INTRODUCTION
Teacher’s beliefs about mathematics have a powerful impact on the practice of teaching (Uusimaki and Nason, 2004; Charalambos, Philippou and Kyriakides, 2002, Ernest, 2000). It has been suggested that teachers with negative beliefs about mathematics influence a learned helplessness response from students, whereas the students of teachers with positive beliefs about mathematics enjoy successful mathematical experience that result in them seeing mathematics as a discourse worth-while of study (Karp, 1991). That is what goes on in the mathematics classroom may be directly related to the belief teachers hold about mathematics. Hence, it has been argued that teacher belief play a major role in their students achievement and in their formation of

SELF Efficacy, LOcus OF CONTROL, SELF ASSESSMENT OF MEMORY ABILITY AND STUDY HABIT AS PREDICTORS OF PRE-SERVICE TEACHERS ACHIEVEMENT IN MATHEMATICS.

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Abstract
It has been observed by several authors that students entering teacher education programs have preconceptions about teaching Mathematics based on their prior

Keywords: Self Efficacy, Locus of Control, Self-Assessment of Memory Ability, Study Habit, Achievement in Mathematics.
experiences as students. These experiences as it were create the intending teachers self-efficacy and belief about Mathematics which will eventually have a powerful impact on the practice of teaching, learning and over all achievement of their students in Mathematics. Therefore, this study is aimed at investigating self-efficacy, locus of control, self-assessment of memory ability and study habit as a predictor of pre-service teachers’ achievement in Mathematics. The design employed in this study is an ex-post facto type. The sample consists of 147 pre-services teachers purposively selected from two colleges of education within Oyo State. Four standardized instrument were used to collect data on Mathematics teaching efficacy belief, locus of control, memory self-efficacy and study habits. The reliability coefficients of each instrument used are stated thus: 0.69, 0.86, 0.90 and 0.88. Three research questions were proposed in the study and the data collected were analyzed with multiple regression. The study revealed that positive significant correlation (.427) exists between achievement in Mathematics and Locus of Control while a negative correlation (.467) exists between Achievement in Mathematics and Study Habit. Similarly it was observed that no significant correlation exist between self-efficacy, self assessment of memory ability and achievement in Mathematics respectively. Furthermore the regression analysis of the data revealed that the four predictor variables contributed 36.90% to achievement in Mathematics. The analysis of variance also yielded an F-ratio of 20.764 which was significant at 0.05 levels. Hence they are good predictors of achievement in Mathematics. In addition, the study also revealed the relative contributions of each of the independent variables to the prediction of achievement in Mathematics thus; self-efficacy (β=.146), Locus of control (β=.345), Study habit (β=-.458) and each was significant at 0.05 level, while self assessment of memory ability (β=.018) was not significant. Implications for pre-service Mathematics teacher education were also discussed.

beliefs and attitude towards mathematics (Emenaker, 1996). Addressing the causes of negative beliefs held by pre-service teacher education students about mathematics therefore is crucial for improving their teaching skills and the
mathematical learning of their students (Uusimaki and Nason, 2004). Reboli, and Holodick, (2002) reported that the national council of teachers of mathematics in its 1991 publication professional standards for teaching mathematics (NCTM, 1991) and the current mathematics program standards for the national council for accreditation of teacher education (NCATE, 1998) stress the importance of the disposition of the classroom teacher towards mathematics. They maintain that if students are to develop a disposition to do mathematics, it is essential that the teacher communicate a positive attitude towards mathematics. Additionally, teachers need to establish a supportive classroom learning environment that foster the confidence of students to learn mathematics.

Mathematics self-efficacy is a person’s beliefs or expectations about his/her capacity to accomplish certain mathematical task successfully. Confidence in learning mathematics and the perceived usefulness of mathematics, conceptual fore-runners to mathematics self-efficacy and outcome expectations, have consistently been found to predict Mathematics-related behavior and performance (Hackett, 1985; Reyes, 1984). Usually, however, mathematics confidence has been assessed globally by asking students general questions about their perceived mathematics abilities. These global measures cannot properly be called mathematics self-efficacy, however, as this construct must be assessed in terms specific to the criteria task. It is for this reason that research findings on mathematics confidence obtained prior to Bandura’s guidelines for self-efficacy assessment must be carefully interpreted, even though they were important in establishing the first confidence/performance relationships. Correlations in these studies ranged from as low as 0.20 to as high as 0.72 (e.g. Aiken, 1970a, 1970b, 1972, 1974; Armstrong, 1980; Hendel, 1980; Sherman, 1980; Smead & Chase, 1981).

