# The Effects of Humor on Cognitive Learning in a Computer-Based Environment

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## (ABSTRACT)

Previous studies on humor in education have focused on the use of humor embedded in the presentation of content material. Some research, however, suggests that humor is an effective tool for increasing divergent thinking and information acquisition if the humor is given prior to the presentation of content material. This study used an experimental design to test if humor given prior to content presentation was more effective in helping students understand and remember information and enjoy the presentation than a control group treatment. Statistical tests did not support either hypothesis

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# CHAPTER I

## Literature Review

"And we should call every truth false
which was not accompanied by at least one laugh."
*Nietzsche*

Humor is part of the human experience. As human beings, we have the ability to laugh at others and ourselves, to make jokes, to add humor to situations which are seemingly without humor, and to be absurd. Humor is part of everyone's experience, and those who have no sense of humor would probably not admit it.

Humor has also been used in education. Teachers and educators of all levels and disciplines have praised the ability of humor to aid the learning process, to help students' understanding of key points, and to relax students in moments of anxiety and increased tension. The benefits of humor have been made obvious to them by a variety of personal accounts and descriptions.

But what exactly is humor? What does it mean to have a sense of humor? What makes something funny? What are the learning benefits of adding humor to an educational activity? Does research truly support the assertion that humor helps student understanding? This literature review will look at the relationship between humor and education and provide a foundation for posing further research questions.

### *Definitions of Humor*

A standard definition for humor is hard to find. Martin and Lefcourt (1984) said that humor is "the frequency with which the individual smiles, laughs, and otherwise displays amusement in a variety of situations" (p. 147), but later (Lefcourt & Martin, 1986) said that laughter and humor are not the same thing. Anthropologist Robert R. Provine has spent years studying laughter and believes that laughter is not always connected to humor;

rather, laughter is more often used as a mechanism for moving conversation (Provine, 1996). The question still remains whether humor is a learned behavior or a natural characteristic of all people.

Some scholars have explored the evolutionary basis of humor. Weisfeld (1983) says "(h)umor appreciation is a distinct, pleasurable effect that often is accompanied by laughter" (p. 142) and therefore humor ought to be defined as an emotion or affect. He believes that humor is not an incidental behavior of people but is an evolved behavior. He argues this because (a) it is found species-wide in all known cultures, (b) humor has been observed in related species such as simians and apes, and (c) some neural structures seem to mediate our responses to humor. Whatever its origin, humor is a very complex part of human personality.

Many agree that humor is mutlidimensional in nature, but few agree on the exact dimensions of humor. Solomon (1996) says that humor is a three-step process that begins with arousal, is followed by problem solving, and ends with resolution. Humor to her is "clearly a multifaceted phenomenon. The following list of synonyms is evidence for the multidimensionality of humor: farce, wit, jocularity, tease, laugh, snicker, zany, joke, ludicrous, satire, mirth, pun, jeer, glee, and giggle" (p. 250) . Shade (1996) suggests five elements related to humor; humor appreciation, humor identification, humor comprehension, humor mirth response, and humor production. Humor appreciation refers to the affective domain after the humorous elements have been comprehended. Humor identification is recognizing the four forms of humor, which are figural, verbal, visual, and auditory. Humor comprehension is the cognitive demands of understanding a joke. Humor mirth response refers to the spontaneous physical reflex to humorous stimuli, usually in the form of smiling and/or laughter. Humor production is an individual's ability to create humor. These five elements, in varying quantities, are always present in a person's personal sense of humor, according to Shade. Other tests (Martin & Lefcourt, 1983; Svebak, 1974; Thorson & Powell, 1993) designed to measure a person's sense of

humor (discussed later in this paper) divide humor into different dimensions. Humor seems to involve many dimensions of an individual's personality.

Some have even speculated that humor is closely related to belief. Philosophers LeFollette and Shanks (1993) say that any situation can be perceived from a variety of viewpoints, based on the beliefs of the individual. Humor can only come from the ability to rapidly "flicker" from one viewpoint to another. In the same vein, what we find humorous depends on which belief patterns we hold and which alternate belief patterns we can contemplate. This idea also depends on the individual keeping an appropriate psychic distance. This would theoretically explain why we can laugh at situations later, after an appropriate psychic distance has been found. It also explains why some jokes continue to amuse us while others are not amusing the second or third time around, based on our willingness and ability to see the alternate belief patterns.

No definition of humor found can account for all forms and styles of humor, nor has any attempt to define humor been able to cover all possible situations and scenarios in which humor takes place. Any definition offered by this study will therefore be limited in its ability to encompass all humor and in its ability to apply to other studies. For the purposes of this study, humor will be defined as "the attempt to create positive feelings of amusement and/or laughter in another person." This study will focus on explicit humor created for the purpose of increasing enjoyment in others during an instructional situation.

### *Humor and Physiology*

Some physiological evidence exists which suggests that humor utilizes the complete power of the brain. McGhee (1983a) reviewed literature showing that EEG brain wave patterns are relatively concordant within both hemispheres in the brain during humor appreciation accompanied by laughter. He theorizes that humor appreciation uses both hemispheres in the brain; the left hemisphere, which is responsible for language competence and logical thought, identifies and recognizes details within the joke, whereas

the right hemisphere, which is more emotional and interconnected, is responsible for comprehending and appreciating humor. Students involved in divergent thinking problems have shown this preference of using both hemispheres of the brain during the production task (Jausovec, 1985a), and highly creative students also show a preference for using both hemispheres of the brain (Jausovec, 1985b). People engaged in humor, then, show similar brain activity to people engaged in divergent thinking. Thus, the understanding of humor seems to be a cognitive activity that makes use of the entire brain.

Humor research has shown some significant results concerning how humor can benefit the health of an individual. Humor has been correlated to high intimacy in married couples (Hampes, 1992), has been suggested to be a coping mechanism among groups (Burbach & Babbitt, 1993), and has even been shown to have significant effects on the physical health of a person (Solomon, 1996).

Although difficult to define, humor is an observable phenomenon in humanity. Clearly people use, and respond to, humor. We are amused by certain stimuli and find them humorous. Humor has cognitive, emotional, physiological, and behavioral components, all of which may or may not be present in every occurrence of humor. So why do we find some things humorous and some not? Various theories have been developed trying to explain humor as discussed below.

### *Theories of Humor*

Numerous theories have been developed about why people laugh and what controls our sense of humor. The Egyptians believed that the world was created by the first Egyptian God through laughter (Sanders, 1995). Plato and Aristotle believed that humor resulted from superior people looking at the inadequacies of inferiors (Lefcourt & Martin, 1986). Several theories attempted to connect humor to the arousal of our feelings, suggesting that the function of humor is to release internal tensions or to release pleasurable

emotions (McGhee, 1983a). The theoretical approaches to humor are vast and continue to be debated. Three main theories, however, have survived as being the most prominent in current thought: incongruity, superiority, and relief.

*Incongruity Theory*

The incongruity theory is the prevailing current theory on humor; it views humor as being primarily cognitive. This theory says that something is humorous because the event (joke, body movement, statement, for example) is incompatible with our expectations and causes a momentary cognitive struggle to resolve the perceived incongruity. Once the incongruity is resolved, the situation is perceived to be humorous. The most famous proponent of this theory is Immanuel Kant, and other supporters have included Gerard, Beattie, Schopenhauer, Bergson, Menon, and Willmann (Keith-Spiegel, 1972).

According to this theory, children first find humor in perceptual discrepancies. After developing the ability to identify logical inconsistencies and think abstractly, older children can then find humor in a wider variety of incongruities. McGhee (1972) offers this explanation of the cognitive origins of incongruity humor:

> Consider the following two jokes: (1) "Molly the elephant is very kindhearted. In yesterday's parade she stepped on a mother bird, and then went up to the bird's nest and sat on the baby bird to keep it warm." (2) "Well, I see you have a new dog. I thought you didn't like dogs." "Well, I don't, but my wife bought a lot of dog soap on sale, so we had to get a dog to use it up." In the first example, the knowledge that elephants cannot climb trees, that elephants do not sit on nests, or that the limb would break with an elephant on it is sufficient to generate a humor response in a 4- or 5- year-old child.... In the second example, on the other hand, as the child conjures up visual images of the depicted content, no inconsistency with prior knowledge occurs. It is only upon the identification of some logical inconsistency that a potential basis for humor occurs (p. 67).

Suls (1972) goes even further and says that, in processing humor, incongruity must be present for any humor appreciation to occur in adults. He even says "that there are no incongruous situations that are not funny" (p. 84). Disagreements about resolution still remain. Some hold the view that incongruity must be accompanied with resolution in order to be considered humorous (for adults), but others say that incongruity alone is sufficient (Suls, 1983). Whether or not resolution is a prerequisite, however, humor still seems to have a strong link to our cognitive abilities.

An example of the incongruity theory can be found in this W.C. Fields joke. Someone asked Mr. Fields, "Do you believe in clubs for young people?" to which Fields responded, "Only when kindness fails." The response to the question makes no sense if someone is expecting "clubs" to refer to groups. Only when the hearer realizes that the response is referring to "clubs" as a weapon does the joke become funny. The momentary incongruity can be only a microsecond or it can last for an extended period of time. When the incongruity is perceived and resolved, the hearer will then be amused.

*Superiority Theory*

The superiority theory was formally developed by English philosopher Thomas Hobbes but has fallen out of favor in the past couple of decades. This theory holds that something is funny because the viewer is made to feel superior to the person(s) in the event. In this theory, humor is a way of boosting one's ego or sense of self-worth. The moment of "sudden glory" in which the hearer feels self-satisfied is the moment he or she is amused. Proponents of this theory include Aristotle, Plato, Meyerson, Sidis, and Wallis, although some theorists, such as Hunt, Carpenter, McDougall, and Rapp, hold that this theory can also include laughter that is not always scornful, but is congenial and empathetic (Keith-Spiegel, 1972).

Laughter has also been theorized as serving social functions in helping persons identify with a group or individual and solidifying the social bonds that exist within the

group (Martineau, 1972). By laughing along with a joke that ridicules others, the person is sending a message that he or she belongs with the laughing social group rather than the ridiculed group. Laughter has also been suggested to serve as an "appeasement gesture" to the person creating the humor (Berlyne, 1972). Because laughter can also occur in a solitary individual, many theorists would agree that this view offers some insight into the nature of laughter and humor but is too limited in focus to be used as a complete comprehensive theory of humor.

An example of this theory can be found in any of the classic light bulb jokes, such as "How many Whatsamatta University students does it take to screw in a light bulb?" The answer is "One, but he gets three hours credit for doing it." The hearer can feel superior to the people at the ridiculed university.

*Relief Theory*

The third most prominent surviving theory is the relief theory, or psychoanalytic theory, which was introduced by Spencer (McGhee, 1983a) and popularized by Freud. (1905/1989) According to this theory, humor is a socially acceptable way of releasing built-up tension and nervous energy. Everyone has certain areas that he or she finds uncomfortable, fearful, and/or embarrassing, and humor is a way of relieving this stress in a socially acceptable way. Other proponents of this theory include Kline, Gregory, Dewey, Patrick, Dooley, Feldmann, and Wolfenstein (Keith-Spiegell, 1972). This theory has fallen out of favor because the idea that energy or tension demands release does not get much support from more recent evidence on how the nervous system operates (Berlyne, 1972).

O'Connell's (1996) analysis of Freud's view of humor contends that Freud believed most people used wit to release hostile and sexual energy. The humorist, however, did not fit into his paradigm. By humorist, Freud was referring to a person who used gallows humor in the midst of suffering. He categorized this humor into two groups:

showing another in a humorous light and showing yourself in a humorous light. By creating humor, a person is able to feel positive feelings of pleasure, even in environments of suffering.

> This pleasure, Freud theorized, followed from the triumph of the ego, the pleasure principle, and narcissism over real adverse conditions under which the person refused to suffer. The severity of the situation itself was not repressed, rather the superego behaved toward the ego in a loving and playful manner (p.315).

Freud theorized that the humorist was able to span discrepant points of references and switch between the real world situation and an abstract distancing from this situation. Thus, the line between humor and pain is seen as being very thin.

Examples of this theory can be found in prevailing "dirty jokes," which are attempts to deal with sexual inhibitions, or in making jokes in times of stress, such as accidents and funerals. The emergence and popularity of the movie "Dr. Strangelove" was an attempt to deal with the fears and anxieties of the Cold War.

To illustrate the different approaches of the three theories, consider the following joke:

> A boy goes up to his father and says, "Daddy, mommy just ran over my bicycle with the car." The father says, "Well, son, I told you not to leave your bike on the front porch."

