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I am submitting herewith a dissertation written by Gloria Chineze Ononye entitled "Creativity and Future Time Perspective: An Investigation of Construct Validity." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Human Ecology.

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We have read this dissertation and recommend its acceptance:

Accepted for the Council:

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CREATIVITY AND FUTURE TIME PERSPECTIVE: AN INVESTIGATION OF CONSTRUCT VALIDITY

A Dissertation

Presented for the

Doctor of Philosophy

Degree

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Gloria Chineze Ononye

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DEDICATION

This dissertation is dedicated to:

-- My mother, Mrs. Obiodu Erokwu who taught me the value of persistence, patience and hardwork.

-- My husband, Ike who provided the much needed support and stability in our home.

-- My children, Uchenna, Chiagozie and Olisaeloka, who are my joy and pride.

Above all, I glorify my Lord and Saviour Jesus Christ.

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ABSTRACT

The purpose of this study was to investigate the relationship between the cognitive dimensions of Creativity and Future Time Perspective (FTP). An attempt was made to integrate Guilford's cognitive model of creativity with Nurmi's problem solving model of FTP. The sample consisted of 135 female undergraduate students between the ages of 18 - 24 years. Creativity was measured using Guilford's Consequences, and FTP was measured using the Future Problem Solving Tasks (FPST) instrument. Creative thinking was assessed as the number of Obvious and Remote responses and the combined total of these responses (Fluency). Other variables measured were Length of Response Time, GPA and Perceived Likelihood of Event. Results show that Consequences and FPST were significantly correlated on all of the creativity variables considered. Creativity was found to be a stronger predictor of FTP than academic achievement. Remote scores on the Consequences was significantly correlated with GPA while the remote scores on the FPST was not; the Length of Response Time was positively correlated with FPST while likelihood of event was negatively correlated with FPST.

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CHAPTER 1

INTRODUCTION AND PURPOSE

1.1 Introduuction

Adolescent Future Time Perspective (FTP) is receiving an increased amount of attention in the literature. Nurmi (1989) postulated that adolescents' initial independence and transition into adulthood enabled them for the first time to think about, and make plans regarding their future occupation, education and family. The tasks about which adolescents make decisions have been classified as "normative life tasks" (Havighurst, 1974). Successful accomplishment of these normative life tasks is usually regarded as the foundation for later personal development, happiness and success (Nurmi, 1989).

Adolescent FTP is important, and has attracted researchers working from different perspectives. Personality theorists and researchers have studied adolescents' FTP as a correlate of personality (Frank, 1939; Freud, 1953). Cognitive theorists studied adolescents' FTP as a cognitive trait and attributed differences in FTP to differences in cognitive development (Douvan and Adelson, 1966; Heimberg, 1963; Piaget and Inhelder, 1958). Differences in FTP have been argued to reflect differences

in achievement motivation (Agarwal and Tripathi, 1980; Devolder and Lens, 1982).

Within the cognitive domain, the relationship of other cognitive processes to the FTP of adolescents has not been fully explored. For example, the relationship between adolescent creativity and FTP has received very little attention. Studies and insight into the relationship between creativity and FTP are still preliminary and for the most part, exploratory. Existing evidence regarding the nature of this relationship has not yet been founded on a sound theoretical framework or empirical research.

A study of the relationship between creativity and Future Time Perspective is important when one considers the issues regarding values and means for planning positive future outcomes. Creativity has been speculated upon by educators as one of the several means by which positive future outcomes could be achieved. If these speculations are accurate, then efforts should be directed towards fostering adolescents' creative thinking as a means of preparing adolescents for future challenges that may face them in the increasingly complex and everchanging world.

1.2 Speculations on the Relationship Between Creativity and Future Time Perspective

Persuasive speculations exist which propagate the notion of a possible relationship between FTP and creativity. Polak (1973) wrote in his book, The Image of the Future that

> the image of the future that transforms the world invariably belongs to the creative minority of a society. The formation of such images of the future depends upon the awareness of the future that makes possible conscious, voluntary and responsible choices among alternatives (p.13).

Torrance, Williams and Torrance (1977) utilized Polak's proposed relationship between creativity and the future by instituting a program involving gifted children in future problem solving. The program consisted of 400 gifted and talented students selected on the basis of state wide competition for excellence in visual arts, communication arts, foreign languages, mathematics, music, natural and social sciences. In this program, called "The Futuristic Problem Solving Program," gifted students were presented with hypothetical future problems such as air and water pollution, and acid rain. They were asked to brainstorm ideas about solutions to these problems. Futhermore, these students were asked about their views concerning the future and how much they believed their actions could influence

their future. An evaluation reported by Torrance (1978) indicated that gifted students are futuristically oriented and believe that their actions can influence their futures. Adolescents in the program were reported to be more motivated than younger children in thinking about the future.

Torrance recommended, as did Toffler (1974), that a considerable part of the school curriculum be devoted towards helping students enlarge, enrich and make more positive their images of the future. Education in alternative and creative ways of thinking could be one such means of encouraging adolescents to explore future possibilities.

Another insight into the relationship between cognitive ability and FTP comes from the work of Mooney (1984). Mooney studied ability groupings of adolescents in relation to their self-perceptions and perceptions of the future. In this study, ability groupings of 260 students were made based on their academic performance in different subject areas. The gifted students were identifed as those students who performed at the highest levels in those subject areas. These students completed the creative personality instrument and also the future questionnaire. The results of this study showed that gifted students were more positive and optimistic about the future than non-gifted students.

Gifted students also believed that they have control over the future. Mooney commented that,

> With gifted students' abilities to see patterns and situations from varying perspectives, future studies have provided an excellent learning opportunity (p.61).

From the foregoing discussion, giftedness has been measured typically as academic achievement or excellence in a particular subject area. Creativity, on the other hand, is not limited to academic endeavours but includes other life processes in which an individual demonstrates originality of ideas that are useful to both the individual and the society. Unlike giftedness, creativity is not usually measured by ability tests but by creative tests specifically designed to elicit such creative behaviours.

Although creativity and giftedness are conceptually different as discussed above, both share similar characteristics: According to Barron (1988) creative as well as gifted individuals have the unique ability to recognize patterns and see things in new and different ways. Barron argued that creativity is an essential commodity for the solution of future problems that threaten the very existence of our society. It is essential in all fields of human endeavour.

