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Study Habits and Mathematics Proficiency of Teacher Trainees in Primary Teachers' Training Colleges in Southwestern Uganda

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*Abstract: The study aimed at establishing the relationship between study habits and mathematics proficiency of teacher trainees' in primary teachers' training colleges in southwestern Uganda. The specific objectives included establishing study habits of Teacher Trainees in PTCs in South Western Uganda, assessed the level of Mathematics proficiency in general arithmetic skills among teacher trainees in PTCs in South Western Uganda and determined the relationship between study habits and Mathematics proficiency of PTC Trainees in South Western Uganda. The study adopted a correlational design, using quantitative approach. The population was 254 teacher trainees in PTCs in South Western. All the teacher trainees in PTCs in South Western from the 6 PTCs were considered by proportionate sampling. The findings revealed that the study habits of Teacher Trainees in PTCs in South Western Uganda were low mean=2.562, std deviation= .3837), level of Mathematics proficiency low (mean=5.6969, std deviation=1.4926). There is a statistically significant high and positive correlation between study habits and mathematics proficiency (R = .686**, p = .000). The study concludes that study habits of Teacher Trainees in PTCs in South Western Uganda is low, the level of Mathematics proficiency low and study habits are important towards improving mathematics proficiency of PTC Trainees in South Western Uganda. The study recommends those PTC administrators, policy makers, and other stakeholders in education: should ensure study habits of Teacher Trainees in PTCs for improvement through training, mentoring and continuous assessment, they should improve mathematics proficiency of PTC Trainees in South Western Uganda.*

***Keywords**: Habits, Study, Mathematics, Teacher Training, Proficiency, Primary teachers*

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1. Introduction

Poor achievement in mathematics is an issue of great concern for many countries across the globe(Chand et al., 2021) and it has prompted developing countries to participate in initiatives to bring positive change to their communities (Sinyosi, 2015). Mathematics is a tough subject to understand and an even tougher subject to teach. This challenge is derived from the fact that Mathematics concepts are highly abstract, hierarchical and interconnected, and the dominant mode of instruction remains teacher-centred (Nandwa, Wasike, & Wanjala, 2015). Mathematics proficiency requires an interest in analytical skills and mastery of the interpretation and application of Mathematics concepts (Sithole et al., 2017). Proficiency in Mathematics is acquired over time(Nargloric, 2019). Each year trainees are in school, they ought to become increasingly proficient. Many researchers have ventured into studying the poor performance and low proficiency of learners in Mathematics.

Many initiatives seeking to improve the quality of teacher preparation for their roles and tasks have been put in place with little attention to teacher education in developing countries (Namamba & Rao, 2017). Previous research in sub-Saharan Africa (Ghana, Mali, Senegal, Uganda, Tanzania and Kenya) suggests that understanding how teacher education affects teachers' grasping of basic Mathematics concepts and reading influences greatly the quality of education (Sawyer,

2018). It is noted that teachers focus on the prestige of paper qualifications with no performance standards in the requirements for certification (Theobald et al., 2007). Criticism about the curriculum for teacher training in Africa and other parts of the world is based on a theoretical approach with little emphasis on practical knowledge (Moja, 2000). For that matter, Mathematics is put at the edge of regression beginning as far as when its teachers are being trained.

The study is guided by the self-determination theory developed by Edward Deci and Richard Ryan Deci and Ryan (1985). They define self-determination as the experience to initiate your behaviour. The theory mainly focuses on the positive growth of humans. It gives the three necessary cores for growth and these are; Autonomy; which means a feeling of one having control of what he/she is doing and behaviour. People need to feel that they are masters of their own and they control themselves. Competence; means that one should have a feeling of capableness and develop mastery of what he/she does and feels that what he/she has done is good and important to him/her. Relatedness; is to have healthy relations and meaningful interactions with others to have a sense of belonging.