The incongruity theory says this joke would be considered funny because of the unexpected twist of the bicycle being on the front porch when it was run over. Had the father instead said, "I keep telling you not to leave your bike on the driveway," the joke would cease to be funny. The superiority theory says this joke is funny because the listener is made to feel like a better driver than the mother in the joke. One could argue that this joke is an attempt to ridicule all women drivers in general. The relief theory says this

joke is funny because it releases animosity toward women in a socially acceptable way. Instead of repressing our anger at women, this joke serves as an outlet of our frustrations and hostility toward women.

So humor remains an elusive concept to define. Humor seems to be a multifaceted phenomenon that defies being restricted by one singular definition or theory. Although humor is also connected to emotions, physical health, and psychology, the role of humor in this study will primarily be concerned with the cognitive aspects of humor as explained by the incongruity theory. Despite the difficulties in defining humor, some have tried to develop instruments that can measure humor.

### *Measuring the Sense of Humor*

Several attempts have been made to develop an instrument that will measure one's sense of humor. The immediate problem is that a "sense of humor," as has already been discussed, is very difficult to define and consensus on a definition is even harder. Some instruments are self-evaluative in nature; this is problematic because humor is a highly prized quality that people may over-attribute to themselves. As Leacock (1961), the Canadian humorist, points out, "A man will freely confess that he has no ear for music, or no taste for fiction, or even no interest in religion. But I have yet to see the man who announces that he has no sense of humor" (p. 223-224). Some instruments seek to measure propensity to laugh as a measure of sense of humor, but laughter and humor are not synonymous. Despite these pitfalls, useful instruments have been developed and validated.

Previous attempts included Martin and Lefcourt's (1984) Situational Humor Response Questionnaire, which is a 21-item questionnaire that measured the propensity to laugh in a variety of pleasant and unpleasant situations. Once again, the question arises if the propensity to laugh is the same as humor. Martin and Lefcourt's (1983) Coping Humor Scale is an attempt to measure humor as a coping mechanism, and is thus limited in

that regard. Svebak's (1974) Sense of Humor Questionnaire was one of the first humor scales developed with attention to validity by measuring humor along two elements - the ability to perceive humor and the value one places on humor. Thorson and Powell (1991), however, have criticized the scale as being an "anti-humor" scale, in that it asks about negative attitudes toward humor and those who create humor.

In the most recent attempt, Thorson and Powell (1993) have developed a multi-dimensional sense of humor instrument scale with high validity that does not depend on measuring laughter. Their instrument measures humor in four major categories: (1) humor production, creative ability, and the ability to use humor to achieve social goals; (2) coping or adaptive humor; (3) humor appreciation; and (4) attitudes toward humor.

If humor is a cognitive process, then what effect would humor have on the cognitive processes of students, and how would humor affect their learning and understanding? Some studies conducted in the past few decades have tried to measure the effects of humor on education.

## Effects of Humor on Education

Many people praise the effect humor has on education and the learning process, but the literature on the effectiveness of humor is far from unanimous. Stopsky (1992), in his book *Humor in the Classroom: A New Approach to Critical Thinking*, asserts that humor is a vital component of encouraging critical thinking in students. He gives numerous examples of how humor can be incorporated into classroom activities, yet he offers no experimental evidence for his assertions. Shade (1996), with all his statements about the usefulness of humor in the classroom, acknowledges that,

> (b)oth a personal sense of humor and the use of humor in the work environment are essential. Many teachers state their experiences of using humor in their classrooms are beneficial in almost all aspects of the learning

> process. In contrast, the results of empirical studies on using humor in teaching offer mixed results as to its effectiveness (p.96).

Zillman and Bryant (1983), before giving some tentative generalizations of humor in educational ventures, state "that any unqualified generalizations, whether they project good or bad consequences of humor use for teaching and learning, are untenable" (p.188). The role of humor in education is still being debated.

Studying the effects of humor on learning in general has led to mixed results. One of the main difficulties surrounding the issue of humor in education is the multidimensionality of humor. Humor is at once cognitive, emotive, and psychological. Differences among people's personalities, experiences, and ideas lead to different concepts of what is funny. Disagreements concerning the definition of humor and the theories surrounding humor make humor research difficult and prone to debate. However, the research that has been conducted so far has yielded some significant results.

### *The Development of Humor*

Humor seems to be developmental in nature, in that children must develop certain cognitive abilities in order to appreciate a wide variety of humor. One study (Spector, 1996) showed that children as young as 8 years are capable of understanding humor based on idioms ("I'd like to give you a piece of my mind" "Are you sure you can spare it?" where "piece of mind" is an idiom with both literal and figurative meanings). He states that the understanding of this humor is related to the students' development of metalinguistic abilities. In the same work, fifth graders were shown to have a significantly higher understanding of humorous idioms than third graders. Thus, the understanding of humor improves between third and fifth grade, lending support to the concept that humor improves with development for young people. Another study (Courturier, Mansfield, & Gallagher, 1981) showed a correlation between verbal humor tests developed by the authors and the Lunzer Quiz, a measure of formal operations. McGhee (1983b) points out

in his overview of research on humor development that "(o)ur present understanding of humor development amounts to a limited understanding of the development of children's humor in the preadolescent years. No attempt has been made to study humor development in adolescence, adulthood, or the aging years" (p. 129).

Humor has been shown to have different impacts on students of different ages. Most of the positive effects of humor on learning have come from studies done with preschool and elementary school children (Hauck & Thomas, 1972; Wakshlag, Day, & Zillmann, 1981; Zillmann, Williams, Bryant, Boynton, & Wolf, 1980). Studies done with secondary and college students have been less successful (Ziv, 1988). Humor seems to have a motivating effect on the younger students' attention, which might explain why studies on older students, who are presumably more internally motivated to be attentive, find humor to have no effect on learning.

Humor research on college students, however, is not without its problems. In his review, Ziv (1988) cites eleven sources concerning the impact of humor on college students, eight of which demonstrated that humor has no significant effect on learning. All this research, however, was conducted at least twenty years ago (between 1961-1977) and six of the studies are listed as either "unpublished master's thesis" or "unpublished doctoral dissertation." In a more recent study (Schmidt, 1994), undergraduate students remembered humorous words more often than non-humorous words. Humor was believed to have an arousal effect on the students, thus humor was a motivating factor. Much disagreement remains on the effectiveness of humor on older students.

### *Humor and Retention*

A question also arises about the effectiveness of humor on the retention of learning. Most studies done with college students took place in a single day and showed no significant differences on the effect of humor on information acquisition (Ziv, 1988). Studies (Snetsinger & Grabowski, 1994a, 1994b) where the posttests were given one

week after the presentation of the information also showed no significant results in retention of information. A study by Kaplan and Pascoe (1977), however, showed that, although there were no immediate effects on information acquisition between videotaped lectures of varying levels of humor, a posttest performed six weeks later showed that humorous items were significantly more effective in retention of information than the non-humorous items. Therefore, many studies involving humor may have been too limited in their measurement of information retention and thus ignored the possible long term benefits of humor in learning.

### *Humor and Creativity*

Humor may also be associated with other educational qualities, such as creativity and divergent thinking. Hauck and Thomas (1972) showed that humor was highly correlated with intelligence and creativity, as measured by the Lorge Thorndike Intelligence Test and the Torrance Tests of Creativity. No instruments were available at the time to measure humor, however, so the study ranked humorous students by peer evaluation. Thus, students who were seen as humorous by their classmates were given high values of humor. This technique seems questionable, thus any conclusion based on this study should also be questioned. A study by Ziv (1976) revealed that students who listened to humorous records performed significantly better on a creativity test than control groups. These studies raise the question whether humor is associated to educational qualities such as intelligence and creativity.

Humor has been linked to problem-solving skills. Strombom (1989) conducted a study in which married couples who viewed humorous tapes were able to discuss and resolve conflict more easily than couples who did not. The tapes elicited laughter which, according to comments made by participants in the study, helped with easing tension and with divergent thinking. Humor did not reduce the amount of conflict for the treatment group, but humor did help couples become more involved in the problem solving of the

conflict. Humor also significantly reduced the amount of tension in the conflict area by creating a safe environment for the couples to safely disclose information.

Experiments have been conducted to examine the relationship between humor and creative thinking. A study by Isen, Daubman, and Nowicki (1987) showed that humor fostered creative thinking. People who were exposed to a few minutes of a comedy film performed better on a problem solving task than the control group who were not exposed to comedy. The same study showed that people also performed better on the same problem solving task when given a small bag of candy prior to the task than subjects who were not given a treat. The same study also showed that subjects were exposed to a film on the holocaust (negative affect) did not perform better or worse on the problem solving task. Exercise (arousal) did not facilitate any improved performance either. The authors suggest that positive affect facilitated creative problem solving whereas neither negative effect nor arousal alone appear to have any influence on problem solving skills.

Theories about how humor would help facilitate creative thought are still being developed. Humor may bring about positive affects in people, causing them to improve performance. Positive affects are positive feelings that can be induced in a person through a variety of methods, such as admiration, praise, and gifts. Humor has been found to elicit positive effects (Lefcourt & Martin, 1986). Isen and Means (1983) found that people exposed to positive affects, in the form of praise, performed better on negotiation tasks than the control group. Some have suggested humor may be acting as an arousal mechanism (Berlyne, 1972; Brown & Itzig, 1976). Although humor has been theorized to raise the arousal level of a person (Berlyne, 1972; Brown & Itzig, 1976; Godkewitsch, 1972), the study by Isen et al.(1987) mentioned earlier casts suspicion that arousal alone can improve cognitive ability. If divergent thinking is an aim of education, then humor may play a role in helping students make new discoveries and better decisions.

### *Humor and Anxiety*

Humor has been investigated in its use in reducing test anxiety. One study (Brown & Itzig, 1976) showed that students with high anxiety performed better on non-humorous tests than humorous tests, and students with low anxiety performed better on humorous tests than non-humorous tests. The authors concluded that humor was acting as an arousal mechanism which increased arousal in students with already high levels of anxiety and inhibited their performance; also, humor helped arouse students with low levels of anxiety to achieve a suitable arousal level for test taking. Humor, instead of helping relieve test anxiety, seems to hinder the performance of those students with high anxiety. Another study (Smith et al., 1971), however, reported that high-anxiety students performed significantly worse on a non-humorous test than on a test which included humorous items. Low-anxiety students showed no significant differences between the humorous and non-humorous tests, and all anxiety groups who took humorous tests did not differ significantly from each other. Humor may help students perform educational tasks; these mixed results, however, indicate that further study needs to be conducted concerning humor and the reduction of anxiety.

### *Pacing and Type of Humor*

The pacing of humor is another important factor. Studies (Zillmann et al., 1980; Wakshlag et al., 1981) done with elementary students watching educational programs with differently paced humor (fast, medium, slow, and none) show that students remembered more of the shows with fast-paced humor and more information is remembered from shows with fast-paced humor. The authors speculate that humor does not help with the retention of information; rather, humor helps motivate the students to continue watching the program, whereas programs without humor are not as effective in holding the students' attention.

The type of humor is also an important factor. Younger students respond well to visual humor and puns, but they become easily confused when presented with satirical or ironic humor (Zillmann, Masland, Weaver, Lacey, Jacobs, Dow, Klein, & Banker, 1984). A study by Hezel, Bryant, and Harris (1982) with college students using four versions of a videotaped lecture with different levels of humor (four levels of humor were used: relevant, related, unrelated, and none) showed no significant differences in information acquisition between relevant humor and no humor, whereas the related and unrelated humor showed lower scores on information acquisition. Related humor seems to have a negative impact on younger students and have little or no impact on older students, whereas unrelated humor seems to have a positive impact on younger students and a negative impact on older students. Figure 1 shows a hypothetical relationship between the effect of related and unrelated humor on the acquisition of information of students of different ages. As seen in the chart, type of humor is thought to have a serious impact on how students acquire and retain information.