Schwermann (1984) used the Form A of Torrance's Test of Creative Thinking (Torrance, 1962) for grouping students

involved in the "Minnesota Future Problem Solving Competition." This process was based on the general notion that creativity is an essential ingredient for effective future problem solving. Evaluation of the process failed to show a significant relationship between creativity and scores obtained in the future problem solving competition.

Schwermann's findings suggest that programs involving FTP and creativity operate mainly on intuitive grounds. It could be that group solutions to futuristic problems do differ from individual solutions to such problems. For example, Milgram and Milgram (1976) found that group scores on creativity tests are usually lower than individual scores on such tests. Given this finding, Schwermann's results could have been different if the individual rather than the group was the unit of analysis. More research is needed which will help provide adequate theoretical and empirical clarification of the proposed relationship between FTP and creativity. Theoretical generalizations will also help researchers interpret and communicate program results; and plan as well as implement effective programs in this area.

1.3 Statement of Purpose

The main purpose of this study was to investigate the relationship between the cognitive dimensions of creativity and FTP. To investigate this relationship a new measure of

FTP was developed. This measure was modeled after Guilford's divergent thinking approach to creativity, but unlike Guilford's (1967) "lenient" measures, the present instrument was based on realistic or "stringent" future problems.

Additionally, the present study was designed to seek preliminary construct validity of the new FTP instrument. The subjects' GPA as a measure of academic achievement was included in the study. The inclusion of GPA made possible comparisons between the relative strengths of creativity and academic achievement as predictors of FTP.

The relationship between the likelihood of future events and FTP was also investigated; this is because theoretically it could be assumed that the likelihood of occurance of the future problems presented may be a motivating factor in the subjects' generation of solutions. Finally the length of response time to solve the future problems was included in order to investigate the effect of time on the generation of solutions to future problems.

It is hoped that the results of this study will contribute to the clarification and understanding of the nature of the relationship between the cognitive dimensions of FTP and creativity. It is further hoped that this study will be the catalyst for empirical studies relating FTP and creativity.

1.4 Conceptual Framework

Future time perspective and creativity were viewed in the proposed research as interrelated cognitive constructs. An attempt was made to integrate Guilford's cognitive theory of creativity (Guilford, 1967) and Nurmi's (1989) cognitive model of adolescent FTP; the resulting theoretical framework constitutes the model for the present study.

Guilford's Theory of the Intellect represents one of the most persuasive cognitive theories of creativity. In his Structure of Intellect model, Guilford (1967) identified a range of cognitive abilities which he referred to as Divergent production (DP). Divergent production is defined by Guilford (1967) as "the efficient generation of numerous and varieties of ideas to meet a given question or problem" (p.1). Divergent production is a cognitive trait related to creativity. Individuals with this trait have the tendency toward greater fluency of ideation, flexibility, originality, elaboration and evaluation. There are two types of divergent productions: Semantic Units and Semantic Transformation. Ideational fluency is related to the Divergent Production of Semantic units which implies the efficient generation of numerous and useful ideas; while originality is related to the Divergent Production of Semantic Transformation which implies the generation of varieties and unusual ideas.

Instead of the rigid cognitive schedule that is characteristic of convergent thinking, Guilford stated that divergent thinkers seek more possibilities and alternatives toward the solution of problems. This tendency to explore alternatives and possibilities without restrictions leads to the production of large quantities (fluency) and varieties (flexibility) of ideas some of which are unusual (originality), but relevant (evaluation) to the problem (Guilford, 1967).

Guilford's Divergent Production model of creativity fits well with Nurmi's (1989) cognitive model of adolescent Future Time Perspective. Nurmi indicated that "one of the major functions of the cognitive schemata is to orient individuals to change in the context of future activities" (p.13). Since the future is itself vast and dynamic, effective future planning, according to Nurmi, requires a problem solving ability that enables an individual to perceive numerous and alternative futures, and also create different "action routes" leading to future goal accomplishments. Additionally, effective future oriented planning requires the evaluation of these ideas in order to consciously determine their effectiveness.

These two models are clearly conceptually related in that they both support the notion that ideational fluency,

flexibility, originality, and evaluation are integral to effective problem solving.

Extrapolating from these models of creativity and FTP, it was posited in the present study that the creative individual's ability to seek possibilities and alternatives in the face of a given problem predisposes him or her to be able to generate numerous future possibilities and alternatives towards the solution of future problems. The capability to generate numerous possibilities in one's future has been referred to as "density" by students of FTP (Kastenbaum, 1961). High density (fluency) means high Future Time Perspective, and high originality means high Creativity.

Creative individuals can foresee a more dense future (future ideation). They can mentally map out alternative paths to the solutions of future problems (flexibility),and also provide unusual (originality) but relevent solutions to the problems.

1.5 Research Questions

In the conceptual framework discussed above a relationship between FTP and creativity is hypothesized. To test this hypothesis, the results of the present study will

be directed towards investigating the following research questions:

1. What is the relationship between Creativity and Future Time Perspective?

2. What are the relative strenghts of creativity and academic achievement as predictors of Future Time Perspective.

3. What is the relationship of creativity measured on lenient and stringent problem solving tasks?

4. What is the relationship between the creativity score on the future problem solving task and

   a. Length of Response Time.
   b. Perceived Likelihood of Event.

CHAPTER 2

LITERATURE REVIEW

2.1 Future Time Perspective

Research in the area of FTP has been growing since the 1960s. Heimberg (1961) attributed the growth in this body of literature to the theoretical importance of this construct. The theoretical importance of FTP is well exemplified in the philosophical writings of Polak (1973). Polak wrote that,

> throughout history, "man" has never stopped to explore the boundary of the unknown, and the drive behind overstepping of the boundaries of the future is human creativity. (p.5)

Polak continued to argue that humans have the capacity to categorize and reorder reality and thus continuosly live in two worlds, the present and the imagined. Elaborating on Polak's perspectives, Plante (1975) indicated that because humans can live in both the present and the future, they have the ability to formulate likely and desirable long term possibilities and alternatives.

2.2 Developmental Studies of Future Time Perspective

Research based on the developmental aspects of adolescents' FTP suggests that as individuals move from childhood into adolesence, they become more aware and more

realistic about the future (Klineberg, 1967; Lessing, 1972; Moeker and Becker, 1971; Monks, 1968).

Monks (1968) studied the FTP of adolescents ranging in age from 14 to 21 years. Through the content analysis of the subjects' self-reports, he found that older adolescents showed greater complexity and differentiation of FTP than younger adolescents.