Deci and Ryan (1985) further define self-determination as the ability or process of making one's own choices and controlling one's life. One should be able to grow to achieve. This theory further brings out two types of motivation as intrinsic and extrinsic which are directly connected to one's self-motivation either autonomously where the drive is within oneself or controlled where there is an external influence. All these three pillars of growth are motivational drivers which are directly connected to study habits and Mathematics proficiency in a way that one needs to have self-determined study habits to achieve big.

Deci and Ryan as cited by Mnyandu (2009) state that self-determination (intrinsic and extrinsic motivation) plays a prominent role in Mathematics proficiency and this sense, students need to be autonomous (control themselves), need competence (to master what they do) and they need to relate and interact with others to develop good habits to be proficient in Mathematics. Thus, this study adopted the theory to explain the association between study habits and Mathematics proficiency of teacher trainees in PTCs in southwestern Uganda.

Students' proficiency in Mathematics is a component of their home condition, attitudes towards the discipline, and curriculum that clarify varieties in students' proficiency (Peteros et al., 2019). The attitudes towards Mathematics assume a critical job in the instructing and learning procedure of science(Peteros et al., 2019). It influences the student's accomplishment in science. Endeavour to improve demeanour towards science and mathematics at lower level gives the base to higher investigations in arithmetic. Thus, the role and applicability of Mathematics in today's generation, which is characterized by exponentially increasing technology, becomes more imperative. In effect, many students get low performance in Mathematics. Accordingly, the ratio of low performing students in Mathematics to the total population of students is an essential factor of Mathematics education quality.

It is now generally accepted that many students enter college severely underprepared for their Mathematics college courses in terms of basic skills and study habits, and that intervention is expected to overcome these deficiencies(Clemence-Mkhope, Varatharajah, Oldham, Tankersley, & Seongtae, 2019). The study habits that students develop eventually influence their interest in STEM(Were, 2020). The development of good study habits is equally relative and helpful not only in academic work but in career actualization(Maiyo & Atsiaya, 2015). Diaz and Dio (2017) attested that Mathematics is not about the answer, but rather it is about processes. Diaz and Dio (2017) elaborated that how students learn Mathematics is like building a scaffold without even constructing the building that the scaffolding is intended to support. As further stated, the real building in Mathematics knowledge is the correct mathematical understanding, the actual ability to think, perceive and analyze mathematically. Many students admitted that learning and engaging in Mathematics is a difficult task to accomplish, not even realizing its importance and usefulness. It is therefore needed to ensure that all pupils' proficiency in literacy and numeracy is developed and that teachers whose grades in the same subject areas are still wanting are equipped with necessary skills.

Many factors contribute to differences in Mathematics proficiency, including attitudes (Ma, 1999), motivation (Steinmayr & Spinath, 2009), language ability (Dolan, 2009) and IQ (Mayes, Calhoun, Bixler, & Zimmerman, 2009), in addition to social (Byrnes & Wasik, 2009), and educational factors (Opdenakker & Van Damme, 2007). It could also be a result of several factors such as poor teaching, psychological factors, unpreparedness on the part of the students, poor learning environment, location of schools, and the evaluation process (Alordiah, Akpadaka, & Oviogbodu, 2015). Social skills and, work and study habits are important aspects of the primary curriculum. Mathematics courses play a critical role for most college students as they are required to take college algebra in their academic careers (Cortez, 2019). Shober (2012) asserts that the quality of teachers has far-reaching effects on pupils' learning and performance than the quality of the curriculum, the teaching methods, the school buildings or even the role of parents.

The quality of education depends majorly on the role of teachers and this notion is accepted globally, and in developing countries. The issue of quality education started emerging at the Jomtien Conference in Thailand in 1990 which focused on education for all where they acknowledged that the current provision of education is seriously deficient and it must be made more relevant and qualitatively improved. Since that time, the quality of

primary education and primary teacher education has become a great concern for developing countries (O'Sulivan, 2006).