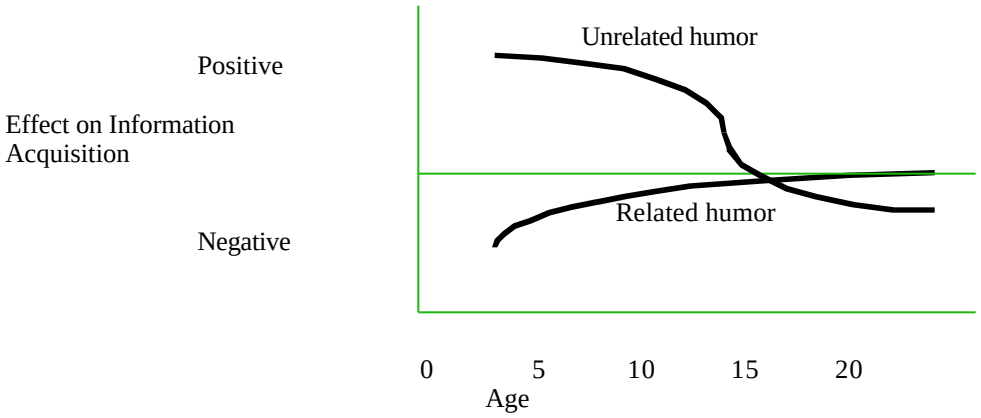



**Figure 1.** Hypothetical gradients of the effects of the involvement of humor that is unrelated or related to the educational message on information acquisition and age of the student. (Zillmann & Bryant, 1983)

### *Humor and Computer-Based-Instruction*

Research concerning computer-based-instruction (CBI) and its relation to humor is even less extensive. Teslow (1995) in his call for research writes that a "review of the

literature indicates that much of the basic research is two decades old, little replication has taken place, most studies involve young children, findings have been equivocal, and hardly any research has addressed the effectiveness of humor in CBI" (p. 7). Research studying the role of humor in CBI is extremely underdeveloped.

Two studies, however, by Snetsinger and Grabowski (1994a, 1994b) examined the role of humor in CBI. Both studies compared a science CBI program about ticks with and without humor, and both studies found that although no significant differences occurred concerning acquisition or retention of information for college students, a significant difference occurred in the affective realm. Students who watched the program with humor were more concerned with ticks and tick-borne diseases. Although no cognitive differences of content were observed, humor did appear to positively impact the feelings of the students toward the content.

### *Summary of Humor in Education*

Previous studies on humor in education can be summarized as follows. First, for children, humor should be used in small units and frequently to increase attention, and should be unrelated to the educational message to prevent confusion with the content (Coleman, 1992; Zillmann & Bryant, 1983). Second, for adults, humor shows little benefit on immediate information acquisition, although humor that is unrelated or irrelevant to the educational message can be detrimental to learning. Humor, however, may help in long-term retention of information and in making the learning experience more pleasurable for older students (Coleman, 1992; Zillmann & Bryant, 1983). Finally, humor seems to foster creative thinking in both younger and older students, although findings and theories surrounding the role of humor and creativity are still being examined (Isen, et al., 1987; Ziv, 1988).

Findings suggest that humor can act as a positive motivation toward learning and can positively influence one's affective feelings toward content. Findings also suggest that

humor can act as a positive stimulant for creative and divergent thinking. Studies have demonstrated that humor is at least partially a cognitive act, but findings which attempt to show humor as positively influencing cognitive learning and information acquisition are mixed and inconclusive.

## Developing the Research Questions

As has been discussed, humor has the ability to influence creative and divergent thinking in students. Physiological evidence also suggests that humor increases connections of neural activity when analyzing and appreciating humor. Thus, humor would seem to have an ability to help learning and retaining information, yet few studies support such a conclusion and many studies have been unable to find humor having any usefulness in the cognitive role of learning.

Perhaps previous studies have been too limited in their use of humor by only including humor within the presentation of content. Humor has the potential to serve many roles in learning, such as a source of motivation for learning, a releaser of tension, and a positive influence on affective feelings toward content. For the cognitive realm, however, humor should be reexamined in its role during the presentation of material.

If the incongruity theory is correct (in that humor appreciation is the cognitive ability to resolve two disparate ideas in a playful context), then one would expect a correlation between the processing and understanding humor and the processing and understanding of problems and new information. Few studies, however, demonstrate any significant influence on cognitive activity. Perhaps humor is ineffective for cognitive purposes if its use is restricted to the presentation of material.

All studies using humor as an aid to learning have limited the use of humor to the presentation exclusively. Several studies, however, have shown that exposing people to humor prior to tasks aids in making decisions, resolving conflict, and creative problem solving. Considering the research done on humor and education, all has included humor

only within the presentation of material, not as a primer to tasks. No study to date has used humor prior to the learning task to study the effects of humor on learning, acquiring, and retaining information.

This study seeks to explore the effectiveness of humor on learning in a computer-based environment, using both humor that is embedded in the presentation of the material and humor that is given prior to the learning task. The appropriate uses of humor in instruction should be explored. Humor has the potential to be a very powerful method of motivating students to learn and increasing their cognitive abilities.

# CHAPTER II

## Research Methodology

"Boy, keep [your students] laughing. Make them laugh
so damn hard and so damn loud that
they don't realize they are learning."
*Bernie, from Pat Conroy's The Water is Wide*

Previous studies on humor in education have focused on the use of humor embedded in the presentation of content material. Some research, however, suggests that humor is an effective tool for increasing divergent thinking and information acquisition if the humor is given prior to the presentation of content material. This study used an experimental design to test if humor given prior to content presentation was more effective in helping students understand and remember information than a control group treatment.

### Research Hypotheses

Many studies have examined the relationship of humor and learning by controlling humor given during the presentation of learning. These studies, although sometimes conflicting, indicate some possible positive effects of humor on learning (Kaplan & Pascoe, 1977; Schmidt, 1994; Zillmann & Bryant, 1983). Some additional studies have also explored the relationship of humor and creative thinking by controlling humor given prior to the problem-solving task. These studies found that humor significantly affected the ability of the students to think creatively (Ziv, 1976) and to solve problems (Isen, Doubman, & Nowicki, 1987). Studies exploring the effect of humor on computer-based instruction have shown benefits to the students' affective feelings about the content but no learning benefits of the content itself (Snetsinger & Grabowski, 1994a, 1994b).

Previous studies hypothesized that content accompanied by humor would be more enjoyable and more memorable than content without humor, but many studies have not shown this to be the case (Snetsinger & Grabowski, 1994a, 1994b; Ziv, 1988). Research

conducted by Isen and her colleagues (Isen, Doubman, & Nowicki, 1987; Isen & Means, 1983) have hypothesized that positive feelings, which include humor, given prior to the problem solving task help prepare the mind for complex thought processes. Because these studies have demonstrated a positive effect of humor on problem solving, humor may possibly benefit education and learning as well.

This study sought to explore the effectiveness of humor on learning using humor that was given prior to the learning task. The study addressed the following question: is there a difference in the effect of humor, as defined by the incongruity theory, given prior to the presentation of non-related content material on the information acquisition and retention of students?

To examine the effects of humor on learning, the following hypotheses based on the literature review were considered:

1. Humorous treatment groups will score significantly higher on content posttests than non-humorous control groups.

2. Humorous treatment groups will score significantly higher on enjoyment of the instructional unit than non-humorous control groups.

A one-way analysis of variance was conducted on the posttest scores achieved by the students. An F ratio of 0.05 or lower was the level of significance necessary for the results to be considered significantly different. A t-test was conducted on the enjoyment scores achieved by the students. A difference of 0.05 or greater was the level of significance necessary for the results to be considered significantly different. Details on data analysis procedures are outlined later in this chapter.

## Sample

Students were eighty graduate and undergraduate students from the College of Human Resources and Education at Virginia Polytechnic Institute and State University. Students in this study were enrolled in Advanced Educational Psychology and Foundations

of Educational Psychology. Students enrolled in Foundations in Family and Child Development and in Multimedia Development at Bluefield College were added later. Specific statistics on the students who took part in the experiment are provided in the Results section of this paper.

## Experimental Design

This study examined the effects of humorous stimuli on the learning behaviors of college students. The independent variable was exposure to humor given prior to the presentation of content material. Three groups were used in the study, involving humorous stimuli, non-humorous stimuli, and a control group. The humorous stimuli was the reading of a variety of humorous comic strips prior to the instructional unit. The non-humorous stimuli was the reading of a variety of non-humorous comic strips prior to the instructional unit. The control group did not have any reading material strips prior to the instructional unit. The dependent variable was test scores based on information given during an instructional unit on the human heart.

A posttest-only control group design was employed. This design is an appropriate method to determine if an independent variable has produced significant differences in a treatment group when compared to a control group. Randomizing all students into the three groups should ensure that all groups represent the equivalent population. A pretest was not used because of a possible sensitizing effect, in which students respond to the posttest due to learning from the pretest rather than the treatment, which can decrease the external validity of the experiment (Kerlinger, 1973).

True randomization should ensure that all groups prior to the instructional unit were equivalent in their understanding of the systolic and diastolic phases of the heart, especially considering that such information is generally unknown to the general population. Four Likert scale questions were asked about the student's prior knowledge of systolic and diastolic phases, and any student who said that he or she has prior knowledge of these

phases was not used in the experiment. Details on these questions will be discussed later in this chapter.

Any differences between the outcomes of the three groups have a high probability of being due to the treatment, which in this case is the exposure of humorous and non-humorous stimuli.

The data consisted of a series of posttests given to the students. A series of three tests which focus on different aspects of the content determined if students learned the material presented in the tutorial. An additional 5-item questionnaire determined if students enjoyed the tutorial.

**Humor in the Experiment**

The humorous comic strips used in this research consisted of thirty-five comics which came from a variety of humorists. Of these thirty-five comics, seven comic strips were from "Calvin and Hobbes" by Bill Watterson (1993, 1994, 1996), seven comic strips were from "The Far Side" by Gary Larson (1986, 1988), seven comic strips were from "Doonesbury" by Gary Trudeau (1984, 1987), seven comic strips were from "Dilbert" by Scott Adams (1995, 1996), and seven were from various cartoons by John Callahan (1990, 1991, 1992, 1994). These comics were selected by the researcher in an attempt to represent a range of humor and comic styles.

The non-humorous comic strips used in this research consisted of thirty-five comics which came from a variety of sources. Seven comic strips were from "Dick Tracy" by Chester Gould (1987), seven comic strips were from "Lil' Abner" by Al Capp (1988), seven comic strips were from "Terry and the Pirates" by Milton Caniff (1987), seven comic strips were from "Pogo" by Walt Kelly (1959), and seven were from various cartoons by Jean-Francois Batellier (1984). These comics were selected by the researcher in an attempt to represent a range of comic styles not intended to be humorous.

After being exposed to humorous and non-humorous stimuli, the student was asked a series of questions to ascertain if the student had any prior knowledge of the heart. Four Likert scale questions were asked. A four-number Likert scale was used, so the student had to choose between agreeing or disagreeing, rather than choose a middle neutral number that an odd-numbered Likert scale would offer. The student was not given a "no opinion" choice, again to force the student to decide whether he or she agreed or disagreed with the question. The student selected a number corresponding to the extent to which he or she agreed or disagreed with each of the questions, one meaning disagreement and four meaning agreement. The questions were as follows:

1. I am familiar with the diastolic phase of the heartbeat cycle.
2. I do not know the systolic phase of the heartbeat cycle.
3. I know where the valves in the heart are located.
4. I am confident that I know how blood moves through the heart.

The validity of the test questions was established by the five committee members. The reliability of the testing instruments was established by calculating a Cronbach's alpha coefficient during the data analysis.

The pilot study on humor used in the experiment and the selection process of the comic strips can be found in Appendix A. A discussion of copyright issues for using the comic strips can be found in Appendix B.

## Instructional Materials

The content used was a 2,000-word instructional unit, developed by Frank Dwyer at Penn State University, describing the human heart, its parts, and the internal processes which occur during the systolic and diastolic phases (Dwyer, 1978). The content was delivered through a computer-based instruction program.

The unit consists of thirty-seven pages which show the parts and functions of the human heart. The graphics are black and white line drawings. First, the outer and inner

linings of the heart are described, such as the apex, pericardium, epicardium, myocardium, and endocardium. Then, the inner chambers of the heart are described, including the septum, auricles, and ventricles. The veins and valves are then described, including the superior vena cava, inferior vena cava, tricuspid valves, pulmonary valve, pulmonary artery, pulmonary valve, pulmonary veins, mitral valve, aortic valve, and aorta. Next, the flow of blood through the veins, valves, and chambers are described in sequential order. Finally, the cycle of the heartbeat is outlined and described, including the diastolic phase and the systolic phase.

After reading every page, the student was asked if the picture in the upper right corner of the page described the text on that page. The student was encouraged to answer the question and then turn the page to see if the graphic was in fact correct or if it needed correction. Students were able to self-monitor their progress to see if they were correctly reading and understanding the text material.

**Testing Instruments**

Dwyer (1978) developed three tests that can be combined into a total criterion test. Each of the three tests measures different attributes of student learning.

Terminology Test: The objective of this test is to evaluate the student's knowledge of specific facts, terms, and definitions. In this multiple choice test (N = 20 items), the student is asked to identify the word or phrase that correctly corresponds to the question. Each word had been discussed during the instructional presentation.