Moeker and Becker (1971), using interviews and questionnaires, asked high school students between the ages of 14 and 17 years to judge the optimal ages for marriage and childbearing. Their results showed that older students preferred a smaller number of children, and attributed a higher value to goals in the distant future; goals such as education and career.

Furthermore, Lessing (1972) found support for the hypothesis that an individual's cognitive perspective of the future increases with age. He studied the FTP of 168 girls between the ages of 9 and 15 years. These subjects were given measures of cognitive perspective developed by Heimberg (1963). He reported that younger children were involved in wishful fantasies and these children showed deficiencies in their abilities to differentiate the levels of "reality" from "irreality." Lessing's findings agree with Klineberg's (1967) conclusions that adolescence is

associated with increased reality in relation to thinking about the future, unlike childhood which is associated with unrealistic fantasies.

Contrary to the findings discussed above, Greene (1986) studied 60 adolescent males and females between the ages of 15 and 19 years. These subjects were stratified on the basis of sex and grade level. Cognitive advancement was measured using a balance beam task developed by Piaget and Inhelder (1958), and FTP was measured using density, and future events tasks developed by Kastenbaum (1961).
Results of this study failed to provide support for the age-related differences in FTP. The data suggested that an individual's experience and cognitive advancement are the major predictors of the number of future events which the individual is able to project. Blinn and Pike (1989) supported Greene's experiential basis for FTP when they reported no significant age-related differences in FTP between middle and late adolescence.

The inconsistency of the findings reviewed above may have occured as a result of the differences in the general focus of the studies. Some of these studies focused on the age-related differences while the others focused on the cognitive developmental and experiential basis for FTP. Both lines of study failed to recognize the effect of the interrelatedness of age, experience and cognitive

advancement on the FTP of the subjects. Empirical studies which investigate the interrelatedness of dimensions of FTP could provide a clearer notion of the developmental differnces associated with FTP.

2.3 Cognitive Motivational Studies of Future Time Perspective

Research into the cognitive motivational aspect of FTP is very limited. The few available studies focused on the relationship between academic performance and FTP. These studies have provided inconsistent results, while some of the studies have concluded that high achievers have a more extended FTP than low achievers, others found no relationship between academic achievement and FTP.

For example, Devolder and Lens (1982) studied 251 high school boys between the ages of 17 and 18 years. They assessed the subjects' FTP and academic achievement using measures of motivational goals and grade point average (GPA). Students' levels of study persistence were also measured by means of a questionnaire. Results revealed that high achievers had more persistence in studying than low achievers, and high achievers attached "higher valency" or higher importance to goals in the distant future than low achievers.

Devolder's findings agree with the earlier work of Lessing (1968). Lessing studied the relationship between FTP and sex, IQ, academic achievement and social class of elementary, middle and high school students. A Future Events Test was used to assess the FTP of these subjects; this test required subjects to list 10 future events and the ages at which such events might occur in their lives. Grade point average was used to measure academic achievement, and IQ tests were used to separate high from low achievers. The results from this investigation showed that both IQ level and academic achievement were positively related to longer and more dense FTP.

Kastenbaum (1961) also reported that FTP is positively related to intelligence. In his factor analytic study of the dimensions of FTP using 209 senior high school students, Kastenbaum included measures of IQ and personality. He found that "high scorers on the density of FTP tend to perform well on intelligence tests and exhibit preference for being free and spontaneous in their behaviour, and actually do behave in a manner judged by others as flexible and creative" (p.121). A closer look at the above findings suggests that the density of FTP could be related to both intelligence and creativity, this is because the attributes reported by Kastebaum seem to match closely with those

generally described in the literature as the characteristics of a creative personality.

Nurmi (1989) failed to find a positive relationship between FTP, intelligence, and academic achievement. The failure to find a positive relationship between the above variables could be a result of differences in the conceptualization of FTP. Nurmi's conceptualization of FTP differed markedly from those presented in the studies described ealier. Nurmi adopted a problem solving approach to FTP. Instead of a mere projection of events that has been generally used to define FTP, Nurmi presented a definition of FTP which includes a problem solving technique and strategy for reaching future goals. Nurmi identified three psychological processes that are charactistics of a problem solving model of FTP. These are: motivation, planning and evaluation. Motivation refers to the interest that people have in the future; planning refers to how these interests are planned and carried out; and evaluation refers to the extent to which the interests are expected to be realized.

A recent study carried out by Gillespie et al (1991), which utilized a problem-solving model of FTP, failed to find support for a positive relationship between academic achievement and FTP. This study supported Nurmi's findings and provided impetus for a problem-solving model of FTP.

In the above study, FTP was measured as the clarity of perceived future events as well as optimism and commitment to future goals, and comparison of the future to the present.

Studies utilizing the problem-solving model of FTP which have failed to find support for a positive relationship between FTP and academic performance, as well as IQ, support Nurmi's speculations that FTP and planning involve a higher level of cognitive ability and procedural knowledge beyond what intelligence tests and GPA can measure. He called for more research in this area; research that includes other cognitive processes which may predict FTP. One such cognitive process is creativity, and the primary purpose of the present study was to investigate the relationship between creativity and FTP using a problem-solving model.

2.4 Dimensions of Future Time Perspective

Part of the inconsistency in the FTP literature has been attributed to the different ways in which this construct has been defined and measured by different researchers. The concept of FTP has been referred to as "time sense," "time orientation," "future perspective", and "future orientation" (Heimberg, 1963).

Kastenbaum (1961) investigated the nature and dimensions of FTP. He identified four logically distinct dimensions of FTP commonly used in literature and investigated their interrelatedness. These dimensions included extension, density, coherence and realism. Extension was defined as how far ahead one can extend his or her future perceptions; Density was defined as the quantity of the images of the future. Coherence was defined as how well organized an individual's views of the future appear to be and Realism was defined as a match between goal-oriented activity and views of the future.

These four dimensions of FTP, though distinct, have been shown by Kastenbaum to share a common factor which suggests that there is a generalized concern for future events and experiences no matter the terms used to describe such an experience. In the present study, the generalized definition of FTP advanced by Lewin (1942) is adopted. Lewin defined FTP as the totality of an individual's views of his or her past and future.

Density of FTP was the focus of the present study as well as the interrelationship between density and the divergent thinking process of creativity.

2.5 Creativity

A unified conceptualization of creativity is a very difficult task. Brown (1989) made an observation that creativity has been studied from many different and sometimes incompatible theoretical perspectives. The different methodological approaches used to study creativity emerge from the different assumptions regarding the nature of creativity.

