GAAP; comparability issues
Opinion --- Other auditors
Unusual circumstances requiring GAAP departure
Supplementary information

Classroom case studies provide students an opportunity to assess various company scenarios to determine if a report other than standard is called for, what circumstances justify the required report, and a requirement to write the necessary report.

To summarize exceptions to the standard unqualified report, we utilize the following:

D S L

Departure from GAAP
Scope limitations
Lacking independence

To achieve maximum learning from these mnemonic devices, repetition of the mnemonic as well as incorporating the device in practice/application activities such as class work and homework will aid student memory and understanding. Students must apply the mnemonic to their learning.

CONCLUDING OBSERVATIONS

Research indicates that students respond favorably to the use of mnemonic learning strategies (Mastropieri, Sweda, & Scruggs, 2000; Muha, 2000). Students often find that mnemonics can be fun to use. They provide students with a mechanism for taking a mental snapshot of the information to be learned. Mnemonics have been shown to be highly effective at promoting memory of critical content. Prior research has suggested that processes such as critical thinking are themselves meaningless when students cannot recall primary information about which to think.

Mnemonics require the learner to note relevant features of the material and to process the material more deeply than by simply memorizing it. Mnemonics impose meaning and structure to material that otherwise would be unstructured or meaningless. It enables learning by cuing memory through association between items to be learned and items already stored in long-term memory. In this way, mnemonic learning strategies provide a bridge---a connection to other things already known to the learner. Mnemonic techniques do not detract from other learning objectives and can be very effective in engaging the student in the learning process.

LIMITATIONS

A limitation to using mnemonic learning strategies involves the time and resources needed to develop and implement the mnemonic devices. Educators must apply creativity to constructing effective mnemonics, which are time consuming to develop. Instructors must review texts and select concepts that are assessed as critical content and their associated meanings. Then, a mnemonic must be created for remembering the concept and its associated meaning. The simplest, most creative mnemonics typically result in the most effective learning.

Also, some instructors may eschew mnemonic learning strategies because of concern that they appear odd, nonsensical, or seem to bear little resemblance to the content to be learned. Mnemonic devices may appear to trivialize underlying content and to promote learning by memory “tricks” rather than substantive studying of the meaning of the content. However, such concerns incorrectly assume that memory and comprehension objectives are mutually exclusive. They also ignore the fact that students frequently understand the meaning of academic content, but forget the verbal labels of this content, thus rendering their comprehension inaccessible and useless in test situations.

Other limitations address how much information can be acquired and remembered in a given amount of time, regardless of the methods utilized. As with all instruction, mnemonic learning aids must be inserted at appropriate positions in the instructional sequence to achieve maximum effectiveness (Dick & Reiser, 1989; Glaser, 1976; Haertel et al., 1983).

Future research plans for gauging the effectiveness of mnemonic devices for teaching auditing will include testing these devices in the classroom through use of a pretest/posttest instrument as well as a class survey document. Future research on using mnemonics as effective encoding techniques might also examine experimental situations in which learners are required to generate their own personal mnemonics when attempting to learn relatively difficult, abstract, or unfamiliar material. Prior empirical research provides some evidence of higher recall rates after generation of person, idiosyncratic mnemonic systems for learning verbal information (Levin, 1993; McDaniel & Einstein, 1986; Wang & Thomas, 1995).

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