Identification Test: The objective of the identification test is to evaluate the student's ability to identify parts or positions of an object. In this multiple choice test (N = 20 items), the student is asked to identify the numbered parts of a detailed drawing of the heart. Each part of the heart which had been discussed in the instructional presentation is numbered on the drawing and appeared in a list on the answer sheet. The test measures the student's ability to associate specific parts of the heart with their proper name.

Comprehension Test: In this multiple choice test (N = 20 items), the student is given the location of certain parts of the heart at a particular moment of its operation, then the student is asked to locate the function and position of other specified parts of the heart at the same point in time. This test requires that the student have a thorough understanding of the heart, its parts, its internal functioning, and the simultaneous processes occurring during the different phases. The comprehension test was designed to measure a type of understanding that occurs when the individual understands what is being communicated and can use the information to explain some other phenomenon occurring at the same time.

Total Criterion Test: The items contained in the three individual criterion tests can be combined into a sixty-item total criterion test. The objective of this test is to measure the student's total understanding of all the content material presented in the instructional unit. The student will receive the identification test first, then the terminology test, and lastly the comprehension test.

Each of these tests measures different educational objectives. The terminology test measures the student's ability to remember specific facts and definitions. The identification test measures the student's ability to identify parts of positions of an object. The comprehension test measures the student's ability to understand complex procedures and/or processes. This experiment not only examined the effect of humor on overall learning, but it also examined the effect of humor on different educational performances.

The validity of the individual criterion measures is based on the congruence between the content information presented in the instructional units and the content measured by the test items. The verbal versions of the criterion tests have been used with more than 23,000 university and high school students and have been found to be effective in measuring information acquisition. Content validity of the visual format of the criterion tests has been verified by a committee composed of four graduate students majoring in science education and a medical doctor. All considered the visual tests to be valid in

content and appropriate to measure achievement resulting from content presented in the instructional units (Dwyer, 1978).

After the student had finished answering all test items, the four pretest questions were asked again to see if the student felt any change had occured in his or her perception of what he or she had learned. Five additional questions were asked to measure student reactions to the presentation. A four-number Likert scale was used, so the student had to choose between agreeing or disagreeing, rather than choose a middle neutral number that an odd-numbered Likert scale would offer. The student was not given a "no opinion" choice, again to force the student to decide whether he or she agreed or disagreed with the question. The student selected a number corresponding to the extent to which he or she agreed or disagreed with each of the questions, one meaning disagreement and four meaning agreement. The five additional questions were as follows:

1. The presentation conveyed the information effectively.
2. The presentation was boring.
3. The presentation contained interesting graphics.
4. The presentation was hard to understand.
5. Overall, I enjoyed the presentation.

The validity of the test questions was established by the five committee members. The reliability of the testing instruments was established by finding a Cronbach's alpha coefficient during the data analysis.

## Procedures

The researcher went to a class session to announce that students were needed for an experiment. The students were told that the experiment would take approximately one hour to complete and that their participation would be anonymous. They were also told that they could leave the experiment at any time for whatever reason if they so desired. Those that completed the experiment would be provided a copy of the results on request. They would

be given the chance to ask any questions which did not include the focus of the experiment. The script of what the tester told the students is provided in Appendix D.

After a student agreed to be a participant, the student then came into the computer lab at any point within a week's time period. The student was given a sheet of paper that described how to open the program on either a Mac or PC machine in the lab. These instructions are found in Appendix E. When the student opened the program, he or she filled out some demographic data, including gender, ethnicity, educational level, and major. The computer would then randomly assign the student to one of the three experimental groups. If the student was assigned to the control group, the student proceeded through the program. Students assigned to either the humorous or non-humorous groups were told to find a lab assistant and ask for the folder that corresponded to the student's group. The folders contained instructions on what to do with the contents of the folder.

Students in the humorous-treatment group were given thirty-five humorous comic strips and the instructions in this folder asked the student to read the comics. These instructions can be found in Appendix F. As the student read the comic, he or she gave a score on how humorous they found the comic strip on a separate data sheet. A four number Likert scale was used, so students had to choose between agreeing or disagreeing, rather than choose a middle neutral number that an odd-numbered Likert scale would offer. Students were not given a "no opinion" choice, again to force the students to decide whether they agreed or disagreed that the comic was humorous. The students selected a number corresponding to the extent to which they agreed or disagreed with each of the comics, one meaning they did not find the comic humorous and four meaning they did find the comic humorous. The Comic Response Form is found in Appendix G. During the data analysis, an average of all the scores was made for each student. Any student who did not score higher than 2.5 for the humorous treatment group was not used within the humorous treatment group, because students who scored less than 2.5 (i.e. who more often found the comic strips not to be humorous) would have had no demonstrable humorous reaction.

Students in the non-humorous treatment group were given thirty-five non-humorous comic strips and the instructions in this folder asked the student to read the comics. These instructions can be found in Appendix F. As the student read the comic, he or she gave a score on how humorous they found the comic strip on a separate data sheet. These students used the same four-number Likert scale used in the humorous treatment group. During the data analysis, an average of all the scores was made for each student. Any student who did not score lower than 2.5 for the humorous treatment group was not used within the non-humorous treatment group. Students who scored more than 2.5 (i.e. who more often found the comic strips to be humorous) would have had a demonstrable humorous reaction.

All students in all three groups were then asked to go back to their computer in the computer lab. The student then proceeded to read the instructional material on the heart, which took approximately twenty minutes to view. The student was then given the test items, which took another twenty minutes approximately.

After the student completed the tests, the student gave his or her folder back to one of the lab assistants. In a separate sheet of paper, the student was thanked for participating in the experiment, told the purpose of the experiment on the role of humor in learning, and given a place to fill out his or her name and address if the student wanted to receive a copy of the results. The script of what was told to the student is provided in Appendix H.

### Additions to Procedures

Once the assigned week had been established, contact was made with the Advanced Psychology and Foundations in Psychology classes. These classes consisted of one graduate class of approximately twenty-five students, and two undergraduate classes of approximately one hundred students combined. After the week of data concluded, approximately forty students had taken part in the study; this was well under the eighty originally proposed. With the consent of the advisor, the data collection was extended to

an additional week, during which only five students took part in the study. With the consent of the advisor, an additional class of Foundations in Family and Child Development was added to the data collection sample. This class had approximately three hundred students enrolled. With the consent of the committee, a Multimedia Development class at Bluefield College was also included in the data collection sample. Over fifty people took part in the study from these classes.

**Data Analysis**

The scores of the treatment group and control group were recorded by the computer. Those scores were then compared using one-way analyses of variance for each of the tests used in the study. A t-test was used on each of the Likert scale questions.

An F ratio of 0.05 or lower was the level of significance necessary for the results to be considered significantly different. A t-test was conducted on the enjoyment scores achieved by the students. A difference of 0.05 or greater was the level of significance necessary for the results to be considered significantly different.

Eighty students were proposed to be used in this study. Using the formula to determine the power of the study,

$$\delta = d\sqrt{\frac{N}{2}}$$

a sigma ($\delta$) of 2.8 was chosen because that number is necessary for a power of .80 to be achieved. An effect size (d) of .80 was chosen using a set of conventions proposed by Cohen when expecting a large effect. By using these numbers and solving for N, one finds an N of 24.5 per sample. Therefore, only seventy-five students were required for this study, but extra students were sought in case of attrition.

## Summary

This study used an experimental design to test if humor given prior to content presentation was more effective in helping students understand the information and enjoy the presentation than a control group treatment. Humor was measured by a series of Likert scale responses for a set of comic strips. The presentation of content was an instructional unit developed by Dr. Frank Dwyer. Student understanding was measured by a series of testing instruments developed for the instructional unit, and student enjoyment was measured by a series of Likert scale questions.

Most studies examining the effectiveness of humor on learning have led to mixed results. By utilizing research that has found humor to be an effective precursor activity, however, this study tested whether or not humor can have a positive impact on the learning and retention of information.

# CHAPTER III

## Results

"Statistics are like bathing suits; what they show is interesting,
but what they conceal is crucial."
*Author unknown*

Previous research suggested that humor could be an effective tool for increasing divergent thinking and information acquisition if the humor is given prior to the presentation of content material. This study used an experimental design to test if humor given prior to content presentation is more effective in helping students understand and remember information than a control group. Data for this study were collected as described in the Procedures section of Chapter 2. Statistical tests did not support either of the hypotheses. The following discussion details the results of the study.

### Subjects

Ninety-eight people participated in the study. These ninety-eight students were randomized into the three groups. Twenty-six were placed into group one, which read non-humorous cartoons prior to the tutorial. Thirty-nine were placed into group two, which read humorous cartoons prior to the tutorial. Thirty-three were placed into group three, which did not read any cartoons prior to the tutorial. Due to technical and procedural problems, the results of five students were not recorded (three from group one and two from group two); therefore, their data were not used in the study.

According to the methodology of the study, students who scored higher than 2.5 on the pretest in any group were dropped from the study. Using this criterion, nine were dropped from group one, seventeen were dropped from group two, and five were dropped from group three. In addition, according to the methodology of the study, two students in group one who scored higher than 2.5 on the Comic Response Form were dropped from the study. Five students in group two who scored lower than 2.5 on the Comic Response

Form were dropped from the study. After dropping the participants according to all the criteria of the methodology, fifty-five students were used in the analysis: group one had twelve students, group two had fifteen students, and group three had twenty-eight students.

Demographic information for these fifty-five students revealed forty-one undergraduate students, twelve master's level graduate students, and two doctoral level graduate students. Forty-two students were female and thirteen students were male. Forty-four students were Caucasian, six students were African-American, three students were Asian, one student was Jewish, and one student was Native-American.

### Humor and Test Scores

Results of the effect of humor on test scores did not support either of the hypotheses. Humor did not show any significant effect on the performance of the students on any of the tests. Please note, however, that the power study done previously showed that twenty-five students per cell were needed to determine true significance. Because group one only had twelve students and group two only had fifteen students, all conclusions based on these results should be tempered with caution. Statistical tests did not yield significance, but further tests with more students are appropriate to determine if the humor did not have any additional significant effect on test scores.

The first hypothesis, humorous treatment groups will score significantly higher on content posttests than non-humorous control groups, was not supported by the results of study. One-way analysis of variance was used to determine if significant differences existed between the total test scores of the three groups in the study (Non-Humor Group, m=25.417; Humor Group, m=21.067, Control Group, m=24.107). P-values between all groups were higher than .05 (Groups One and Two, p=.1776, Groups One and Three, p=.6462, Groups Two and Three, p=.2529). No significant differences were found between any of the three groups (see Table 1 in Appendix I).

In addition to total test scores, one-way analysis of variance was used to determine if significant differences existed between the three different test scores among the three groups in the study. The three different tests were Definition Test, Comprehension Test, and Synthesis Test.

Examining the Definition Test, group two (which read humorous cartoons) scored lower than the other two groups (Non-Humor Group, m=10.500; Humor Group, m=7.733, Control Group, m=9.857). P-values between all groups were higher than .05 (Groups One and Two, p=.0568, Groups One and Three, p=.6136, Groups Two and Three, p=.0761), so the differences were not found to be significant, but the P-value was extremely low. Because of the low number of subjects in some cells, further investigation is needed to determine if true significance is possible (see Table 2 in Appendix I).

Examining the Comprehension Test, all three groups had approximately the same means (Non-Humor Group, m=8.000; Humor Group, m=7.067, Control Group, m=7.429). P-values between all groups were higher than .05 (Groups One and Two, p=.4414, Groups One and Three, p=.5962, Groups Two and Three, p=.7173). No significant differences were found between any of the groups in the study (see Table 3 in Appendix I).

Examining the Synthesis Test, all three groups had approximately the same means (Non-Humor Group, m=6.917; Humor Group, m=6.267, Control Group, m=6.821). P-values between all groups, however, were higher than .05 (Groups One and Two, p=.5682, Groups One and Three, p=.9251, Groups Two and Three, p=.5555). No significant differences were found between any of the groups in the study (see Table 4 in Appendix I).

Four Likert scale questions were asked prior to the tutorial to determine if students had previous knowledge of the heart, its parts, and its phases. The same questions were asked again after students had completed the tutorial. The validity of the questions was established by the five committee members. The reliability of the questions was established

by finding a Cronbach's alpha coefficient during the data analysis and was determined to have an alpha of .3063 when asked in the pretest and an alpha of .5268 when asked in the posttest.

**Table 1:** Table of Means for Humor and Test Scores

| | Non-Humor Group | Humor Group | Control Group |
|---|---|---|---|
| Total Test Score | 25.417 | 21.067 | 24.107 |
| Definition Test | 10.500 | 7.733 | 9.857 |
| Comprehension Test | 8.000 | 7.067 | 7.429 |
| Synthesis Test | 6.917 | 6.267 | 6.821 |

## Humor and Enjoyment of Tutorial

The second hypothesis, humorous treatment groups will score significantly higher on enjoyment of the instructional unit than non-humorous control groups, was not supported by the results of study. Statistical tests did not yield significance, but further tests with more subjects are appropriate to determine if the humor did not have any significant effect on attitudinal scores.