Although creativity has been studied differently by various researchers, four dimensions of this construct have been consistently identified: the creative person, the creative process, the creative product, and the creative situation (Mackinnon, 1970).

In the present study, the creative process was studied using Guilford's (1967) Divergent Thinking approach to the study of creativity.

2.6 Creativity and Divergent Thinking

The divergent thinking approach to the study of creativity has been the most widely used in the literature (Hocevar, 1981). This approach involves the identification of various cognitive skills based on Guilford's Structure of Intellect Model that are collectively labeled as divergent thinking skills. Guilford (1967) argued that these

divergent skills are correlates of creativity and can successfully be used to identify creative individuals.

Originality of thought refers to unusual or statistically infrequent responses. Ideational fluency refers to the generation of numerous but relevant responses. These two are among the skills identified by Guilford and his collegues as divergent correlates of creativity.

Research as well as the assessment devices that have emerged from Guilford's divergent thinking approach to creativity provided support for Guilford's position. These studies have employed ideational fluency tasks and also measures of originality in their assessment of creativity. Creative individuals have been consistently identified as possessing a high potential for both ideational fluency and originality. One of the tests based on Guilford's divergent thinking approach is called Consequences (Christensen, Guilford and Merrifield, 1958). Consequences consists of a five-item test in which fantasy situations are presented to the subjects who are encouraged to generate large numbers of ideas in response to these situations. Using Consequences, many investigators have been able to successfully identify creative individuals.

For example, Eisenstadts (1966) used Consequences to study the problem-solving ability of creative and non-creative college students. The total sample for the study consisted of 231 liberal arts students who were placed into four subgroups based on their performance on Consequences and other tests. The problem-solving abilities of these subjects were assessed using different forms of puzzles. Results showed that the creative group demonstrated the ability to produce faster solutions to the problems as well as increased numbers of solutions.

Furthermore, Goor and Sommerfield (1975) employed Consequences in the assessment of the verbal problem-solving processes of 52 college freshmen. The subjects' verbal responses to the problem-solving tasks were tape recorded and analyzed. The authors concluded that high creatives were better able to generate new information at a faster rate than low creatives.

Other studies which utilized Consequences to investigate the relationship between creativity and other personality variables found that high creatives were high in originality, cognitive flexibility, social presence and self-acceptance (Barron, 1955; Garwood, 1972).

2.7 Studies on Adolescent Creativity

Most of the research on creativity has centered either on the childhood or adult years with an obvious gap in the adolescent years. Torrance (1962) made this observation when he wrote that

> Of the different educational levels, the adolescent years have perhaps been the most neglected in creativity research. Information has accumulated concerning the preschool and elementary school years because of interest in creative imagination. Apparently, educators have not had much interest in the creative imagination of adolescents or high school students. Information has accumulated concerning creativity during the college years or adulthood, because many outstanding creative scientists, writers and performers of many kinds began their productivity during these years, and because it has been deemed appropriate for colleges to produce professionally trained people who will make creative contributions (p.29).

Little research exists in the area of adolescent creativity. In one of the few dated but well supported studies, Getzels and Jackson (1962) used IQ measures and a modified version of Guilford's creativity measure to study differing characteristics of intelligent and creative adolescents.

Their study showed that adolescents with high IQ's but low in creativity were more convergent, more conforming, and endorsed conventional standards in their approach to problems. Those high in creativity with high or average IQ scores tended to diverge from conventional standards and

stereotypes and perceive problems from perspectives that were usually different from the model provided by the teacher.

Getzels and Jackson's study with adolescents has been widely supported by other researchers in this area. Garwood (1964) using Guilford's tests of creativity found that high creatives are more original, more flexible and more independent than low creatives. Furthermore, Cashdan and Welsh (1966), and also Torrance and Dauw (1966), concluded from their results that creative individuals show a high degree of originality, flexibility, independence, and non-comformity. Highly creative adolescents are open to experience and seek change in their environments.

Recent research using Guilford's Consequences also endorses the assertion that high creatives show high originality in thinking. Jaquish (1984) administered Consequences to 45 adolescents to study their phenomenological complexity and originality. Phenomenological complexity referred to the capacity of an individual to recognize and process information in finer and richer details. This process was measured using the autobiographical data composed by the participants. Originality was scored as the statistical rareness of responses using Consequences. He concluded that adolescents high in creativity are also high in originality, and these

individuals organize, encode and reflect upon information derived from life experience in phenomenologically complex ways.

2.8 Creativity and Future Time Perspective

Research in creativity, though highly diversified, asserts that creative individuals in all stages of human development possess a high degree of divergence in thinking, originality, flexibility, fluency, openness to experience and ability to organize information in a highly complex manner. Thus creative individuals are able to liberate their thinking from the conventional stereotypical models and explore opportunities and possibilities in new and unconventional ways. Because creative individuals possess these abilities, educators have continued to speculate on possible theoretical relationships between creativity and views of the future. The purpose of the present study was to investigate the nature of the proposed relationship between creativity and FTP.

CHAPTER 3

METHODOLOGY

3.1 Sampling and Data Collection

Sample Characteristics

The sample for this study consisted of a total of 135 college students enrolled in a basic required class at a large southern university. The subjects were all female caucasians and represented students from different majors across the university. The subjects ranged in age from 18 through 25 years with a mean age of 19 years (SD = 1.09). Subjects were either single, engaged or involved in a serious relationship but not married.

Subjects were volunteer students who were asked to complete the tasks anonymously. All participants were instructed on how to complete the tasks. The study was conducted in two parts: the first session was conducted in class and involved the completion of Consequences and a demographic information sheet. The second session was conducted out of class and involved the completion of Future Problem Solving Task (FPST) and related information.

3.2 Measurement

Consequences

Creativity was assessed using Consequences. Consequences is a 5-item divergent task developed by Christensen, Guilford, and Merrifield (1958). Consequences has been validated following years of factor analytic studies by Guilford and his colleagues (see Chapter 2, see also Guilford, 1967).

Consequences was designed to challenge subjects to generate large quantities of ideas in connection with new and unusual situations. For example, subjects are asked to enumerate different solutions to the following problems; the questions were timed and the participants spent two minutes on each question:

#1 "What would be the consequences if it appeared that within three months the entire surface of the earth would be covered with water, except for a few of the highest mountain peaks?"