1.1 Statement of the Problem

Despite all the efforts by the government, through recruitment and appointment of Tutors of Mathematics into the service in all PTCs countrywide, free education in PTCs, providing instructional materials like textbooks to all PTCs (The Education and Sports Sector Annual Performance Report, 2017), instituting a policy for a credit pass in Mathematics as required for students' entry into PTCs and to qualify for a certificate after PTC, the proficiency of students in Mathematics remains low. There is also a growing concern nowadays by parents, private sector employers and educators about the competence of teachers produced by PTCs. This is reflected in the Uganda- National Assessment of Progress in Education (NAPE, 2018) Report which shows that the quality of newly recruited teachers and even those with five years and less teaching experience is wanting.

Kyomuhendo (2017) suggests that teachers' competence is one of the factors that have been adduced for being responsible for this problem in recent times. To commence improvement in Mathematics proficiency, the root causes of the current low Mathematics performance of the students should be assessed. The move to raise the minimum qualification of teachers in Uganda has been criticized by several educationists, teachers, and policymakers noting that having a degree might not be the magic solution to the current teacher education challenges in the country(Kisekka, 2021).

According to the Uganda Service Delivery Indicators (2013), Teachers' ability was assessed in the subjects they teach and it was found that an average Teacher scored 65% and 58% in Mathematics. Only one in five managed to score 80% showing inadequate mastery of the curriculum they teach. This poor quality of teachers and failure to get good Mathematics teachers might stem from several causes one of which is the individual study habits that must have been inherited when they were still PTC trainees. No known study has been carried out to determine the teacher trainees' study habits and their Mathematics proficiency in PTCs in South Western Uganda. It is upon this background that this study set out to investigate the study habits and Mathematics proficiency of teacher trainees in Primary Teachers' Colleges in South Western Uganda.

1.2 Research Questions

The following research questions guided this study:

1. What are the study habits of Teacher Trainees in PTCs in South Western Uganda?
2. What is the level of Mathematics proficiency in general arithmetic skills among teacher trainees in PTC in South Western Uganda?

1.3 Hypothesis

There is no significant relationship between study habits and Mathematics proficiency of Teacher Trainees in PTCs in South Western Uganda.

2. Literature Review

2.1 Theoretical Review

Self-determination theory (SDT) was adopted to guide this study investigating study habits, mathematics proficiency and their relationship among teacher PTC trainees. SDT embraces an organismic view of self as playing an integrative role in development (Vansteenkiste, Ryan, & Soenens, 2020). The theory is concerned with the functioning of the self, that is, its organization of experience, and its regulation and integration of impulses, emotions, motives, and values (Ryan, Deci, Vansteenkiste, & Soenens, 2021). For more than four decades, SDT has been deploying a wide variety of empirical methods, including experimental studies of behaviour, experience sampling, longitudinal studies, neuroscience, and controlled interventions to understand individuals' motivations (Hayes, Ciarrochi, Hofmann, Chin, & Sahdra, 2022). In doing so, SDT has emerged as a broad framework for a truly human science built upon cumulative and convergent evidence (Ryan & Vansteenkiste, 2023).

SDT theoretical propositions are not reliant on single studies or narrow models, but rather draw from multiple forms of evidence, tested across diverse domains of human endeavour (Ryan & Deci, 2019). Moreover, SDT research spans all sub-disciplines of psychology, including developmental, cognitive and biological psychologies (Rossides, 2022). Thus, this study adopted the theory to explain the association between study habits and Mathematics proficiency of teacher trainees in PTCs in southwestern Uganda.

2.2 Study Habits of Teacher Trainees

Several studies have been conducted to assess the study habits of students or learners.