The validity of these questions was established by the five committee members. The reliability of these questions was established by finding a Cronbach's alpha coefficient during the data analysis and was determined to have an alpha of .7025.

All five posttest questions asking about student attitudes toward the tutorial were averaged. An unpaired t-test was used to compare these averages. All three groups had approximately the same means (Non-Humor Group, m=1.967; Humor Group, m=1.933, Control Group, m=2.064). P-values between all groups were higher than .05 (Groups One and Two, p=.8800, Groups One and Three, p=.6554, Groups Two and Three,

p=.5219). No significant differences were found between any of the three groups in the study (see Table 5 in Appendix I).

In addition to averages of student attitudes, an unpaired t-test was used on each of the posttest questions to determine if significant differences existed between the three groups in the study.

For the first posttest question, "The presentation conveyed the information effectively," all three groups had approximately the same means (Non-Humor Group, m=2.167; Humor Group, m=2.000, Control Group, m=2.357). P-values between all groups were higher than .05 (Groups One and Two, p=.6132, Groups One and Three, p=.5093, Groups Two and Three, p=.1875). No significant differences were found between any of the three groups in the study (see Table 6 in Appendix I).

For the second posttest question, "The presentation was boring," all three groups had approximately the same means (Non-Humor Group, m=1.833; Humor Group, m=2.200, Control Group, m=2.036). P-values between all groups were higher than .05 (Groups One and Two, p=.3627, Groups One and Three, p=.5538, Groups Two and Three, p=.5604). No significant differences were found between any of the three groups in the study (see Table 7 in Appendix I).

For the third posttest question, "The presentation contained interesting graphics," all three groups had approximately the same means (Non-Humor Group, m=2.000; Humor Group, m=1.933, Control Group, m=2.179). P-values between all groups were higher than .05 (Groups One and Two, p=.8645, Groups One and Three, p=.6258, Groups Two and Three, p=.4367). No significant differences were found between any of the three groups in the study (see Table 8 in Appendix I).

For the fourth posttest question, "The presentation was hard to understand," all three groups had approximately the same means (Non-Humor Group, m=2.333; Humor Group, m=1.733, Control Group, m=1.857). P-values between all groups were higher than .05 (Groups One and Two, p=.0924, Groups One and Three, p=.1533, Groups Two

and Three, p=.6655). No significant differences were found between any of the three groups in the study (see Table 9 in Appendix I).

For the fifth posttest question, "Overall, I enjoyed the presentation," all three groups had approximately the same means (Non-Humor Group, m=1.500; Humor Group, m=1.800, Control Group, m=1.893). P-values between all groups were higher than .05 (Groups One and Two, p=.3331, Groups One and Three, p=.1574, Groups Two and Three, p=.7125). No significant differences were found between any of the three groups in the study (see Table 10 in Appendix I).

**Table 2:** Table of Means for Humor Enjoyment of Tutorial

| | Non-Humor Group | Humor Group | Control Group |
|---|---|---|---|
| Average of 5 Quest. | 1.967 | 1.933 | 2.064 |
| Question 1 | 2.167 | 2.000 | 2.357 |
| Question 2 | 1.833 | 2.200 | 2.357 |
| Question 3 | 2.000 | 1.933 | 2.179 |
| Question 4 | 2.333 | 1.733 | 1.857 |
| Question 5 | 1.500 | 1.800 | 1.893 |

## Humor and Time

Because test scores can potentially be influenced by the amount of time spent on a tutorial, a one-way analysis of variance was used to determine if significant differences existed in the time spent on the tutorial among the three groups in the study. Time spent reading the tutorial and time spent taking the test were both examined.

For time spent reading the tutorial, group one (which read non-humorous cartoons) had a lower mean than the other two groups (Non-Humor Group, m=13.825; Humor Group, m=15.151, Control Group, m=16.037). P-values between all groups, however,

were higher than .05 (Groups One and Two, p=.5948, Groups One and Three, p=.3211, Groups Two and Three, p=.6672). No significant differences were found among any of the three groups in the study (see Table 11 in Appendix I).

For time spent taking the test, all three groups had approximately the same means (Non-Humor Group, m=9.641; Humor Group, m=11.044, Control Group, m=10.411). P-values between all groups were higher than .05 (Groups One and Two, p=.3183, Groups One and Three, p=.5376, Groups Two and Three, p=.5843). No significant differences were found between any of the three groups in the study (see Table 12 in Appendix I).

No significant differences were found between any of the groups either in time spent reading the instructional unit or the time spent taking the test. Statistical tests did not yield significance, but further tests with more subjects are appropriate to determine if the humor did not have any significant effect on time.

**Table 3:** Table of Means for Humor and Time

| | Non-Humor Group | Humor Group | Control Group |
|---|---|---|---|
| Time w/ Tutorial | 13.825 | 15.151 | 16.037 |
| Time w/ Test | 9.641 | 11.044 | 10.411 |

## Conclusion

Although previous research suggested that humor could be an effective tool for increasing divergent thinking and information acquisition if the humor is given prior to the presentation of content material, data from this study did not support either of the hypotheses. The following chapter will interpret the results, discuss possible factors, and give suggestions for further research.

# CHAPTER IV

## Discussion

"I discovered that laughter is foolish, that pleasure does you no good."

*Ecclesiastes 2:2*

Although previous research suggested that humor could be an effective tool for increasing divergent thinking and information acquisition if the humor is given prior to the presentation of content material, data from this study did not support either of the hypotheses. This chapter will interpret the results, discuss possible factors, and give suggestions for further research.

### Interpretation of Results

The experiment sought to study the possible effects of humor on learning in a computer-based-environment. The two hypotheses being examined were: (1) humorous treatment groups will score significantly higher on content posttests than non-humorous control groups, and (2) humorous treatment groups will score significantly higher on enjoyment of the instructional unit than non-humorous control groups. Neither hypothesis was supported by the data collected in this study.

The power study done for this study called for twenty-five students per group. Group one, the group who read non-humorous material, had only twelve students. Group two, the group who read humorous material, had only fifteen students. These two groups did not have the number of students suggested by the power study. Therefore, all conclusions in this study should be considered with caution.

Humor had been shown to help students in critical thinking and problem solving in other studies (Isen, Doubman, & Nowicki, 1987; Isen & Means, 1983). In this study, however, humor did not demonstrably help students learn any better from the instructional

tutorial or score any higher on any of the tests. Many reasons are possible to explain this discrepancy.

### *Related Humor*

Studies have shown that the relatedness of the humor can have an impact on learning. For younger students, humor that is related to the content, such as exaggeration and irony, does not help learning and can even hinder understanding of the content (Coleman, 1992; Hauck & Thomas, 1972; Wakshlag, Day, & Zillmann, 1981; Zillmann, Williams, Bryant, Boynton, & Wolf, 1980). Students who are too young to think abstractly cannot separate which part of the humor is based on truth and what part of the humor is meant to be seen as an exaggeration or an example of irony. For these younger students, non-related humor, or humor that is unrelated to the content, is preferable, because it helps increase attention and motivation without confusing the child. Studies with older students, in contrast, suggest that these students respond well to related humor and do not respond to unrelated humor (Coleman, 1992; Zillmann & Bryant, 1983; Ziv, 1988). Some believe that these students, who are assumed to be more internally motivated, perceive unrelated humor as inconsequential or even distracting, whereas related humor can be an effective way to help students remember examples of content (Zillmann & Bryant, 1983). Studies in this area of research, however, remain conflicting and are not conclusive.

No anecdotal evidence exists in this study that suggests students perceived the humor as inconsequential or distracting. The fact that humor did not help students learn, however, may be seen as possible support for the theory that students are not motivated by humor unrelated to the content.

### *Tutorial in the Study*

The tutorial itself may have been a hindrance in the study. Anecdotal evidence suggests that students found the tutorial to be long and tiresome. Some students, while leaving the lab where the research was conducted, were heard to say comments such as "that was long," and "I need to go take a nap." Also, whatever positive effects elicited by the humor may have been offset by negative feelings toward the tutorial. Out of the fifty-five people ultimately used in the study, three-fourths scored under 50%. Anecdotal evidence suggests that some students had a negative experience. Some comments indicating this include "I feel stupid" and "My head hurts." In answering the last posttest question, "Overall, I enjoyed the presentation," no group scored higher than 1.9 out of 4, indicating a generally low attitude toward the tutorial by all subjects that may have overshadowed whatever possible effect humor may have had on their attitudes. Whether this was a significant problem, however, is pure conjecture.

### *Humor in the Study*

Students in group two, the group that read humorous material, were kept in the study if they scored 2.5 or higher on the Comic Response Form. The assumption is that those who gave the comics a higher rating perceived the comics to be humorous. The possibility does exist, however, that even those who rated the comics as funny did not necessarily perceive the comics to be humorous. Of the thirty-six people originally randomly placed into group two, only sixteen scored less than 2.5, and three of those scored very close to 2.5 (from 2.46 to 2.49). Only four people scored under 2.00. The most likely explanation is that most people in group two did in fact perceive the comics as humorous, but the researcher acknowledges that this is ultimately an assumption.

### *Cognitive Nature of Humor*

Because of the low numbers in the statistical analysis, one cannot use this study as any definitive justification for making broad generalizations or sweeping conclusions. If future research bears out similar results, however, the cognitive nature of humor may need to be reexamined. Although understanding humor clearly involves mental activity, the ultimate basis for humor may have little connection with cognition (resolving mental incongruities) and may be more heavily influenced by other factors, such as emotions, feelings, and psychological viewpoints. More research is required before one can embrace this possibility.

## Suggestions for Further Research

Future research should be conducted with more participants so that a more definitive statistical analysis can be conducted. Unforeseen problems made gaining more students for this particular study more difficult than originally believed. Perhaps an even larger pool of students, more than the 450 used in this study, is necessary when designing future studies.

This research should also be continued with different computer-based-tutorials. Perhaps humor can be effective only in specific situations, and using a variety of tutorials will be required if this possibility is to be explored. Different humorous stimuli, such as TV clips or comedy sound recordings, can also be explored.

## Conclusion

Current theories in humor research state that humor is primarily a cognitive event, in which a positive feeling of humor is elicited from resolving a mental incongruity presented in a joke or humorous situation. Some research even indicates a possible link between the positive feelings evoked by humor and the ability to solve problems.

Research in this study sought to discover a link between the increased ability to solve problems using humor and the possible educational benefits of using humor in a computer-based-environment. The results of this study did not support any of the hypotheses. As humor research continues and further investigations are conducted, humor will likely be linked to a variety of benefits. The educational benefits of humor may be quantitatively identified in the future.

# REFERENCES

Adams, S. (1996). Fugitive from the Cubicle Police. Kansas City: Andrews and McMeel.

Adams, S. (1995). It's Obvious You Won't Survive by your Wits Alone. Kansas City: Andrews and McMeel.

Batellier, J. (1984). Is Anybody Out There? New York: Free Association Books.

Berlyne, D.E. (1972). Humor and its kin. In J.H.Goldstein & P.E. McGhee (Eds.), *The Psychology of Humor* (pp. 43-60). New York: Academic Press.

Brown, A. S., & Itzig, J. B. (1976). The Interaction of Humor and Anxiety in Academic Test Situations. ERIC Document Reproduction Service No. ED 152 783.

Burbach, H. J., & Babbitt, C. E. (1993). An exploration of the social functions of humor among college students in wheelchairs. *Journal of Rehabilitation, 59* (1), 6-9.

Callahan, J. (1990). Do Not Disturb Any Further. New York: Quill Books.

Callahan, J. (1991). Digesting the Child Within. New York: Quill Books.

Callahan, J. (1992). Do What He Says! He's Crazy!!! New York: Quill Books..

Callahan, J. (1993). The Night, They Say, Was Made for Love. New York: Quill Books.

Callahan, J. (1994). What Kind of a God Would Allow a Thing Like This to Happen?!! New York: Quill Books.

Caniff, M. (1977). Terry and the Pirates: China Journey. New York: Nostalgia Press.

Capp, A. (1988). Lil' Abner Dailies, Volume One: 1934-1936. Princeton WI: Kitchen Sink Press.

Coleman, J. G. (1992). All seriousness aside: The laughing-learning connection. *International Journal of Instructional Media, 19* (3), 269-276.

Courturier, L.C., Mansfield, R.S., & Gallagher, J.M. (1981). Relationships between humor, formal operational ability, and creativity in eighth graders. *The Journal of Genetic Psychology, 139*, 221-226.