#2 "What would be the consequences if everyone suddenly lost the ability to read and write?"

#3 "What would be the consequences if human life continued on earth without death?"

#4 "What would be the consequences if the force of gravity were suddenly cut in half?"

#5 "What would be the consequences if suddenly no one could use their arms and hands?"

All of the subjects' relevant responses to the questions presented in this instrument were coded; while irrelevant responses and duplicate answers were discarded. An irrelevant response was subjectively considered as that response that appeared to be totally unrelated to the question; a duplicate response was that which was repeated by the subject either verbatim or in essence.

All relevant responses were scored under two major categories; obvious and remote. Any response which made up 5% or less of the total number of the group's responses was considered remote, remote or original responses were those responses that were statistically infrequent. The remote responses represent the key measure of creativity for the present study. The obvious responses were those responses which appeared more than 5% of the total number of responses; these were the frequent or the common responses. Fluency scores were calculated by adding the number of remote and obvious scores for each subject.

Future Case Study

The Future Problem Solving Task (FPST) was a newly developed ecological measure of FTP modeled after the divergent approach of Guilford's Consequences. This measure

was ecologically based and focused on the "real life" constraints that adolescents may encounter in the future. It was not timed. It involved asking subjects to generate as many solutions as possible to two separate yet related problems dealing with parenthood and career mobility. In line with the Hocevar (1981) and Richard, Kinney, Benet and Mrezel (1988) observations, real-life activities avoid the pitfalls of artificial measurement situations designed to elicit creative behaviors. The FPST was used to assess the subject's ability to generate solutions to future interpersonal and career mobility problems in creative ways.

Case Study 1. **Case #1 was intended to elicit obvious as well as original solutions to the following problem :**

> Imagine you are about to get married. You and your fiance have a problem. One of you is career oriented and wants to postpone having children. The other is not very career oriented and does not want to postpone having children. What different solutions are available to you?

Case Study 2. **Case #2 was designed to elicit obvious and original solutions to problems related to the subject's professional career. The subjects were asked to respond to the following problem:**

> Imagine you have graduated from college and have worked in a professional position in your hometown for several years. You recently were offered your "dream job" but it is in a distant city. What different solutions are available to you?

Scoring the Future Case study 1 and 2. All relevant responses were scored for case study 1 and case study 2. The reponses were coded as remote or obvious. Fluency scores (remote plus obvious) were also calculated for each case study. Case study 1 and 2 were sufficiently correlated in all of the variables, and thus were combined to form a single variable called the Future Problem Solving Task (FPST). Fluency scores represent the key score for the FPST because fluency is synonymous with density as it is used in the measurement of FTP.

Measurement of other variables

Grade Point Average. Academic achievement was measured by the subjects' grade point averages computed on a 4-point scale. The grade point averages were self-reported and the mean GPA was 2.80 (*SD* = .88). The subjects' responses were coded under the following categories:

1) Below 2.00
2) 2.00-2.49
3) 2.50-2.99
4) 3.00-3.49
5) 3.50-4.00

Length of Response Time. Completion of the Consequences occurred in class and was timed according to the instructions given in the manual. The FPST was completed

individually out of class and the subjects were asked to record the length of time they took to answer the questions. Time 1 was coded for the FPST #1 and Time 2 was coded for the FPST #2. Time 1 and Time 2 were significantly correlated ($r = .60$, $p < .001$) and were combined to form the variable "Lenght of Response Time" which was coded under the following categories:

1) under 5 minutes
2) 5-10 minutes
3) over 10 minutes

Perceived Likelihood of Event. Participants were asked to indicate the degree to which each of the two events projected on the Future problem solving tasks were likely to occur in their lives. These events relate to future interpersonal and career mobility problems. The responses to each of the questions were coded on a 4-point likelihood scale ranging from extremely likely to extremely unlikely. The scores obtained on the likelihood scale for both events were statistically significant ($r = .20$ $p < .01$) and were combined to form the variable "Percieved Likelihood".

3.3 Data Analysis

The data were analysed using Pearson Product Moment Correlation Coefficient. Partial correlations were used to control for variables such as GPA.

CHAPTER 4

RESULTS

The intercorrelations among the five subscales of the Consequences were statistically significant (see Table 1 parts a & b). Also the correlations between the subscales of the Future Problem Solving Tasks were significant: The obvious scores on case 1 and case 2 were significantly correlated ($r = .37$, $p<.01$); and the remote scores on case 1 and case 2 were also significantly correlated ($r = .43$, $p<.001$). Based on this data a number of subscales were combined. The obvious responses on the Consequences were combined to form one variable. The remote responses on the Consequences were also combined into one variable. The obvious responses for the two cases for the Future Problem Solving Task were combined into a single variable and also the remote responses on the Future Problem Solving Tasks were combined into a single variable. The obvious and the remote responses on the Consequences were combined to form the fluency scores on the Consequences, and the obvious and remote responses were pooled and represented the fluency scores on the Future Problem Solving Task. As Table 2 shows, on both measures, subjects gave more obvious than remote responses. They also gave more responses on the Consequences than the Future Problem Solving Task.

Table 1

Correlations For the Responses on the Subscales of Consequences

	Problem				
Problem	1	2	3	4	5
(a) Obvious Consequences					
1		.31***	.26**	.38***	.11
2			.27**	.46***	.40***
3				.31**	.19*
4					.25**
5					
(b) Remote Consequences					
1		.38***	.36***	.28**	.12
2			.39***	.27**	.28**
3				.44***	.29**
4					.42***
5					

(a) Note: N = 116; ***P < .001
**P < .01
*P < .05

(b) Note: N = 72; ***P < .001
**P < .01

It is important to note that these analysis included only the subjects who gave at least one obvious or at least one remote response to each of the problems posed on the Consequences and the Future Problem Solving Tasks.

Table 2

The Range, Means and Standard Deviations for Consequences and FPST

Variables	Range	Mean	SD	N
Consequences				
Obvious	8-34	18.00	5.35	116
Remote	7-32	15.80	5.57	72
Future Problem Solving Task				
Obvious	16	7.42	2.50	131
Remote	2-19	5.35	3.25	70

4.1 Results From the Multitrait-Multimethod Approach

The major variables of interest for the present study were ideational fluency, obvious (popular) responses, remote (original) responses, grade point average (GPA), length of response time, and perceived likelihood of event.