Mathematics self-efficacy has more recently and more accurately been assessed in terms of individual’s judgments of their capabilities to solve specific mathematics problems, perform mathematics related tasks, and succeed in mathematics-related courses (Betz and Hackett, 1983). The growing career literature (Lent and Hackett, 1987) is especially concerned with the latter. Students entering teacher education programs have preconceptions about teaching mathematics based on their prior experiences as student (Bramald, Hardman, and Leat, 1995; Calderhead and Robson, 1991; Carter and Doyle, 1995; Thompson, 1992). These experiences are more likely to reflect traditional roles of teachers as dispenser of knowledge and students as receiver of knowledge. Current mathematics and science education reform efforts i.e. (National Council of teachers of mathematics, 2000), (National Research Council, 1996) Provide an
alternate view of instruction. In this vision, students are active constructors of their own mathematical knowledge and teachers facilitate this construction. Most teacher education programs encourage a reform vision and methods classes have been shown to influence pre-service teachers’ beliefs towards a reform vision of teaching mathematics and science (Hart, 2002, Wilkins and Brand, 2004). However, belief can also be barriers towards a reform vision such as pre-service teachers’ traditional views on teaching, their lack of mathematical knowledge rich in connections, and anxiety about doing mathematics becomes obstacles to learning alternate ways of teaching mathematics (Ball, 1990). The pre-service teachers’ epistemic belief (assumptions about the nature, limit and certainty of knowledge) or “ways of knowing” influence the way in which they interpret the information presented in college courses (Baxter Magolda and King, 2004), influence their ability to interpret the ideas fundamental to the teacher education program (Sutton, Cafarella, Shurvell and Bichrel, 1996) and influence their instructional decisions in clinical experience (Richardson, 1996). Therefore, understanding pre-service teachers’ epistemological beliefs are experts who provide black-and-white, right-or-wrong answers (Perry, 1970). They see their role as students as memorizing the right answers and giving them back upon request (Gallagher, 1998, Holt-Reynolds, 2000, Muis, 2004). This view would suggest that pre-service teachers are seeking a step-by-step approach to teaching mathematics from college and university educators. As pre-service teachers develop critical thinking skills and move towards a view of knowledge as contextual, rather than static, they are able to support their own opinion and are capable of viewing a problem from several paradigms (Gallagher, 1998). College educators strive to have their students recognize other perspectives and require viewpoints be supported with sound reasoning developed after critical reflection (Baxter Magolda and King, 2004, Perry, 1970). This critical reflection and emergence of one’s own voice suggests more mature levels of intellectual development in addition to the development of an internal locus of control (Baxter Magolda, 1992) Baxter Magolda, 1999, Baxter Magolda and King, 2004, Perry, 1970). Thus openness to the voice of others, seeing the value of listening to those dealing with the contexts and constraints of the classroom and adapting their recommendations to the classroom situation by the teachers is of paramount importance (Cooney, Shealy, and Arvold, 1998).

Locus of control is an individual’s generalized expectations concerning where control over subsequent events resides. As students mature, they acknowledge a variety of opinions but do not weigh their merits. When students support their opinion with reason and logic and no longer view authorities as the source of
knowledge, they have developed an internal locus of control. To encourage this development of an internal locus of control in mathematics, the teacher educator's role includes providing opportunities for students to grapple with problems, to develop connections between mathematical and scientific domains, and to develop connections between the classroom and the real world. At this point, the teacher educator is viewed as a facilitator and the pre-service teachers learning can be described as autonomous (Cooney and Shealy, 1997, Cooney et al, 1998; Szydlilc, Szyclilic, and Benson, 2003, Warfield, Wood, and Lehman, 2005). The development of an internal locus of control and thus autonomous learners is aligned with the inquiry-based approach to teaching mathematics and science supported by reform document (e.g. NCTM, 2000, NRC, 1996). In other words, teachers and students become learners and ask questions of themselves and others in order to understand the world in which they live. Learning experiences in mathematics and science methods courses should involve collaboration, experimentation, synthesis, and analysis of information, similar to what reform documents compel pre-service teachers to model in their future classrooms.