Dwyer, F. (1978) Strategies for Improving Visual Learning. State College PA: Learning Services.

Freud, S. (1989). Jokes and their Relation to the Unconscious. (J. Strachey, Trans.). New York: W.W.Norton & Co. (Original work published 1905)

Godkewitsch, M. (1972). The relationship between arousal potential and funniness of jokes. In J.H.Goldstein & P.E. McGhee (Eds.), *The Psychology of Humor* (pp. 143-158). New York: Academic Press.

Gould, C. (1987). Dick Tracy: America's Most Famous Detective. New York: Citadel Press.

Hauck, W. E., & Thomas, J. W. (1972). The relationship of humor to intelligence, creativity, and intentional and incidental learning. *The Journal of Experimental Education, 40*, 52-55.

Hampes, W. P. (1992). Relation between intimacy and humor. *Psychological Reports, 71*, 127-130.

Isen, A.M. Daubman, K.A., & Nowicki, G.P. (1987). Positive affect facilitates creative problem solving. *Journal of Personality and Social Psychology, 52* (6), 1122-1131.

Isen, A.M., & Means, B. (1983). The influence of positive affect on decision-making strategy. *Social Cognition, 2* (1), 18-31.

Jausovec, N. (1985a). Hemispheric asymmetries during nine-year-olds performance of divergent production tasks: A comparison of EEG and YSOLAT measures. *The Creative Child and Adult Quarterly, 10* (4), 233-238.

Jausovec, N. (1985b). Creativity and cerebral preference: A comparison of writers, art students and low creative individuals. *The Creative Child and Adult Quarterly, 10* (3), 182-186.

Kaplan, R. M., and Pascoe, G. C. (1977) Humorous lectures and humorous examples: Some effects upon comprehension and retention. *Journal of Educational Psychology, 69,* (1), 61-65.

Keith-Spiegel, P. (1972). Early concepts of humor: Varieties and issues. In J.H.Goldstein & P.E. McGhee (Eds.), *The Psychology of Humor* (pp. 4-39). New York: Academic Press.

Kelly, W. (1959). Ten Ever-Lovin' Blue-Eyed Years with Pogo. New York: Fireside Press.

Kerlinger, F. (1973) Foundations of Behavioral Research, 2nd Ed. Holt, Rinehart, and Winston, Inc., New York.

LaFolette, H., & Shanks, Nl. (1993). Belief and the basis of humor. *American Philosophical Quarterly, 30* (4), 329-339.

Larson, G. (1986). The Far Side Gallery 2. Kansas City: Andrews and McMeel.

Larson, G. (1988). The Far Side Gallery 3. Kansas City: Andrews and McMeel.

Leacock, S. (1961). My Discovery of England. Toronto: McClelland & Stewart.

Lefcourt, H. M. & Martin, R. A. (1986). Humor and Life Stress: Antidote to Adversity. New York: Springer-Verlag.

Martin, R. A., & Lefcourt, H. M. (1983). Sense of humor as a moderator of the relation between stressors and moods. *Journal of Personality and Social Psychology, 45* (6), 1313-1324.

Martin, R. A., & Lefcourt, H. M. (1984). Situational humor response questionnaire: Quantitative measure of sense of humor. *Journal of Personality and Social Psychology, 47* (1), 145-155.

Martineau, W.H. (1972). A model of the social functions of humor. In J.H.Goldstein & P.E.McGhee (Eds.), *The Psychology of Humor* (pp. 101-125). New York: Academic Press.

McGhee, P. E. (1972) On the cognitive origins of incongruity humor: Fantasy assimilation versus reality assimilation. In J.H.Goldstein & P.E.McGhee (Eds.), *The Psychology of Humor* (pp. 61-80). New York: Academic Press.

McGhee, P. E. (1983a). The role of arousal and hemispheric lateralization in humor. In P.E. McGhee & J.H. Goldstein (Eds.), *Handbook of humor research* (Vol. I, pp. 109-134) New York: Springer-Verlag

McGhee, P. E. (1983b). Humor development: Toward a life span approach. In P.E. McGhee & J.H. Goldstein (Eds.), *Handbook of humor research* (Vol. I, pp. 13-37) New York: Springer-Verlag

O'Connell, W.E. (1996). Freudian humor: The eupsychia of everyday life. In A.J. Chapman & H.C. Foot (Eds.), *Humor and Laughter: Theory, Research, and Applications* (p. 313-330) New Brunswick: Transaction Publishers.

Provine, R. R. (1996). Laughter. American Scientist, *84* (1), 38-45.

Sanders, B. (1995). Sudden Glory: Laughter as Subversive History. Boston, MA: Beacon Press.

Schmidt, S R. (1994). Effects of humor on sentence memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 20* (4), 953-967

Shade, R A. (1996). License to Laugh: Humor in the Classroom. Englewood, Colorado: Teachers Ideas Press.

Smith, R., Ascough, J.C., Ettinger, R.F., & Nelson, D. (1971). Humor, anxiety, and task performance. *Journal of Personality and Social Psychology, 19* (2), 243-246.

Snetsinger, W., & Grabowski, B. (1994a). Use of humorous visuals to enhance computer-based-instruction. *Visual Literacy in the Digital Age: Selected Readings from the 25th Conference of the International Visual Literacy Association.* Beauchamp, D.G., Braden, R.A., & Baca, J.C. (Eds.) pp. 262-270.

Snetsinger, W., & Grabowski, B. (1994b). The use of humor in a CBI science lesson to enhance retention. Paper given at the 1994 Convention of the Association for Educational Communications and Technology.

Solomon, J. C. (1996). Humor and aging well: A laughing matter or a matter of laughing? (Aging Well in Contemporary Society, Part 2: Choices and Processes) *American Behavioral Scientist, 39* (3), 249-271.

Spector, C. C. (1996). Children's comprehension of idioms in the context of humor. *Language, Speech, and Hearing Services in Schools, 27* (4), 307-313.

Stopsky, F. (1992). Humor in the Classroom: A New Approach to Critical Thinking. Lowell, MA: Discovery Enterprises.

Strombom, T.A. (1989). Humor and the problem solving behavior of married couples. Doctoral dissertation: Virginia Tech.

Suls, J.M. (1972) Two-stage model for the appreciation of jokes and cartoons: An information-processing analysis. In J.H.Goldstein & P.E.McGhee (Eds.), *The Psychology of Humor* (pp. 81-100). New York: Academic Press.

Suls, J.M. (1983). Cognitive processes in humor appreciation. In P.E. McGheE & J.H. Goldstein (Eds.), *Handbook of humor research* (Vol. I, pp. 38-57) New York: Springer-Verlag.

Svebak S. (1974). Revised questionnaire on the sense of humor. *Scandinavian Journal of Psychology, 15,* 328-331.

Thorson, J. A., & Powell, F. C. (1991) Measurement of sense of humor. *Psychological Reports, 69,* 691-702.

Thorson, J. A., & Powell, F. C. (1993). Development and validation of a multidimensional sense of humor scale. *Journal of Clinical Psychology, 49* (1), 13-23.

Trudeau, G. (1984). Doonesbury Dossier. New York: Holt, Rinehart and Winston,

Trudeau, G. (1987). Doonesbury Deluxe. New York: Henry Holt and Company.

Wakshlag, J.J., Day, K.D., & Zillmann, D. (1981). Selective exposure to educational television programs as a function of differently paced humorous inserts. *Journal of Educational Psychology, 73* (1), 27-32.

Watterson, B. (1993). The Days are Just Packed. Kansas City: Andrews and McMeel.

Watterson, B. (1994). Homicidal Psycho Jungle Cat. Kansas City: Andrews and McMeel.

Watterson, B. (1996). It's a Magical World. Kansas City: Andrews and McMeel.

Weisfield G. E. (1993). The adaptive value of humor and laughter. *Ethnology and Sociobiology*, *14*, 141-169.

Zillmann, D., & Bryant, J. (1983). Uses and effects of humor in educational ventures. In P.E. McGhee & J.H. Goldstein (Eds.), *Handbook of humor research* (Vol. II, pp. 173-193) New York: Springer-Verlag.

Zillmann, D., Masland, J. L., Weaver, J.B., Lacey, L. A., Jacobs, N.E., Dow, J.H., Klein, C. A., & Banker, S. R. (1984). Effects of humorous distortions on children's learning from educational television. *Journal of Educational Psychology, 76* (5), 802-812.

Zillmann, D., Williams, B. R., Bryant, J., Boynton, K. R., & Wolf, M. A. (1980). Acquisition of information from educational television programs as a function of differently paced humorous inserts. *Journal of Educational Psychology, 72*, 170-180.

Ziv, A. (1976). Facilitating effects of humor on creativity. *Journal of Educational Psychology*, *68* (3), 318-322.

Ziv, A. (1988). Teaching and learning with humor: Experiment and replication. *Journal of Experimental Education, 57* (1), 5-15.

# APPENDICES

# Appendix A

## Pilot Study on Humor Used in the Experiment

Humorous Stimuli

For the humorous comic strips, the author selected one hundred humorous comic strips, twenty from five different artists. Comics from "The Far Side" by Gary Larson (1986, 1988) were selected because they were puns and/or represented absurd situations. Comics from "Doonesbury" by Gary Trudeau (1984, 1987) were selected because they focused on either politics or family situations, such as race relations in Florida and working mothers. Comics from "Dilbert" by Scott Adams (1995, 1996) were chosen because the humor focused on problems in the workplace, such as being fired and dealing with difficult bosses. Comics from "Calvin and Hobbes" by Bill Watterson (1993, 1994, 1996) were selected because they focused on educational humor, such as Calvin poking fun at the educational system and making demands of his elementary school teacher. Comics by John Callahan (1990, 1991, 1993, 1992, 1994) were selected because they focused on morbid humor, such as slugs committing suicide and handicapped people being put in unusual circumstances.

Nine people were asked to read these one hundred humorous comics and choose the five most humorous comics. As the person read each comic strip, the researcher recorded facial reactions to reading the comic strip. The following categories were used; "-" meant there was no facial reaction or change, "S" meant that the person smiled, as defined by an upward change in the corners of the mouth (if the person was smiling during the entire comic strip, a score of "-" was used unless there was a visible change in the corners of the mouth), "N" meant that the person snickered, as defined by an audible noise made with a closed mouth, and "L" meant that the person laughed, as defined by an audible noise made with an open mouth. An additional symbol "?" was sometimes used if the

person exhibited confusion about the meaning of the comic, either through a puzzled look or by some comment such as "I don't get this." Results from this survey were used to select the seven comic strips from each category most often voted as being humorous, and these comics were assembled into a collection of thirty-five comic strips to be used in the field test.

The thirty-five humorous comics were field tested with ten people. These people were asked to read the comic strips and choose the degree to which they found the comic strip humorous. A four number Likert scale was used, so students had to choose between agreeing or disagreeing, rather than choose a middle neutral number that an odd-numbered Likert scale would offer. Students were not given a "no opinion" choice, again to force the students to decide whether they agreed or disagreed that the comic is humorous. The students selected a number corresponding to the extent to which they agreed or disagreed with each of the questions, one meaning they did not find the comic humorous and four meaning they did find the comic humorous. A few comic strips were rated as "4" by some people and as "1" by others. To account for this variety in personal senses of humor, comics with averages above 2.0 were used. All thirty-five comics scored higher than 2.0 and were therefore used in the experiment.

Non-Humorous Stimuli

For the non-humorous stimuli, thirty-five comic strips were chosen from five different artists. Comics from "Terry and the Pirates" by Milton Caniff (1977) were chosen because they represented an adventure comic strip with some negative stereotypes of Orientals and elderly. Comics from "Lil' Abner" by Al Capp (1988) were chosen because they represented a "soap opera" storyline drawn in a cartoon-style but did not have a traditional punchline at the end and contain hard-to-read dialogue that stereotypes southern accents. Comics from "Dick Tracy" by Chester Gould (1987) were chosen because they represented ironic statements set in a context of a detective story. Comics

from “Pogo” by Walt Kelly (1959) were selected because they are cartoonish animals drawn in a humorous way, but with serious political and philosophical points that sometimes overshadow the humor. Comics from Jean-Francois Batellier (1984) were selected because they were single panel cartoons that represented morbid images.

The thirty-five non-humorous comics were field tested with ten people. These people were asked to read the comic strips and choose the degree to which they found the comic strip humorous. A four number Likert scale was used, so students had to choose between agreeing or disagreeing, rather than choose a middle neutral number that an odd-numbered Likert scale would offer. Students were not given a “no opinion” choice, again to force the students to decide whether they agreed or disagreed that the comic is humorous. The students selected a number corresponding to the extent to which they agreed or disagreed with each of the questions, one meaning they did not find the comic humorous and four meaning they did find the comic humorous. All thirty-five comics averaged below 2.0 and were therefore used in the experiment.