Correlations of the scores obtained from Consequences and FPST are shown in Table 3. Results showed that the obvious scores for both measures were significantly correlated .20 ($p < .01$); the remote scores for both measures were significantly correlated .32 ($p < .01$); and the fluency scores had a significant correlation of .39 ($p < .005$).

Table 3

The Multitrait-Multimethod Matrix for the Creativity Measures

	Consequences			Future Problem Solving Task		
	Obvious	Remote	Fluency	Obvious	Remote	Fluency
Consequences						
Obvious	.34**	.83***		.20*	.24*	.24*
Remote		.80***		.30*	.32*	.36**
Fluency				.35**	.30*	.39**
Future Problem Solving Task						
Obvious					.54***	.84***
Remote						.91***
Fluency						

Note: N = 135; ***P < .001
**P < .01
**P < .05

The results suggest that these measures show considerable agreement in their measurement of creative thinking, in other words, the measures demonstrate convergent validity according to the conditions outlined by Campbell and Fiske (1959).

4.2 The Role of Ideational Fluency

It is important to note the high correlations betweeen the ideational fluency scores (quantity of response) and the originality scores (quality of response) for these two measures, .80 for Consequences and .91 for FPST. Other researchers have documented similar high correlations between quantity and quality of responses on the Consequences and other creativity measures (Mednick, 1962; Milgram and Milgram, 1976; Moran, Milgram, Sawyers and Fu, 1983).

Mednick (1962) theorized that fluency plays a facilitative role in the generation of original responses. According to Mednick, an individual with a tendency for generating many potential solutions to a problem is also highly likely to produce more original solutions. Usually these original solutions occur towards the end of the response hierarchy.

Conversely, this strong relationship between originality and ideational fluency scores affects the validity of both measures depending on the method of scoring (see Hocevar, 1981). For example, when the fluency score is derived from the composite score of remote and the obvious responses, and compared with the originality score alone, a confounding effect for fluency on the remote score may

become a problem in the assesment of the validity of originality scores (see Moran et al, 1983). Because of the potentiality of this confounding effect for the present study, the obvious and the remote scores were considered independently in further analysis and discussion.

4.3 Relationship Between Creativity and the Future Problem Solving Task

The remote scores on the Consequences were the key measure of creativity for the present study. This score was significantly correlated with the fluency score on the Future Problem Solving Task which was the key measure of Density ($r = .33$, $p < .05$). This correlation provided the answer to the first question posed in the present study, and provided evidence in support of the hypothesis that creativity is related to future problem solving. Creative individuals in the present study have demonstrated the ability to generate numerous and original responses to the solution of future interpersonal and career mobility problems.

4.4 The Relative Strengths of Creativity and GPA as Predictors of Scores on the FPST

Data presented in Table 4 show that there is no significant correlation between the fluency (density) scores

on the Future Problem Solving Task and GPA. This finding suggests that GPA is not related to future problem solving, and thus provides support for previous findings utilizing the problem-solving model of FTP which failed to find positive correlations between FTP and GPA (Nurmi, 1989; Gillespie, kim and Schulenberg, 1991).

Table 4

Pearson Correlation Coefficients for GPA, RESPONSE TIME, PERCEIVED LIKELIHOOD and the CREATIVITY VARIABLES

CONSEQUENCES	GPA	TIME	PERCEIVED LIKELIHOOD
Obvious	-.18	-------	-------
Remote	.31*	-------	-------
Fluency	-.03	-------	-------
Future Problem Solving Task			
Obvious	-.04	.36*	-.16*
Remote	-.02	.22*	-.23*
Fluency	-.10	.28*	-.22*

Note: N = 135; *P < .05

Further analysis of the result using Fisher's R to Z transformation score to test the strength of the differences in the relationship between Creativity and FPST, and the relationship between GPA and FPST revealed that there is a significant difference between these relationships (Z =

5.05, $p < .01$). In other words it was creativity and not GPA that predicted the scores on the FPST.

4.5 Relationship Between the Creative Scores on Consequences, FPST and GPA

Additional findings in Table 4 relating creativity to GPA revealed that GPA is positively correlated with the remote scores on the Consequences but not the FPST. Theoretically a perfect measure of creativity is not expected to be correlated with measures of academic performance (Wallach and Kogan, 1965). Table 5 shows that the correlation between the remote scores for FPST and consequences were unaffected when GPA was controlled, but the correlation for the obvious scores became non-significant when GPA was partialled out. This finding provides support that the remote score is the key measure of creativity. Since the remote score on the FPST is not related to GPA as shown in Table 4, FPST could be assumed to be a stronger measure of creativity than Consequences. Additionally FPST could become a useful instrument for measuring creativity in the FTP research.

Table 5

Correlations for Consequences and FPST Before and After GPA is controlled

Variables	Before	After	Controlling for
Obvious	.24*	.12	GPA
Remote	.32*	.34*	GPA

Note: *P < .05

4.6 Relationship between the Creativity scores on the Future Problem Solving Tasks and Length of Response Time

Results presented in Table 4 show that all of the scores on the FPST were significantly and positively related to time, with correlations of.22 ($p<.05$), for the obvious scores; .28 ($p<.01$) for the remote scores; and .36 ($p< .005$) for the fluency scores. This result indicates that the longer the time, the more likely it is that there will be an increase in the quantity as well as the quality of responses given by the subjects.

It is possible that the correlation between the length of response time and the remote responses was because original responses usually occur towards the end of the response hierarchy (Mednick, 1962). According to this model, it takes a longer time for original answers to emerge

because the respondent usually begins with those responses with which he or she is most familiar.

The above findings have very strong implications for creativity tests which are administered under rigid time schedules and conditions. This is because such tests deny the participants the freedom as well as the necessary time period that are conducive to creative thinking.

4.7 Relationship between the Creativity Scores on the Future Problem Solving Task and Perceived Likelihood of Events

The relationship between perceived likelihood or salience of an event, and future orientation has been discussed by Seginer (1988). Seginer concluded from her study that the likelihood of occurrance of a particular event serves as a cognitive motivational factor. When an individual sees events as likely to occur in his or her life, there is a tendency to direct energy in pursuit of or towards the solution of the problems associated with such events. For example, in her cross cultural study of adolescent future time perspective, Seginer reported that Arab adolescent females see education as a means of achieving personal development and future career, and hence these adolescents are usually very concerned about education and focus their energies on obtaining higher education.

Furthermore, Devolder and Lens (1982) reported in their study of the cognitive-motivational dimensions of academic achievement and FTP that the degree to which the students perceive the likelihood of obtaining higher grades, and the significance which they attach to such grades are related to their study persistence.