Self assessment of memory ability relate to a measure of general mental ability of an individual. Self-concept according to Ogundimu (1997) is the image an individual has of himself which is a composite of the beliefs he or she has about him/her self, including his/her physical, psychological, social and emotional characteristics, aspirations and achievements. Fayombo (2001) says self-concept embraces some other terms such as self-perception, self-image, self-rating, self-assessment, self-disclosure, self-value, self-worth, self evaluation and self esteem. All these according to her indicate the general assessment an individual consciously or unconsciously makes and customarily maintains with regards to the individual. In the same vein, Abosi (1986) affirms that how a person sees himself exercise a great deal of influence on his achievement and mental health. In other words; the way one perceives oneself forms the foundation of his thinking and of course determines one's view of the world. Developing and continuing to develop mathematics and science content knowledge is also dependent on pre-service Science teachers’ ability to critically reflect upon multiple view points (Cady, Meier and Lubinski, 2006a, 2006b). According to epistemological theories (Baxter Magolda, 1992, 1999; Baxter Magolda and King, 2004; Perry,1970), one must have developed an internal locus of control to function in this type of environment. So it is important for mathematics teacher educator to continually search for more personal factors that could hinder pre-service mathematics teacher from adequate delivery of instructions to their...
pupils. It is mandatory for teacher education courses to provide an audit of students' mathematical knowledge during their training. Some key research on the Subject Matter Knowledge (SMK) of pre-service teachers (e.g., Goulding, Rowland, & Barber, 2002; Rowland, Martyn, Barber, & Heal, 2001) informed item development in terms of tapping connected SMK including knowledge of (substantive) and knowledge about (syntactic) mathematics. Some researchers use professional assessments for beginning teachers as part of their teacher licensure process (Gitomer, Latham, & Ziomek, 1999). The widely-used PRAXIS (2003) pre-professional skills tests (PPST) for mathematics also informed test development. The emphasis in the PPST: Mathematics test is on interpretation rather than computation. Its questions are chosen from five categories: conceptual knowledge, procedural knowledge, representations of quantitative information, measurement and informal geometry, and formal mathematical reasoning in a quantitative context. Another area of research in meta-cognition and memory ability assessment examines the relations between individuals' evaluations of their cognition and actual learning outcomes. For example, individuals may be asked to assess the adequacy of their memory or comprehension of texts, and their self-assessments are examined in relation to actual memory or comprehension performance (Lin, Dewayne & Karen, 2004). Both meta-memory (meta-cognitive skills in memory) and meta-comprehension (meta-cognitive skills in comprehension) have accumulated a great deal of evidence on individuals' tendency to be overconfident in the assessments of their memory or comprehension performance (Lin et al., 2004). Students' own perceptions of their math skills and abilities are often considered as anecdotal evidence, rather than factual information that have been quantified. According to Bandura's (1986) social cognitive theory, individuals possess a self system that enables them to exercise a measure of control over their thoughts, feelings, motivation, and actions. This self system provides reference mechanisms and a set of sub-functions for perceiving, regulating, and evaluating behavior, which results from the interplay between the system and environmental sources of influence. As such, it serves a self-regulatory function by providing individuals with the capability to influence their own cognitive processes and actions and thus alter their environments. How people interpret the results of their own performance attainments informs and alters their environments and their self-beliefs and memory ability which, in turn, inform and alter subsequent performance. This is the foundation of Bandura's (1986) conception of reciprocal determinism, the view that (a) personal factors in the form of cognition (memory ability), affect, and biological events, (b) behavior, and (c) environmental
influences create interactions that result in a triadic reciprocality. In general, Bandura provided a view of human behavior in which the beliefs that people have about themselves and their memory ability are key elements in the exercise of control and personal agency and in which individuals are viewed both as products and as producers of their own environments and of their social systems. Bandura (1986) wrote that, through the process of self-reflection, individuals are able to evaluate their experiences and thought processes known as self-assessment of memory ability. According to this view, what people know, the skills they possess, or what they have previously accomplished are not always good predictors of subsequent attainments because the beliefs they hold about their capabilities and their memory ability powerfully influence the ways in which they will behave and also directly affect their achievements in life. Consequently, how people behave and their approaches in life are both mediated by their beliefs about their capabilities and memory ability can often be better predicted by these beliefs than by the results of their previous performances. This does not mean that people can accomplish tasks beyond their capabilities and memory ability simply by believing that they can, for competent functioning requires harmony between self-beliefs on the one hand and possessed skills and knowledge on the other. Rather, it means that self-perceptions of capability and memory ability help determine what individuals do with the knowledge and skills they have and their success and also their achievements (Schoenfeld, 1985). More important, self-efficacy beliefs are critical determinants of how well knowledge, skill and memory ability are acquired in the first place. The process of creating and using these self-beliefs which is a product of memory ability is an intuitive one: individuals engage in a behavior, interpret the results of their actions, use these interpretations to create and develop beliefs and approaches in life due to their capability to engage in subsequent behaviors in similar domains, and behave in concert with the beliefs created. In school, for example, the beliefs that students develop about their academic capabilities and memory ability help determine what they do with the knowledge and skills they have learned. Consequently, their academic performances and achievements are in part the result of what they come to believe that they have accomplished and can accomplish and also their memory ability. This helps explain why students' academic performances achievement may differ markedly when they have similar ability. Researchers have suggested that these self-beliefs may play a mediational role in relation to cognitive engagement and that enhancing them might lead to increased use of cognitive strategies that, in turn, lead to improve performance and achievements (Pintrich & De Groot, 1990). This
view of self-belief as a mediating construct in human behavior and achievement is consistent with those of numerous scholars and theorists who have argued that the potent evaluative nature of beliefs and memory ability make them a filter through which new phenomena are interpreted and subsequent behavior and the achievement of life mediated (Abelson, 1979; Calderhead & Robson, 1991; Lewis, 1990 and Pajares, 1992). Also there is another relationship between expectancy constructs and achievements. According to Frank (1996), expectancy constructs include task-specific self-concept, self-concept of ability, expectancies, expectancy beliefs, expectancy for success, performance expectancies, perceptions of competence, perceptions of task difficulty, self-perceptions of ability, ability perceptions, perceived ability, self-appraisals of ability, perceived control, subjective competence, and, of course, confidence. There is no reason why theorists should conceptualize expectancy beliefs in identical fashion or agree, without empirical evidence, that one construct is superior to others. It may be that one conceptualization and definition best explains the role that these judgments play in human motivation, behavior and success. Consequently, the process of normal science requires that differing conceptualizations be subjected to empirical investigation so that the most useful and explanatory one may emerge and others are "read out" of the discipline. Alternatively, it may be that differing judgments can be found to play differing roles, and so different expectancy constructs may well provide different insights. Such progress in the evolution of construct and theory might occur if theorists were better able to distinguish among the expectancy beliefs currently in use. That is not the case, however. Typically, most are defined in nearly identical fashion. Compare Boekaerts’ (1991) definition of subjective competence as "a person's knowledge, beliefs, and feelings about his capabilities and skills" with Byrne’s (1984) definition of self-concept as the self-perceptions that individuals have about their academic abilities, specifically, their "feelings and knowledge about [these] abilities [and] skills". Moreover, expectancy constructs are assessed with questions that, although similar, are just different enough to make comparing findings a formidable task. Contrast a perceived ability item, "I can do well on this exam," (Green & Miller, 1996) with one from math ability perceptions, "How have you been doing in math this year;" (Meece, Wigfield, & Eccles, 1990) or one from self-appraisal of ability, "How do you rate yourself in school ability compared with those in your grade at school?" (Felson, 1984). When these similarly conceptualized but differently operationalized self-perceptions of competence are differently used to suit specific research agendas, researchers are left with the imposing task of sifting through expectancy constructs, determining their
"decisive characteristics" (Bong, 1996), evaluating whether findings are consistent or inconsistent with theoretical tenets and prior research, and planning follow-up investigations. Problems are compounded when researchers identify inaccurately defined and used assessments of competence as "self-efficacy" perceptions. Consider also the confusion that centers on self-efficacy and self-concept (or self-esteem) beliefs. As is the case with self-efficacy and other expectancy constructs, the conceptual difference between self-efficacy and self-concept is not always clear to researchers or in investigations. Some researchers use the terms synonymously (Reyes, 1984); others describe self-concept as a generalized form of self-efficacy (Harter, 1990); still others define academic self-concept as self-perceptions of ability and suggest that one reason why these self-percepts affect performance and achievement is because of their effect on students’ effort, persistence, and anxiety (Felson, 1984). The two constructs differ primarily in that self-efficacy is a context-specific assessment of competence to perform a specific task, "an individual's judgment of his or her capabilities and memory ability to perform given actions" (Schunk, 1991). Self-concept is measured at a more general level of specificity and includes the evaluation of such competence and the feelings of self-worth associated with the behaviors in question.