Instructional Materials

For both humorous and non-humorous groups, a folder was prepared with the humorous stimuli and instructions. The students were asked to follow the instructions without asking the researcher any questions. The participants then responded to the humorous stimuli, went through the instructional module, and answered the test questions. After the student completed the tests, the researcher interviewed the participants to find out if the students had any problems or misperceptions with the instructions, the module, or any other part of the experiment. The researcher then took these comments and adjusted the experimental materials accordingly.

## Appendix B

## Copyright, Fair Use, and Research

The Omnibus Copyright Revision of 1976 (Public Law 94-553) is the law regulating the use of all copyrighted materials in the United States. Use of comic strips falls under this law. Specific use of copyrighted materials in educational research is covered by the section on "fair use."

Section 107, Limitations on exclusive rights: Fair use.

> Not withstanding the provisions of section 106, the fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include--
>
> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
>
> (2) the nature of the copyrighted work;
>
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
>
> (4) the effect of the use upon the potential market for or value of the copyrighted work.
>
> (p. 44)

Use of comic strips would fall within the Fair Use conditions and this study meets all four conditions. First, the purpose of this study is clearly for educational use and no one will profit financially. Second, the nature of the material is appropriate because the material copied was not specifically marketed for educational purposes. Third, using five comic strips from any one artist cannot be considered to be a substantial portion of a copyrighted work as a whole, including collections and books. Fourth, using these comic strips in this study would have little or no effect on the value nor the potential market of these comic strips. To avoid any possibility of potential liability for the University or myself, however, permission was requested for use of all materials using the letter in Appendix C.

## Appendix C

## Letter for permission in using the comics

Dear Sir:

My name is Bob Whisonant, and I am a graduate student in Instructional Technology at Virginia Tech. I am conducting an experiment on the effect of humor on learning in a computer-based-environment. Part of the experiment involves exposing the participant to some humor, and I am using comic strips to accomplish humor exposure. Although use of the comics falls under the Fair Use copyright policy, I am asking for written permission to use the following comic strips in the study:

{List of comics }

The comic strips will not be incorporated into any computer program or any other instructional unit, and credit for the authors will be provided in the dissertation. If you have any questions about how the comic strips will be used, please feel free to contact me at the address and/or phone number below. Thank you in advance for your cooperation.

Bob Whisonant
220 War Memorial Gym
Virginia Tech
Blacksburg, VA 24061
(540) 231-7653

## Appendix D

## Script on what to initially tell the students

Hello! My name is Bob Whisonant, and I am a graduate student in Instructional Technology here at Virginia Tech. I am doing a study on factors that influence learning, and I need several participants to volunteer for this study. The experiment will take about an hour, there will be no embarrassing questions, and you can leave at any time during the experiment. The only personal information I will need is some demographic information. You can come into the computer lab located in Room 220 of War Memorial Gym at any time when the lab is open during the week of March 2nd through March 6th.

Are there any questions?

## Appendix E

### Script of directions for finding the computer tutorial

Thank you for participating in this study!

Find an open computer in the computer lab. Either Mac or PC can be used.

**Mac:** On the desktop, you should see a diamond-shaped icon called "Heart Program Mac" near the bottom of the screen. If you do not see this icon on the desktop, move to another computer that has this icon on the desktop. Double click on this icon to start the program.

*Heart Program Mac alias*

**PC:** On the desktop, you should see a diamond-shaped icon called "Heart Program PC." If you do not see this icon on the desktop, move to another computer that has this icon on the desktop. Double click on this icon to start the program.

*Heart Program PC.exe*

## Appendix F

### Directions for humorous and non-humorous groups

Thank you for participating in this study!

In this folder, you should find a set of thirty-five comics and a Comic Response Form. Each of the comics is numbered. Please read each comic, and then quickly decide how humorous you find the comic strip. On a scale from 1 to 4, assign each comic a number, 1 meaning the comic was not funny and 4 meaning the comic was funny. On the Comic Response Form, record your decisions by checking the appropriate number.

When you have finished responding to all thirty-five comics, please return to the computer program.

## Appendix G

## Comic Response Form

| | | | |
|---|---|---|---|
| Comic 1. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 2. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 3. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 4. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 5. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 6. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 7. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 8. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 9. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 10. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 11. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 12. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 13. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 14. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 15. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 16. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 17. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 18. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 19. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 20. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 21. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 22. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 23. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic 24. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |

| | | | | |
|---|---|---|---|---|
| Comic | 25. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic | 26. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic | 27. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic | 28. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic | 29. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |
| Comic | 30. | Not funny | _____ 1 _____ 2 _____ 3 _____ 4 | Funny |

## Appendix H

## Script of Final Folder

Thank you for participating in this study! This experiment was designed to study the effects of humor on learning in a computer-based-environment. If you would like a copy of the results of this experiment, fill out the following information and leave it with the lab assistant. Again, thank you for participating!

Name: _____

[ ] I would like the results sent to me electronically

Email: _____

[ ] I would like the results sent to me by mail

Address: _____

City: _____ State: _____ Zip Code: _____

# Appendix I

## Tables

Table 1: Analysis of scores on the Total Criterion Test

ANOVA Table for TotalTest

| | DF | Sum of Squares | Mean Square | F-Value | P-Value |
|---|---|---|---|---|---|
| HumorGroup | 2 | 142.999 | 71.499 | 1.058 | .3543 |
| Residual | 52 | 3512.529 | 67.549 | | |

Model II estimate of between component variance: .232

Means Table for TotalTest
Effect: HumorGroup

| | Count | Mean | Std. Dev. | Std. Err. |
|---|---|---|---|---|
| 1 | 12 | 25.417 | 8.723 | 2.518 |
| 2 | 15 | 21.067 | 8.233 | 2.126 |
| 3 | 28 | 24.107 | 7.997 | 1.511 |

Fisher's PLSD for TotalTest
Effect: HumorGroup
Significance Level: 5 %

| | Mean Diff. | Crit. Diff | P-Value |
|---|---|---|---|
| 1, 2 | 4.350 | 6.387 | .1776 |
| 1, 3 | 1.310 | 5.690 | .6462 |
| 2, 3 | -3.040 | 5.277 | .2529 |

Interaction Bar Plot for TotalTest
Effect: HumorGroup
Error Bars: 95% Confidence Interval

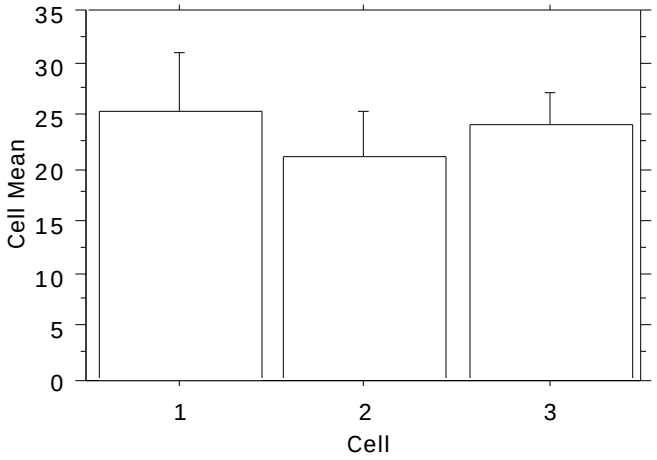


Table 2: Analysis of scores on the Definition Test

ANOVA Table for DefTest

| | DF | Sum of Squares | Mean Square | F-Value | P-Value |
|---|---|---|---|---|---|
| HumorGroup | 2 | 62.020 | 31.010 | 2.306 | .1098 |
| Residual | 52 | 699.362 | 13.449 | | |

Model II estimate of between component variance: 1.032

Means Table for DefTest
Effect: HumorGroup

| | Count | Mean | Std. Dev. | Std. Err. |
|---|---|---|---|---|
| 1 | 12 | 10.500 | 3.705 | 1.070 |
| 2 | 15 | 7.733 | 3.432 | .886 |
| 3 | 28 | 9.857 | 3.768 | .712 |

Fisher's PLSD for DefTest
Effect: HumorGroup
Significance Level: 5 %

| | Mean Diff. | Crit. Diff | P-Value |
|---|---|---|---|
| 1, 2 | 2.767 | 2.850 | .0568 |
| 1, 3 | .643 | 2.539 | .6136 |
| 2, 3 | -2.124 | 2.355 | .0761 |

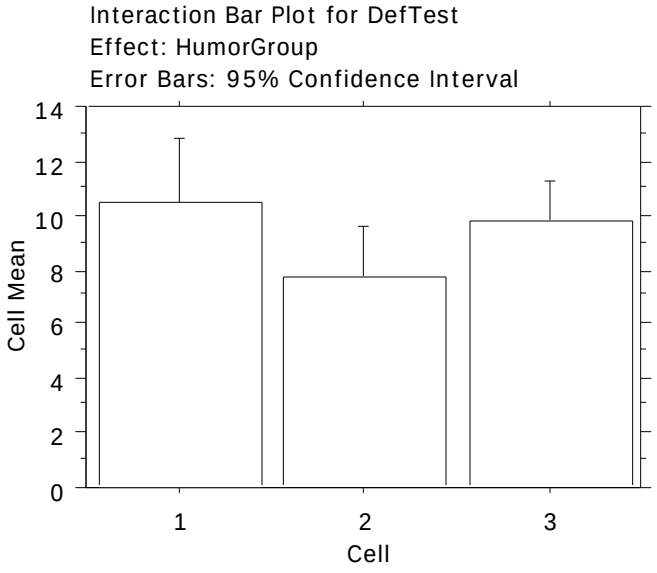


Table 3 Analysis of scores on the Comprehension Test

ANOVA Table for ComprTest

| | DF | Sum of Squares | Mean Square | F-Value | P-Value |
|---|---|---|---|---|---|
| HumorGroup | 2 | 5.846 | 2.923 | .303 | .7400 |
| Residual | 52 | 501.790 | 9.650 | | |

Model II estimate of between component variance: •

Means Table for ComprTest
Effect: HumorGroup

| | Count | Mean | Std. Dev. | Std. Err. |
|---|---|---|---|---|
| 1 | 12 | 8.000 | 3.931 | 1.135 |
| 2 | 15 | 7.067 | 2.890 | .746 |
| 3 | 28 | 7.429 | 2.821 | .533 |

Fisher's PLSD for ComprTest
Effect: HumorGroup
Significance Level: 5 %

| | Mean Diff. | Crit. Diff | P-Value |
|---|---|---|---|
| 1, 2 | .933 | 2.414 | .4414 |
| 1, 3 | .571 | 2.151 | .5962 |
| 2, 3 | -.362 | 1.995 | .7173 |

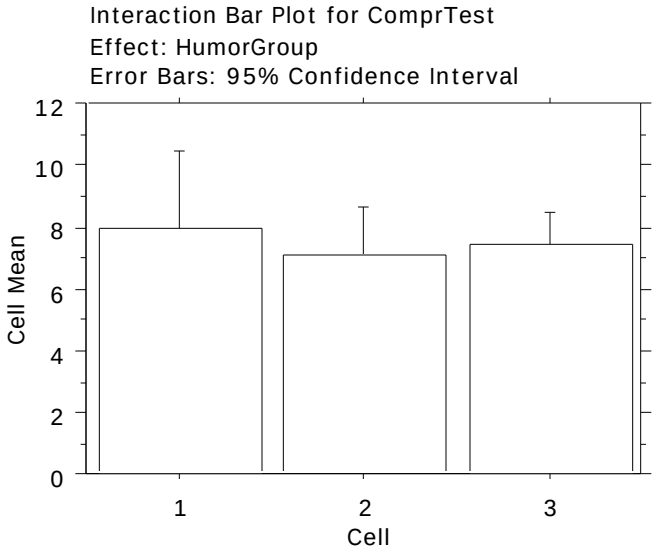


Table 4: Analysis of scores on the Synthesis Test

ANOVA Table for SynthTest

| | DF | Sum of Squares | Mean Square | F-Value | P-Value |
|---|---|---|---|---|---|
| HumorGroup | 2 | 3.788 | 1.894 | .222 | .8018 |
| Residual | 52 | 443.957 | 8.538 | | |

Model II estimate of between component variance: •

Means Table for SynthTest
Effect: HumorGroup

| | Count | Mean | Std. Dev. | Std. Err. |
|---|---|---|---|---|
| 1 | 12 | 6.917 | 2.644 | .763 |
| 2 | 15 | 6.267 | 3.369 | .870 |
| 3 | 28 | 6.821 | 2.776 | .525 |