In light of the above findings and discussion, it was expected that the adolescents who see the events projected in the present study as likely or extremely likely to occur in their lives would be more motivated to respond to the questions than the adolescents who did not see these events as likely to occur in their lives. For the present study about 60% of the sample saw the events projected in the FPST as likely to occur in their lives (see Table 6). An investigation of the relationship between likelihood and the remote, obvious and fluency scores on the FPST showed a negative relationship between these variables and perceived likelihood of the event (see Table 4).

Given the preceeding discussion these findings were unanticipated. However, a close examination of the results revealed that this finding is logically sound. The FPST represents a real life, stringent, nonfantasy-oriented measure which may evoke a stringent criteria by which the subjects evaluate acceptable responses. For the subjects who see these events as happening in their lives (as it is

with about 60% of the sample in the present study), there is a tendency to cut off fantasy and wishful responses and focus only on those responses which are realistic and workable in real life situations. Because of this tendency to exclude unrealistic responses, the quantity as well as the quality of responses will decrease with increasing level of likelihood of occurrance of the events. Milgram and Arad (1981) noted that in all ideational fluency measures, most of which are artificially designed, all responses are usually potential solutions to the test problems because of the lenient standard of what constitutes a solution. However the situation is different in typical real life settings where problems are more clearly defined and subjects are aware of what constitutes a realistic solution to the problems. An advantage which could be derived from the use of real life settings in the measurement of adolescent creativity is that real life situations may have a built in control for wishful fantasies and unrealistic responses. Thus real life settings could become a useful alternative for the measurement of creative thinking.

Table 6

Perceived Likelihood of FPST Events

FPST#	Value	Frequency	Percentage
1	Extremely likely	14	10
	Likely	67	50
	Unlikely	51	38
	Extremely Unlikely	3	2
2	Extremely Likely	15	11
	Likely	59	44
	Unlikely	52	38
	Extremely Unlikely	2	1

Note: N = 135

CHAPTER 5

DISCUSSION AND CONCLUSION

5.1 Implications for Research

One of the major findings of the present study is the demonstration that the cognitive dimensions of FTP and creativity are interrrelated, especially with regards to adolescents' divergent thinking approaches to problem solving. The study found support for the conceptual framework developed and used for the present investgation. In the conceptual framework, the researcher presented the idea that both Guilford's cognitive model of creativity and Nurmi's problem solving model of FTP emphasize the notion that ideational fluency and originality, among other cognitive skills, are integral parts of effective problem solving. This notion was supported by findings from this study as a significant relationship existed between Guilford's Consequences and the realistic FPST. Additionally, the correlations between the remote score on Consequences (which was the key score for creativity), and the fluency score on the FPST (which was the key score for density) suggested that creativity is related to FTP. The strength of this relationship revealed by Fisher's Z-score further suggests that creativity is a stronger predictor of FTP than academic achievement.

In the light of these findings, the problem solving approach to the study of adolescent FTP demands the use of adolescents' creativity. It is the creative adolescent who foresees numerous future alternatives and responds uniquely to future problems. Previous studies which conceptualized FTP only as the prospective span of future events have failed to recognize the role of other cognitive processes that may bring to bear on the differences in adolescent FTP. Nurmi (1989) indicated that the future presents a life-planning and problem solving context; if this is so, conceptaulization of adolescent FTP only as the prospective span of future events may not be an adequate criteria for assessing FTP, and also for distinguishing adolescents who are better prepared than others to cope with future crises and challenges. Future research needs to incorporate alternative measures of FTP that include the different dimensions of cognitive functioning.

5.2 Implications for School Curriculum and Programs

Too often schools have focused solely on academic achievement as the means of preparing young people to face the challenges of the future. The present findings suggest that creativity plays an important role in the adolescents' ability to solve future problems. Unlike the convergent thinking processes which is usually assessed by academic

achievement and intelligence, creativity bears on an individual's ability to seek numerous alternatives and possibilities (Guilford, 1967). Since the future is unknown, the school curriculum which challenges students to think in terms of numerous alternatives, and various approaches to problem solving, may strengthen the abilities of the students to anticipate and adapt successfully to future challenges.

It is recommended, given the findings of the present study, that schools should be reoriented, and a significant part of the school curriculum should be directed towards the teaching of creative thinking.

Numerous programs which are involved in training children to think creatively have reported that such training is possible and yields positive gains to the participants (see Torrance, 1977). The present findings have added a core of credibility to programs of FTP and creativity which report that creative individuals can also solve real-life future oriented problems.

5.3 The Effect of Testing Conditions on the Assessment of Creativity.

Wallach and Kogan's analysis of Guilford's tests of divergent thinking revealed that these tests are

significantly correlated with GPA and tests of general intelligence. These authors indicated that such high correlations "leave open the question of whether intelligence and creativity can be more accurately described as sharing one psycological domain or as referring to relatively distinct psychological functions" (p.1). The findings from this study which indicate a significant and positive correlation between GPA and the remote scores on Consequences suggest that Consequences may not be a very strong measure of creativity.

Addressing this issue, Wallach and Kogan (1965) persuasively argued that the context and procedures in which creativity tests are administered influence the results obtained; especially regarding the issue of whether the results will or will not be correlated to measures of general intelligence. Wallach and Kogan found from their study that:

> when the procedures designed to assess creativity involve some kind of explicit or implicit temporal constraint, and a test or examination atmosphere with it's strong implications of evaluation, then such tests are highly likely to correlate with scores of intelligence and achievement tests; on the other hand a test of creativity which requires a frame of reference which is relatively free from the coercion of time limits and the stress of knowing that one's behaviour is under close evaluation may yield scores that are more distinct from the scores of intelligence tests (p.24).

The finding from the present study supported Wallach and Kogan's position in that Consequences was timed and also conducted in class in a situation resembling a test or examination atmosphere, while FPST was untimed, and conducted out of class providing the subjects with the degree of freedom which is necessary for the manifestation of creative behavior.

5.4 Limitations

The generalizability of this study is limited by the choice of the convienient college sample which is not representative of the general population of adolescents. The subjects were female Caucasians and hence the generalizability of findings to other groups and settings is severely hampered. These subjects were also older than those in most studies focusing on the relationship of cognitive variables to FTP which may or may not be a relevant factor.