Because self-perceptions of competence of ability are considered integral components of an individual's self-concept (Shavelson & Bolus, 1982), self-efficacy beliefs are often viewed simply as requisite judgments necessary to the creation of self-concept beliefs. Rosenberg and Kapland (1982) wrote that self-concept percepts include judgments of confidence, along with judgments of self-esteem, stability, and self-crystallization. Most academic outcomes are seldom as particularized as one’s capability and ability of the memory to solve specific problems or successfully accomplish specific tasks, the levels of specificity at which self-efficacy judgments are most predictive of academic performances.

Few researchers have explored the relationships among self-efficacy, self-concept, memory ability assessment and academic performances, and results are inconsistent. Marsh, Walker, & Debus (1991) compared the direct effect of achievement on the math memory ability, self-efficacy and memory ability of fifth graders and reported a stronger direct effect on memory ability than on self-efficacy. Chapman and Tunmer (1995) found that the reading performance of beginning readers during their first year of schooling had a stronger effect on their subsequent self-efficacy than on their reading self-concept. Such hypothesized relationships beg the question of which self belief and memory ability have stronger influences on achievement. Marsh (1990) assessed math
self-concept, math achievement, performance on a mathematics task, and self-efficacy for the task. Achievement correlated equally strongly with domain-specific self-efficacy and self-concept. Specific performance on the math task was more strongly correlated with specifically assessed memory ability which has effect on self-efficacy than with domain-specific self-concept. Pajares and Miller (1994) used path analysis and found that an item-specific math self-efficacy belief which is a result of memory ability were more predictive of a mathematics problem-solving than were domain-specific self-concept beliefs.

Study habit is a constellation of skills which includes reading, writing, time management, mathematics, note taking and test taking/preparation. There are many factors responsible for under achievement like, motivation, study habits, attitude towards teacher, attitudes towards education, school and home background, concentration, mental conflicts, level of aspiration, self-confidence, examination fear, etc. (Sirohi, 2004). Poor habits of study not only retard school progress but develop frustration, destroy initiative and confidence and make prominent the feeling of worthlessness towards himself and the subject of study whereas effective methods ensure success, happiness and sense of accomplishment (Smith & Littlefield, 1948). All too often students perform poorly in school simply because they lack good study habits. In many cases, students don’t know where to begin, don’t fully understand the material, are not motivated by it, or feel there was too much work given to them with too little time to complete or study it. If their studying skills do not improve, these students will continue to do poorly in test and not perform to their fullest. Therefore the pre-service teachers must be aware of the need to adopt good study habits to enhance optimum performance. Pre-service Teacher Education is the education and training provided to student teachers before they have undertaken any teaching. Before entering into any pre-service education most students will have obtained a previous degree, either a general or honors’, in a subject of their choice, (e.g. English, Math, Science, Religion). Pre-service teachers’ achievement in mathematics is a wide study which researchers have been embarking upon (Southwell & Penglase, 2005). There is a relationships between pre-service teachers’ beliefs about mathematics, its learning and teaching and their mathematical achievement (Perry, Way, Southwell, White, & Pattison, 2005), and relationships between pre-service teachers’ attitudes about mathematics and its teaching and their mathematical achievement (Southwell, White, Way, & Perry, 2006). A study involving both Australian and New Zealand pre-service teachers (Grootenboer & Lowrie, 2002) reported that the students’ affective responses to mathematics were generally more positive in the third year of the program than
they were in the first year. Using structural equation modeling, Reynolds and Walberg (1992) found a causal influence of achievement upon attitude, whereas Imai’s (1993) study presented findings which supported the opposite thus providing evidence of a two-way influence between attitudes toward mathematics and achievement of pre-service mathematics teachers. Mathematics achievement of pre-service teachers is influenced by many factors. When exploring the attitudes of pre-service teachers towards mathematics it is necessary not only to consider their attitudes towards mathematics, but also their attitudes towards the teaching of mathematics, because both have significant effect on mathematics achievements (Allan, Jenni, Bob & Beth., 2006).