Fisher's PLSD for SynthTest
Effect: HumorGroup
Significance Level: 5 %

| | Mean Diff. | Crit. Diff | P-Value |
|---|---|---|---|
| 1, 2 | .650 | 2.271 | .5682 |
| 1, 3 | .095 | 2.023 | .9251 |
| 2, 3 | -.555 | 1.876 | .5555 |

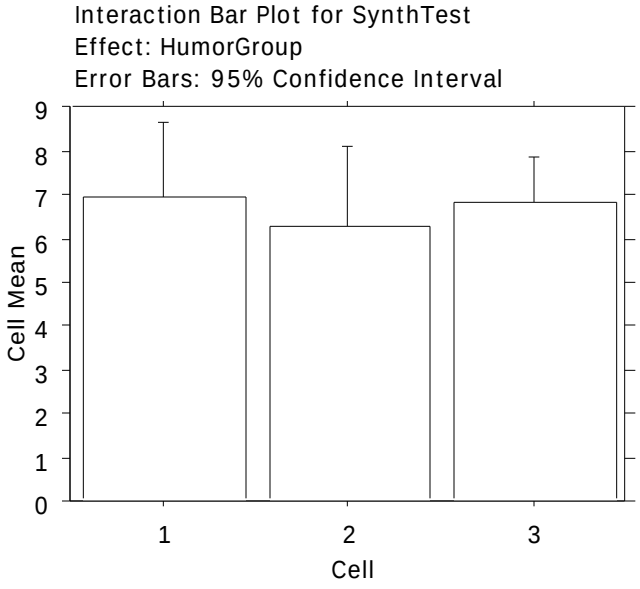


Table 5: Analysis of scores on the average of all five posttest questions

Group Info for EnjoyAvg
Grouping Variable: HumorGroup

| | Count | Mean | Variance | Std. Dev. | Std. Err |
|---|---|---|---|---|---|
| 1 | 12 | 1.967 | .297 | .545 | .157 |
| 2 | 15 | 1.933 | .335 | .579 | .149 |
| 3 | 28 | 2.064 | .436 | .660 | .125 |

Unpaired t-test for EnjoyAvg
Grouping Variable: HumorGroup
Hypothesized Difference = 0

| | Mean Diff. | DF | t-Value | P-Value |
|---|---|---|---|---|
| 1, 2 | .033 | 25 | .153 | .8800 |
| 1, 3 | -.098 | 38 | -.450 | .6554 |
| 2, 3 | -.131 | 41 | -.646 | .5219 |

Table 6: Analysis of scores on the posttest question, “The presentation conveyed the information effectively.”

Group Info for PostTest5
Grouping Variable: HumorGroup

| | Count | Mean | Variance | Std. Dev. | Std. Err |
|---|---|---|---|---|---|
| 1 | 12 | 2.167 | .697 | .835 | .241 |
| 2 | 15 | 2.000 | .714 | .845 | .218 |
| 3 | 28 | 2.357 | .683 | .826 | .156 |

Unpaired t-test for PostTest5
Grouping Variable: HumorGroup
Hypothesized Difference = 0

| | Mean Diff. | DF | t-Value | P-Value |
|---|---|---|---|---|
| 1, 2 | .167 | 25 | .512 | .6132 |
| 1, 3 | -.190 | 38 | -.666 | .5093 |
| 2, 3 | -.357 | 41 | -1.340 | .1875 |

Table 7: Analysis of scores on the posttest question, “The presentation was boring.”

Group Info for PostTest6
Grouping Variable: HumorGroup

| | Count | Mean | Variance | Std. Dev. | Std. Err |
|---|---|---|---|---|---|
| 1 | 12 | 1.833 | 1.424 | 1.193 | .345 |
| 2 | 15 | 2.200 | .743 | .862 | .223 |
| 3 | 28 | 2.036 | .776 | .881 | .167 |

Unpaired t-test for PostTest6
Grouping Variable: HumorGroup
Hypothesized Difference = 0

| | Mean Diff. | DF | t-Value | P-Value |
|---|---|---|---|---|
| 1, 2 | -.367 | 25 | -.927 | .3627 |
| 1, 3 | -.202 | 38 | -.597 | .5538 |
| 2, 3 | .164 | 41 | .587 | .5604 |

Table 8: Analysis of scores on the posttest question, “The presentation contained interesting graphics.”

Group Info for PostTest7
Grouping Variable: HumorGroup

| | Count | Mean | Variance | Std. Dev. | Std. Err |
|---|---|---|---|---|---|
| 1 | 12 | 2.000 | 1.273 | 1.128 | .326 |
| 2 | 15 | 1.933 | .781 | .884 | .228 |
| 3 | 28 | 2.179 | 1.041 | 1.020 | .193 |

Unpaired t-test for PostTest7
Grouping Variable: HumorGroup
Hypothesized Difference = 0

| | Mean Diff. | DF | t-Value | P-Value |
|---|---|---|---|---|
| 1, 2 | .067 | 25 | .172 | .8645 |
| 1, 3 | -.179 | 38 | -.492 | .6258 |
| 2, 3 | -.245 | 41 | -.785 | .4367 |

Table 9: Analysis of scores on the posttest question, “The presentation was hard to understand.”

Group Info for PostTest8
Grouping Variable: HumorGroup

| | Count | Mean | Variance | Std. Dev. | Std. Err |
|---|---|---|---|---|---|
| 1 | 12 | 2.333 | .970 | .985 | .284 |
| 2 | 15 | 1.733 | .638 | .799 | .206 |
| 3 | 28 | 1.857 | .868 | .932 | .176 |

Unpaired t-test for PostTest8
Grouping Variable: HumorGroup
Hypothesized Difference = 0

| | Mean Diff. | DF | t-Value | P-Value |
|---|---|---|---|---|
| 1, 2 | .600 | 25 | 1.750 | .0924 |
| 1, 3 | .476 | 38 | 1.457 | .1533 |
| 2, 3 | -.124 | 41 | -.436 | .6655 |

Table 10: Analysis of scores on the posttest question, “Overall, I enjoyed the presentation.”

Group Info for PostTest9
Grouping Variable: HumorGroup

| | Count | Mean | Variance | Std. Dev. | Std. Err |
|---|---|---|---|---|---|
| 1 | 12 | 1.500 | .636 | .798 | .230 |
| 2 | 15 | 1.800 | .600 | .775 | .200 |
| 3 | 28 | 1.893 | .618 | .786 | .149 |

Unpaired t-test for PostTest9
Grouping Variable: HumorGroup
Hypothesized Difference = 0

| | Mean Diff. | DF | t-Value | P-Value |
|---|---|---|---|---|
| 1, 2 | -.300 | 25 | -.987 | .3331 |
| 1, 3 | -.393 | 38 | -1.442 | .1574 |
| 2, 3 | -.093 | 41 | -.371 | .7125 |

Table 11: Analysis of time spent reading the instructional unit

ANOVA Table for TimeUnit

| | DF | Sum of Squares | Mean Square | F-Value | P-Value |
|---|---|---|---|---|---|
| HumorGroup | 2 | 41.630 | 20.815 | .508 | .6045 |
| Residual | 52 | 2129.596 | 40.954 | | |

Model II estimate of between component variance: •

Means Table for TimeUnit
Effect: HumorGroup

| | Count | Mean | Std. Dev. | Std. Err. |
|---|---|---|---|---|
| 1 | 12 | 13.825 | 7.394 | 2.135 |
| 2 | 15 | 15.151 | 6.982 | 1.803 |
| 3 | 28 | 16.037 | 5.596 | 1.058 |

Fisher's PLSD for TimeUnit
Effect: HumorGroup
Significance Level: 5 %

| | Mean Diff. | Crit. Diff | P-Value |
|---|---|---|---|
| 1, 2 | -1.326 | 4.974 | .5948 |
| 1, 3 | -2.212 | 4.431 | .3211 |
| 2, 3 | -.885 | 4.109 | .6672 |

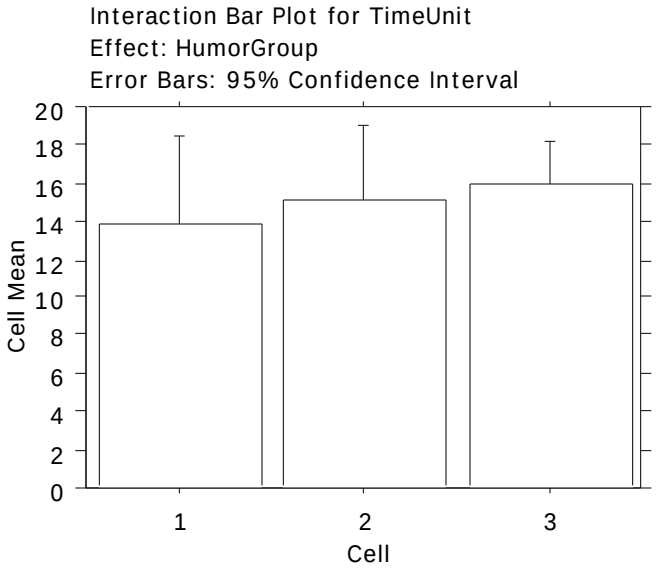


Table 12: Analysis of time spent taking the tests

ANOVA Table for TimeTest

| | DF | Sum of Squares | Mean Square | F-Value | P-Value |
|---|---|---|---|---|---|
| HumorGroup | 2 | 13.127 | 6.564 | .508 | .6048 |
| Residual | 52 | 672.180 | 12.927 | | |

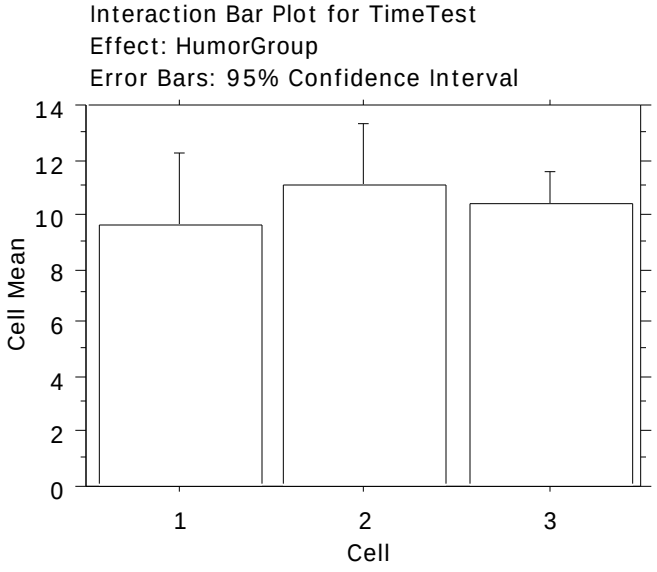
Model II estimate of between component variance: •

Means Table for TimeTest
Effect: HumorGroup

| | Count | Mean | Std. Dev. | Std. Err. |
|---|---|---|---|---|
| 1 | 12 | 9.641 | 4.134 | 1.193 |
| 2 | 15 | 11.044 | 4.139 | 1.069 |
| 3 | 28 | 10.411 | 3.008 | .569 |

Fisher's PLSD for TimeTest
Effect: HumorGroup
Significance Level: 5 %

| | Mean Diff. | Crit. Diff | P-Value |
|---|---|---|---|
| 1, 2 | -1.403 | 2.794 | .3183 |
| 1, 3 | -.770 | 2.489 | .5376 |
| 2, 3 | .633 | 2.308 | .5843 |



# Vita

# Robert D. Whisonant

**Personal Data:**

Born: September 7, 1968, in Houston, Texas
Marital Status: Single

**Education:**

- Radford High School, Radford, Virginia, graduated 1987
- James Madison University, B.S. in Art, minor in Geology and Secondary Education. Graduated 1991, Cum Laude.
- Radford University, M.S. in Science Education, graduated 1993.
- Virginia Tech, PhD in Curriculum and Instruction, graduated 1998

**Work Experience:**

- ACA Technology Office, Summer 1996-present. Responsibilities include:
  - creating and conducting instruction for technology workshops (focus of workshops was to teach faculty at small Appalachian colleges how to use various software, including web navigation, e-mail, and software for specific needs, such as Adobe Photoshop and science and math software)
  - monitoring and evaluating technology projects
  - creating and editing web pages
  - creating and editing databases accessible via the Web
  - maintaining a web server

- Adjunct Faculty member, Radford University, Fall 1994 -Spring 1996. Responsibilities included teaching Physical Science 350, a hands-on science class for preservice elementary teachers.

- Earth Science teacher, Rockbridge County High School, Fall 1993 - Spring 1994.

- Participated as member of Radford University V-QUEST team, 1993 to 1996.