In a study to investigate pre-service teachers' conceptions of online learning during the transition from face-to-face to emergency distance education in Italy, Sweden and Iran was conducted (Tarchi, Brante, Jokar, & Manzari, 2022). Conceptions of online learning were conceptualized based on how pre-service teachers defined online learning, the self-regulated learning skills associated with it and how they compared it to face-to-face education. (Tarchi et al., 2022) asked about the characteristics of their online courses, yielding information about the online learning conditions and

experiences. (Tarchi et al., 2022) found out that conceptions of online learning were found to be underdeveloped. (Tarchi et al., 2022) recommended that pre-service teachers should develop a flexible approach to self-regulated learning skills that takes into consideration the demands of the specific educational setting.

The effect of students' work ethic and study habits has been undermined and entirely omitted in prior research (Niepel et al., 2018). A study in 2018 examined nearly 6,000 incoming female the University of California, Los Angeles (UCLA) students found that graduates of all-girl schools are more likely to show higher levels of science self-confidence, consider themselves critical thinkers, score higher on measures of academic habits of mind, and demonstrate stronger study habits (Riggers-Piehl, Lim, & King, 2018).

Cuy and Salinas (2019) reveal that senior high school students should build a strong academic foundation, strengthen their skills, develop critical thinking, establish effective time management and study habits, and learn how to communicate effectively through writing and speaking to be college-ready. Blaich, Wise, Blaich and Wise (2011) found that most North Carolina A&T State University students lacked study habits conducive to success.

According to Azikiwe (2008), good study habits are a good asset to learners because they (habits) assist students to attain mastery in areas of specialization and consequent excellent performance, while the opposite constitutes constraints to learning and achievement leading to failure. Research conducted by Good (2006) defined the term study habits as the student's way of study whether systematic, efficient or inefficient etc. Study habits are perceived to be the determinants of academic performance; hence, efforts are made to develop and improve study habits in students. The same result was found in the study of Utanes (2014) while Ikegbunam (2008) revealed that patterns of sex differences are present in Mathematics learning.

Parental supervision and input had a direct impact on the amount of time a student spent completing the actual homework assignments (Núñez et al., 2015). The researchers suggested that teachers devise strategies for helping students to take ownership of improving homework habits and educating parents on ways to assist their middle and high school children to develop study habits that lead to academic success. Nunez et al. did find that younger students completed higher levels of homework than junior high and high school students. However, academic achievement as evidenced by report card grades did not improve with parental control of homework completion. Future studies should examine why older students tend to lose self-motivation for completing homework activities and include the parental perception of control and support.

2.3 Level of Mathematics Proficiency of Teacher Trainees

In a study in pre-School Teachers in Teaching Mathematics in Nigeria to determine how frequently pre-school instructors used the scaffolding teaching style when instructing math, ex-post-facto research was used whereby both descriptive and inferential approaches were used to examine the data (Afolabi & Yakubu, 2022). Findings revealed that low math proficiency unless scaffolding was considered namely directing, was being used at an appropriate mean frequency level score of 64.2 while the other five had low mean usage ranging between 4.5 and 23.7. It was concluded that the frequency of usage of the scaffolding teaching approach significantly influenced by preschool teachers' math proficiency. Besides, the study advised maintenance of focus on ongoing instruction in the approach during in-service training in order to increase math performance.

Students from the United States lag in demonstrating Mathematics competencies when compared to students from other developed nations (Gjicali & Lipnevich, 2021). For example, the Midwest high school has over 2,000 students (Kelderman, 2021). Of the student population, about 12% identify as a minority and 8% are economically disadvantaged. The school boasts a graduation rate of 97%, but only claims a Mathematics proficiency rate of around 45% and a reading proficiency rate of 58%. Mathematics is one of the hardest subjects that a student or pupil undertakes and this can lead to affecting his/her proficiency level (Lacaba, Magalona, & Lacaba, 2018). Female students in STEM fields need high mathematics proficiency (Were, 2020). The attitude among female students in STEM disciplines is important when the students are preparing to attend learning lessons in specific disciplines for example Mathematics. All STEM courses require basic skills in Mathematics and numerical manipulation which leads to either an increase in confidence or a lack of interest which leads to failure.