The significance of research involving pre-service teachers’ mathematics achievements is important due to the potential influence of these people upon pupils. The experiences of pre-service teachers influence the formation of attitudes and these, in turn, influence their classroom practices. These attitudes and practices may sometimes be at variance with the main direction of their tertiary teaching methods courses. Thus it is crucial in understanding pre-service teachers that these attitudes are made explicit and examined in order to adapt tertiary courses to the needs of these students. Research has argued that positive teacher attitudes contribute to the formation of positive pupil attitudes (Sullivan, 1989; Relich, Way, & Martin, 1994). Other studies have shown that classroom strategies used to teach a subject are influenced by teacher attitudes which, in turn, influence pupil attitudes (Carpenter & Lubinski, 1990). The negative attitude of pre-service mathematics teachers is also of great importance. Of interest is whether tertiary educators are able to change the negative beliefs of the pre-service teachers towards mathematics and mathematics teaching. Recent studies testing the robustness of the existing beliefs of pre-service teachers reported evidence of belief change, although the sizes of the samples were not large. Aldridge and Bobis (2001) tentatively reported a change in beliefs about mathematics towards a more utilitarian and problem solving perspective as a result of a university education program. Similarly Beswick and Dole (2001) also reported a change of mathematical beliefs of pre-service teachers undertaking an education degree subject. Among South African pre-service teachers examined by Hobden (2001), personal beliefs about the nature of mathematics were found to be incompatible with the theoretical underpinning of the school curriculum. Several researchers (Amarto & Watson, 2003; Chick, 2002; Morris, 2001) have reported that pre-service teachers do not always have the conceptual understanding of the mathematics content they will be expected to teach. Schuck and Grootenboer (2004) stated research “on the beliefs of student teachers has
found that prospective school teachers generally hold beliefs about mathematics that prevent them from teaching mathematics in ways that empower children”. This link between beliefs and classroom behavior has been investigated with classroom teachers. Perry, Vistro-Yu, Howard, Wong and Fong (2002) found distinct differences between various teacher groups in their beliefs about mathematics achievements and its learning, which led to speculation about the impact of these beliefs upon student mathematics achievement. Hannula, Kaasila, Laine, and Pehkonen (2005) explored the structure of 269 Finnish pre-service teachers’ views of mathematics and also their different belief profiles. The core of the student teachers’ views consisted of three correlated beliefs: belief of one’s own talent; belief of the difficulty of mathematics; and one’s liking of mathematics. Concerning their view towards mathematics, students fell within three main categories: positive (43%); neutral (36%); and some negative (22%). Hannula et al. found that “some of the students with a negative view were seriously impaired as they felt that they have tried hard and failed. Consequently, they have adopted a belief that they cannot learn mathematics, thus affecting their mathematics achievement negatively. There is general agreement (Kane, Sandretto, & Heath, 2002) from the findings of research into pre-service teachers’ beliefs that:
- Students’ enter teacher education programs with pre-existing beliefs based on their experience of school;
- These beliefs are robust and resistant to change;
- These beliefs act as filters to new knowledge, accepting what is compatible with current beliefs; and
- Beliefs exist in a tacit or implicit form and are difficult to articulate.
Thus, it is possible to hypothesized that negative beliefs may contribute to negative classroom teaching strategies, which may in turn contribute to negative pupil beliefs, attitudes, achievements and performance outcomes. If these students then go on to become teachers, a cycle of negativity may be created unless an appropriate intervention breaks the cycle (Kane et al, 2002). Earlier, Caraway’s (1985) data revealed that mathematics competency and achievement were both positively correlated with attitude toward mathematics. This is also true for pre-service teachers, as reported in the study by Rech, Hartzell & Stephens (1993) who compared the mathematical competencies and attitudes of pre-service teachers against a representative college population, over three years. The results supported Caraway’s findings and also showed that the pre-service teachers possessed significantly more negative attitudes toward mathematics achievements. Research into attitudes to mathematics has explored
the influence of a range of affective variables such as anxiety and self-image. Mathematics anxiety is usually defined as a feeling of tension and anxiety that interferes with mathematics performance and achievements. There is a disagreement over whether it constitutes an independent affective construct or is really a reflection of some deeper attitude. Thus, while Nisbet (1991) argued that anxiety and confidence in teaching mathematics were independent factors, Relich, Way, and Martin (1994) disagreed in their study of 212 Australian undergraduate pre-service students. Their study supported the proposition that: “While anxiety related to the learning and/or teaching of mathematics undoubtedly exists among many students, we do not regard it as a variable which is separate from attitude but rather as one which is highly correlated with attitude and therefore as a component of attitudinal profiles”. The measures of self-image as a learner of mathematics are often interchangeable with self-concept, self-esteem or confidence. Self-concept has often been shown to be moderately correlated with mathematics achievement (Skaalvik & Rankin, 1995) of pre-service teachers. Eccles, Adler, and Meece (1984) also reported that self-concept of ability had a significant positive longitudinal effect on course grades in English and Mathematics achievements for senior high school students. In a study that involved pre-service elementary school teachers, Christou, Philippou, and Heliophotou (1999) found an indirect reciprocal causal relationship between mathematics achievement and general self-esteem. House (1993, 1995) conducted several studies involving post-secondary students, producing evidence of a strong relationship between self-concept and mathematics achievement. Several researchers (Amarto & Watson, 2003; Chick, 2002; Morris, 2001) have reported that pre-service teachers do not always have the conceptual understanding of the mathematics content they will be expected to teach. Rech, Hartzell, and Stephens (1993) reported the mathematical competency of students can also affect mathematics achievement of pre-service teachers. The issue of pre-service mathematics teachers self efficacy, locus of control, self assessment of memory ability and study habit as predictor of their achievement in mathematic is the concerns of this research.