Correlational analysis of results for the present study was based on categorical data for GPA and Length of Response Time. Given that correlational analysis is not very effective for categorical data, cautions are exercised in the interpretation of findings presented. The use of categorical data may have resulted in some Type II errors. Despite these limitations the present findings did support the results of other studies in this area.

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APPENDIX

CONSEQUENCES

Directions: This is a test of your ability to think of a large number of ideas in connection with a new and unusual situation. The following are five different situations. Each question is on a separate page and is followed by four sample answers. You will be given two minutes to answer each question. Write as many different consequences or possible results as you can. Your answers need not be complete sentences. Your score will be based on the total number of DIFFERENT consequences or results you give for each question in the given time.

STOP HERE AND WAIT FOR FURTHER INSTRUCTIONS

#1 LIST AS MANY DIFFERENT CONSEQUENCES AS YOU CAN

What would be the consequences if it appeared certain that within three months the entire surface of the earth would be covered with water, except for a few of the highest mountain peaks?

a. Everyone would move to mountain peaks
b. Increased sales of boats
c. Business failure
d. Panic

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

9._____

10._____

11._____

12._____

13._____

14._____

15._____

16._____

17._____

18._____

19._____

20._____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

#2 LIST AS MANY CONSEQUENCES AS YOU CAN

What would be the consequences if everyone suddenly lost the ability to read and write?

a. no newspapers or magazines
b. no libraries
c. no mail or letters
d. television sales increase

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

9._____

10._____

11._____

12._____

13._____

14._____

15._____

16._____

17._____

18._____

19._____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

#3 LIST AS MANY CONSEQUENCES AS YOU CAN

What would be the consequences if human life continued on earth without death?

a. overpopulation
b. more old people
c. housing shortage
d. no more funerals

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

9._____

10._____

11._____

12._____

13._____

14._____

15._____

16._____

17._____

18._____

19._____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

#4 LIST AS MANY CONSEQUENCES AS YOU CAN

What would be the consequences if the force of gravity were suddenly cut in half?

a. jump higher
b. more accidents
c. less effort to work
d. easier to lift things

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

9._____

10._____

11._____

12._____

13._____

14._____

15._____

16._____

17._____

18._____

19._____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

#5 LIST AS MANY CONSEQUENCES AS YOU CAN

What would be the consequences if suddenly no one could use their arms or hands?

a. learn to use feet more
b. no need for gloves
c. clothing would be changed
d. couldn't drive cars

1._____

2._____

3._____

4._____

5._____

6._____

7._____

8._____

9._____

10._____

11._____

12._____

13._____

14._____

15._____

16._____

17._____

18._____

19._____

STOP HERE. WAIT FOR FURTHER INSTRUCTIONS

INSTRUCTIONS FOR COMPLETING PART II

THE FOLLOWING INSTRUCTIONS ARE VERY IMPORTANT FOR COMPLETING PART II. PLEASE BE SURE YOU FOLLOW THEM.

1) Please complete all of the questions without stopping. Write the time you started and the time you stopped on the answer sheets.

2) Do not consult with anyone about your answers.

3) Return your answers by _____.

4) Do NOT detach the first page with your name and social security number from your answers until told to do so.

THANK YOU!!!!!!!

THINK ABOUT YOUR LIFE IN THE FUTURE . . .

Below are two case studies about problems you may face in the future. Read each case study and then write as many solutions to the problems as you can on the lines below. There are no right or wrong answers. Take as long as you need to complete this.

Starting time _____

Case #1

Imagine you are about to be married. You and your fiance have a problem. One of you is very career oriented and wants to postpone having children. The other is not very career oriented and does not want to postpone having children. What different solutions are available to you?

1._____

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2._____

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3._____

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4._____

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19. _____

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20. _____

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26. Which person in the story are you more like: (circle one)
    a. career oriented person
    b. not career oriented person

    Please explain why you answered this way:

Starting time _____

Case #2

Imagine you have graduated from college and have worked in a professional position in your hometown for several years. You recently were offered your "dream job" but it is in a distant city. What different solutions are available to you?

1. _____

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2. _____

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22. _____

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21. _____

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22. _____

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23. _____

_____

Stopping time _____

24. How likely is it that you will have this problem in the future? (Circle one number)

1	2	3	4
extremely unlikely	unlikely	likely	extremely likely

Please explain why you answered this way:

25. If you answered #24 as 3 (likely) or 4 (extremely likely), at what approximate age will this problem occur?
_____ years

Please explain why you answered this way:

Age _____

Marital Status 1=married 2=never married 3=widowed/divorced

# of children _____

Major at UTK _____

College at UTK _____

Classification 1=freshman 2=sophomore 3=junior 4=senior
5=other

How religious are you? 1=very 2=moderately 3=not very

Your present religious denomination
_____

Gender 1=male 2=female

Race 1=White 2=Black 3=Oriental 4=Hispanic 5=other

Highest educational level completed by your father
1=elementary
2=high school
3=GED
4=vocational school
5=2-year college
6=B.S.
7=M.S.
8=Ph.D./M.D./J.D.

Highest educational level completed by your mother
1=elementary
2=high school
3=GED
4=vocational school
5=2-year college
6=B.S.
7=M.S.
8=Ph.D./M.D./J.D.

Current G.P.A. at UTK _____

Are your parents divorced? 1=yes 2=no

Are you currently engaged or involved in a serious relationship?
1=yes 2=no

VITA

Gloria Chineze Ononye was born in Onitsha, Nigeria. She graduated from a renowned Catholic High School in her hometown in 1976. She attended the University of Jos, Nigeria from 1978-1982 and obtained a Bachelors degree in Biology and Education in July of 1982.

Chi moved to Canada in 1983 to join her husband; while in Canada she earned a Masters degree in educational psychology from the University of Western Ontario, London, Canada. She was accepted as a doctoral student in 1986 in the College of Human Ecology, with a specialty in Child Development, and cognate in Education at the University of Tennessee, Knoxville.

As a graduate assistant, she gained a total of 4 years experience working with pre-school children, and supervising student teachers in the University of Tennessee Child Development Laboratories. She also assisted in teaching human ecology classes in her department. Chi obtained a Tenessee Teacher Certification in Biology and General Science Education, and has gained experience teaching middle and high school biology in the Knox County School System.

She holds membership in the National Education Association (NEA), Tennessee Education Association (TEA) and Tennessee Association on Young Children (TAYC).

Chi is married to Dr. Aloysius Ikechukwu Ononye and they have three children, Uchenna, Chiagozie and Olisaeloka.