Peteros et al. (2019) determined the attitudes and academic achievement of students who are recipients of conditional cash transfers towards Mathematics in a public national high school, in Bohol, Philippines. The study revealed that respondents fairly performed in their achievement in math. A 2015 study by Eisenkopf et al. identified a "very robust" positive effect on Mathematics proficiency for girls randomly assigned to single-sex classes in a Swiss high school (p. 137). The effect was greater for students with high ability in maths and classes taught by a male teacher, but "the effect also holds for less talented students and classes taught by a female teacher". Girls in single-sex classes also "evaluate their Mathematics skills more positively and are more likely to attribute their performance in Mathematics to their efforts rather than to exogenous talent or luck" (p. 125). Mathematical proficiency requires that all students develop concepts and skills, become flexible with

mathematical ideas, and engage in higher-order or critical thinking; rigorous content and expectations underpin such opportunities(National Council of Teachers of Mathematics (NCTM), 2014; Lester, 2007).

Prior efforts to understand the variability in Mathematics performance have primarily focused on demographic (e.g., SES, gender) (Sirin, 2005), cognitive (e.g., working memory, prior knowledge) (Duncan et al., 2007), non-cognitive (e.g., motivation) (Pintrich & de Groot, 1990), personality (Poropat, 2009), and learning factors and skills (e.g., self-regulation) (Zimmerman, 1990). However, a comprehensive framework that relates noncognitive constructs of beliefs and attitudes to academic performance in Mathematics has largely remained unexplored in educational psychology research (Burrus & Moore, 2016). Prior studies that have specifically focused on noncognitive predictors of Mathematics achievement primarily investigated student confidence in Mathematics (Morony, & Lee, 2014), self-efficacy (e.g., Skaalvik, Federici, & Klassen, 2015), and motivational constructs (e.g., task interest, intrinsic motivation) (Cleary, Kitsantas, & Dowdy, 2017). Thus, limited research has relied on the predictive value of other noncognitive factors such as attitudes and beliefs, and study habits on Mathematics proficiency even though attitudes towards Mathematics (e.g., Lipnevich, MacCann, Krumm, Burrus, & Roberts, 2011) are a promising avenue for understanding the variability in Mathematics proficiency as indicated by, both, cross-sectional (Lipnevich et al., 2011) and longitudinal research (Niepel et al., 2018).

It is said that learning is not limited to the mere acquisition of knowledge; it includes various other aspects such as attitudes, interests, values etc. Rao (1964) quoted by Singh (2015) said that proficiency includes life goals, aspirations, study habits, emotional factors, and personal and social adjustment to a certain area of study. Harrock (1969) in Singh (2015) also says that to be proficient is to have a skill, range and depth of knowledge in a designed area of learning and behaviour. To optimize Mathematics proficiency, therefore, parents, teachers, educational planners and students must have a great role to play. The modern age is an age of science and technology, where every student needs to perform well in science and Mathematics. It is understood that vocabulary understanding is one of the major contributors to overall comprehension in many content areas including Mathematics. Teaching and learning the language of Mathematics is vital for the development of mathematical proficiency (Smith, 2015).

National Research Council (2001) says that "Mathematically proficient people exhibit certain behaviours and dispositions as they are doing Mathematics." It further defines Mathematics with 5 strands, an idea shared with Douglas (2013) and these are; conceptual understanding, procedure fluency, strategic competence, adaptive reasoning and productive disposition. These strands must be the main influence on students to become mathematically fluent.

Several studies have been conducted to assess Mathematics proficiency in other countries such as the Philippines, the United States of America, and India among others.