Research Questions
This study will therefore attempt to answer the following questions.
(1) Is there a significant relationship between?
   (a) Pre-service teachers’ self efficacy and achievement in mathematics.
   (b) Pre-service teachers’ memory ability and achievement in mathematics.
(c) Pre-service teachers’ locus of control and achievement in mathematics.
(d) Pre-service teachers’ study habit and achievement in mathematics.

(2) How much did self efficacy, locus of control, self assessment of memory ability and study habit (when taken together) contribute to the prediction of mathematics achievement of pre-service teachers?
(3) What is the relative contribution of each of the variables to the prediction of achievement in mathematics among pre-service teachers?

Method

Research Design

The design that was employed in this study is an ex-post facto type. In such a research, the investigator does not have a direct control of independent variables because their manifestations have already occurred or because they are inherently cannot be manipulated. What the researcher did was to examine the four variables (self-efficacy, locus of control, self assessment of memory ability and study habit (independent) variables and achievement (dependent) variable as it occur rather than creating these manifestations.

Participants

Data for this study were collected from 147 pre-service mathematics teachers enrolled in Nigerian Certificate in Education program at Emmanuel Alayande College of Education Oyo and Federal College of Education Oyo (Special), Nigerian

Instrumentations

(1) Mathematics Teaching Efficacy Belief Instrument (MATEBI)

The MATEBI consist of 25 items in a four point Likert type Scales ranging from strongly agree, agree, disagree and strongly disagree. The MATEBI was adapted from Akinsola (2008). The internal consistency of the MATEBI score was measured by Cronbach coefficient alpha. The coefficient alpha is the function of the extent to which items in a test have commonality and is the lower limit of the reliability of a set of test scores (Cortina, 1993). The reliability of scale scores will naturally be influenced not only by the instrument used but also by the sample composition and variability (Davis, 1987). It is therefore important to report reliabilities coefficient for the actual data collected (Vacha-Haase, Kogan, & Thompson, 2000; Friedman, & Kass, 2002). The MATEBI was administered to
twenty pre-service teachers and subjected to Cronbach alpha reliability coefficient and was found to be 0.69.

(2) Locus of Control Scale
The Locus of control behavior scale based on Rotter (1966) was used as a measuring instrument. It consists of 13 paired items. The instrument has a coefficient alpha of 0.86 after its administration to twenty pre-service teachers.

(3) Memory Self-Efficacy Questionnaire (MSEQ)
The MSEQ is a rationally constructed paper and pencil task that describes 10 memory tasks for which subjects assess their memory abilities. It was adapted from Jane, Robin & Dierdre (1989) and modified by Olumuyiwa (2012). For each task, the most difficult level was listed first followed by two descending levels of task difficulty. For each level subjects indicated whether they could perform the task at that level by circling No or Yes. If Yes was circled, they were to indicate how sure by circling a confidence rating. Following Bandura, the confidence ratings ranged from 10% to 100% in 10 unit increment. After administration to twenty pre-service teachers internal consistency estimates were obtained using Cronbach alpha reliability coefficient and was found to be 0.90.

(4) Study Habit Scale
The study habits questionnaire was a 35 items (3 point scale) adapted from Nneji (2002). It is a 3 point Likert scale featuring mostly, occasionally and only. A reliability coefficient of 0.88 was obtained when given to twenty pre-service teachers to score.

(5) Mathematics Achievement
Raw scores (marks) obtained by the pre-service teachers in two compulsory mathematics courses offered in the previous semester were collected from exams and record office of the respective schools.

Procedure for Data Analysis
Multiple regression analysis was used to examine the separate, joint and relative contribution of self efficacy, locus of control, self assessment of memory ability and study habit to the prediction of pre-service teachers’ achievement in mathematics.

RESULT
The first research question seek to find out if significant relationships exist between Self-efficacy, Locus of control, Self assessment of Memory Ability, Study Habit and Achievement in Mathematics respectively. The result of the descriptive statistics and correlation matrix analysis are presented in table 1 below.
Table 1. Descriptive Statistics and Correlation Matrix between Achievements in Mathematics, and Self-efficacy, Locus of control, Self assessment of Memory Ability and Study Habit.

<table>
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<th>Achievement in Maths</th>
<th>Maths Teaching Efficacy Belief</th>
<th>Locus of control</th>
<th>Memory Self Efficacy</th>
<th>Study Habit</th>
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<td>Achievement in Maths</td>
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<td>Maths Teaching</td>
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<td>Efficacy Belief</td>
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<tr>
<td>Locus of control</td>
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<td>Memory Self Efficacy</td>
<td>.017</td>
<td>-.341**</td>
<td>-.111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study Habit</td>
<td>-.467**</td>
<td>.295**</td>
<td>-.141</td>
<td>-.190*</td>
<td>1</td>
</tr>
</tbody>
</table>

** Sig at .01 levels (2-tailed)
*Sig at .05 levels (2-tailed)

From the above table, the correlation coefficients between Achievement in Mathematics and Mathematics Teaching Efficacy Belief, Locus of Control, Memory Self Efficacy and Study Habit was as shown. It was noted that a positive significant correlation exist between Mathematics Achievement and Locus of Control, a negative Correlation exist between Mathematics Achievement and Study Habit and no significant correlation between Maths Teaching Efficacy Belief, Memory Self Efficacy and Mathematics Achievement respectively. The respective mean and standard deviation are also shown in the table.

The second research question was interested in knowing the joint contribution of the independent variables (Self-efficacy, Locus of control, Self assessment of Memory Ability and Study Habit) and dependent variable (Achievement in Mathematics) of pre-service teachers. The results of multiple regression analysis are presented in table 2 below.

Table 2: Multiple Regression Analysis between Predictor variables And Achievement in Mathematics

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square (R²)</th>
<th>Adjusted Square(R²)</th>
<th>R</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.607*</td>
<td>.369</td>
<td>.351</td>
<td>10.7156</td>
<td></td>
</tr>
</tbody>
</table>

ANOVA:

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of squares</th>
<th>Df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>9537.008</td>
<td>4</td>
<td>2384.252</td>
<td>20.764</td>
<td>.000*</td>
</tr>
</tbody>
</table>
The table above shows that the predictor variables contributed 36.90% of variable in mathematics achievement. The table further revealed that the analysis of variance of the multiple regression data yielded an $F$-ratio of 20.764 which was significant at 0.05 levels. This shows that the independent variables are good predictors of Achievement in Mathematics. Further more research question three was interested in knowing the relative contribution of each of the predictor variables to Achievement in Mathematics. The standardized regression weight is shown in table 3 below.

Table 3. Relative effects of Mathematics Teaching Efficacy Belief, Locus of Control, Memory Self Efficacy and Study Habit on Achievement in Mathematics.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized coefficient</th>
<th>Standardized coefficient</th>
<th>T</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(constant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>S.E</td>
<td>B values</td>
<td>.784</td>
</tr>
<tr>
<td>Maths Teaching Efficacy</td>
<td>.365</td>
<td>.186</td>
<td>.146</td>
<td>1.965</td>
</tr>
<tr>
<td>Belief</td>
<td>2.394</td>
<td>.478</td>
<td>.345</td>
<td>5.003</td>
</tr>
<tr>
<td>Locus of Control</td>
<td>.101</td>
<td>.412</td>
<td>.018</td>
<td>.246</td>
</tr>
<tr>
<td>Memory Self Efficacy</td>
<td>-.546</td>
<td>.085</td>
<td>-.458</td>
<td>-</td>
</tr>
<tr>
<td>Study Habits</td>
<td></td>
<td></td>
<td>6.400</td>
<td></td>
</tr>
</tbody>
</table>

The table above shows the result of the relative contributions of each of the independent variables to the prediction of Achievement in Mathematics which is the criterion been measured. The table also revealed that while Mathematics Teaching Efficacy Belief ($B = .146$), Locus of Control ($B = .345$), Study Habits ($B = -.458$) were significant, Memory Self-Efficacy ($B = .018$) was not.

**Discussion of findings**

In this study Locus of control was found to correlate well with mathematics achievement. Locus of control which is the tendency to ascribe achievements and failures to either internal factor that they can control (effort, ability, motivation) or external factors that are beyond control (chance, luck, others’ actions) is an
important factor that could affect the way a teacher performs his teaching role. It could be ascertain that teachers who believe that effort and ability are essential in the learning of mathematics is likely to motivate and encourage their students to put in more effort in learning mathematics for greater achievement, whereas those who belief in luck, fate, chance or powerful others might not be disposed towards encouraging their students’ to put in more effort in learning mathematics to aid their achievement. Self assessment of memory ability which deals with perception of individuals’ general mental ability was found by Wilhite (1990) to be the strongest predictor of academic achievement. But in this research it was found out that self assessment of memory ability contributed the least to mathematics achievement of pre-service teachers’. This implies that the judgment or perception one has about his/her mental ability to solve a specific mathematics problem must agrees with his/her capabilities to solve the problem in reality. Hence teachers are encouraged not to assume they know and understand mathematical concepts where such knowledge and understanding is lacking. Study habits have been shown to contribute to students’ failure in mathematics (Mangaliman, 2007). Study habits contributed mostly to mathematics achievement of pre-service teachers’ in this research. For teachers’ to encourage good study habits in their students they themselves have to be an epitome of good study habits. The result of this study as evident from Table 2 has shown that these four constructs; self-efficacy, locus of control, self assessment of memory ability and study habit contributed up to 36.90% in mathematics achievement of pre-service teachers. The multiple R value of 0.607 signifies a high correlation between the predictors and the predicted variable. The result indicated that the predictor variables are potent contributors to mathematics achievement of pre-service teachers’. This was further corroborated by F-value of 20.764 which was significant at 0.01 levels. The result revealed that self-efficacy (Maths Teaching Efficacy Belief) contributed significantly to mathematics achievement. Mathematics teaching efficacy beliefs represents a person’s evaluation of his/her ability or competency to reach or overcome a mathematics task. Low self-efficacy has been linked to increase cheating, lack of concentration, low motivation, lack of persistence and depression (Finn & Frone, 2004). Conversely, high self-efficacy has been associated with pursuit and achievement of goals, problem solving and persistence (Vrugt, Langeries, & Hoogstrate, 1997). Consequently these factors are related to mathematics achievement of students. In other words mathematics self-efficacy may influence students’ mathematics achievement positively to a large extent. The way pre-service teachers’ judge his/her capability to organize and execute the course of
action required to attain designated types of performance in mathematics may likely affect the way they approach the task. Hence a pre-service teacher with a high level of mathematics self-efficacy will be willing to expend time, energy and effort to boost mathematics self-efficacy of his/her students through proper instruction and result oriented teaching coupled with encouragement. But the contrary will be the case in a pre-service teacher with low mathematics self-efficacy.

**Conclusion**

Attitude cannot be easily separated from learning because they are acquired through the process of learning which involves interactions of several variables. As illustrated by the definition of learning by Farrant (1994) that “learning is a process of acquiring and retaining attitudes, knowledge, understanding, skills and capabilities”. According to Farrant’s definition, learners are not born with attitudes but instead they acquire them when they get in contact with the new world. This position is supported by Olaitan (1994) that “attitude can be learned and teachers should strive hard to develop the right attitudes in their pupils particularly towards acquiring manipulative skills”. Attitudes differ according to how learners perceive what they are taught and whoever is teaching them. This position is supported by Jonassen (1996) who defined attitudes as “how people perceived the situation in which they find themselves”. He then asserted that if learners are not assisted or encouraged to perceive positively most of the things they learn, their performance in the class will be affected. Thus the crucial roles of teachers’ as facilitator of positive attitudes in students cannot be over emphasized. Most mathematics teachers are obtuse to students’ problems in mathematics thereby failing to educe the best from them. Mathematics teachers with lack of understanding and acceptance often provide a psychological climate which may precipitate negative attitude and avoidance to mathematics by students. This should not be so. As mathematics teachers we should always seek for avenue we will be making our students elated at the end of our interaction with them in the classroom. Methods which are perdurable should be employed always to sustain students’ continuous interest in learning mathematics. This is the only way by which we may be able to gear and stir them up and change their negative perception towards the learning of mathematics. This presupposes that mathematics teachers’ themselves are positively oriented towards learning and teaching the subject. Our teacher training program must be evaluated on their ability to prepare mathematics teachers for students’ that have or may have developed discomfort for mathematics and who may end up teaching the
elementary/junior schools where these feelings have been found to begin. By studying pre-service teachers, we cannot only ascertain what future and present teachers are feeling but we can work with them towards alleviating their own discomfort with mathematics as well as prepare them for students’ they may encounter with similar feelings. The power of process resides in the key pathways through which mathematics teachers learn, grow, and improve in practice. A high self-efficacy, internal locus of control, good perception of memory ability coupled with capability and a good study habit are essential factors for would be mathematics teacher to be able to perform his teaching tasks creditably and optimally. A teacher’s competence, a teacher’s identity, a teacher’ self is woven in a way which means that they have little choice but to be committed to outcomes of events that involve, at one and the same time, both the pupils’ and the teachers’ career in the school (Denscombe, 1995). It is therefore necessary for mathematics teachers to understand students’ mood and by so doing they may be able to reduce their often nasty experience in mathematics classroom.

References


Hart, L. C. (2002). Pre-service teacher beliefs and practice after participating in an integrated content/methods course school science and mathematics, 102, 4-14.