While examining the teaching styles and active teaching in East Africa in an attempt to examine what accounts for differences in performance between schools, and provide some lessons for sub-Saharan Africa, data from 428 teachers in primary schools in Kenya and 157 teachers in primary schools in Uganda were examined (Ngware & Mutisya, 2022). Results showed that teaching practice in math is inclined towards the command and task styles that do not promote critical thinking among learners. Ngware and Mutisya (2022) revealed that the dominant teaching activity in math lessons was individual seat work in Kenya; and whole class chorus in Uganda. Overall, teaching methods were ineffectiveness implying that education systems in sub-Saharan Africa needed to reinvigorate teaching practices and any efforts to increase daily learning hours were counterproductive. This study assessed the mathematics proficiency among teacher trainees in PTCs in Southwestern Uganda.

2.4 Relationship between Study Habits and Mathematics Proficiency of Teacher Trainees

Several scholars have determined the relationship between study habits and the mathematics proficiency / ability of students around the globe. The reviewed literature presents the methodological, conceptual, and contextual gaps identified in the literature. Scholars have identified that students with better study habits tend to have better Mathematics proficiency and ability. This is because studying for longer periods, focusing on the material, and seeking help when needed can all improve student understanding and performance. Additionally, the contextual gaps identified in the literature indicate that there are certain factors, such as culture and socio-economic status, which can influence how students learn and their Mathematics proficiency.

A study by Villa and Sebastian (2021) examined achievement motivation, locus of control and study habits as predictors of mathematics achievement of freshman students taking non-board examination programs at a certain state university in Southern Luzon, Philippines. A descriptive-correlational research design and purposive sampling technique were used to select 258 participants enrolled in the subject of mathematics in the Modern World. Four sets of research instruments were used for the data collection: namely, the mathematics Achievement Motivation Scale, Locus of Control Scale, mathematics Study Habits Inventory and the teacher-made Mathematics Achievement Test. The results showed that most students have desirable study habits and average mathematics achievement. The results

also revealed that there was a significant relationship between achievement motivation and mathematics achievement and achievement motivation was found to be the only predictor of mathematics achievement. This indicates that achievement motivation is effective in enhancing mathematics achievement. Thus, students' achievement motivation increases to a high level if given the right remediation. Hence, high achievement motivation can predict high mathematics achievement. Study habits and mathematics proficiency are closely related to achievement motivation. High achievement motivation can not only increase a student's effort in studying mathematics but also lead to higher mathematics proficiency, leading to higher mathematics achievement. This study assessed the relationship between study habits and mathematics proficiency among teacher trainees in PTCs in western Uganda

Oliva (2021) investigated the effects of students' study habits on their academic performance in professional and general education subjects. To attain this aim, the researcher used a sample of thirty-two (32) students from the Bachelor of Science in Radiologic Technology program under the College of Allied Medical Sciences for the academic year 2019–2020 a university in Bulacan. The researcher used the descriptive-correlational method of research, which utilized a standardized questionnaire as the primary data-gathering technique. Results of the regression analysis indicate that all eight (8) variables of study habits are correlated with the academic performance (professional subjects and general education subjects) of the students to a varying extent. The results of the analysis of variance of the regression of study habits on the academic performance of the students revealed the study habits of the students did not produce significant combined effects on their academic performance of the students. The study findings cannot be generalized since data was collected from students under the Radiologic Technology program. However, they point to the sum relationship between study habits and academic achievement. Thus, this study looked at this relationship in the data collected from teacher trainees in PTCs.

Peteros et al. (2019) determined the attitudes and academic achievement of students who are recipients of conditional cash transfers towards Mathematics in a public national high school, in Bohol, Philippines. It utilized descriptive research to gather data on the achievement and attitude of students towards Mathematics. The 112 respondents answered a standardized survey questionnaire, attitudes toward Mathematics inventory constructed, which contains self-confidence, value, enjoyment, and motivation. The gathered data were statistically treated using frequency, simple percentage, and Pearson r. Also, it found that the students' attitudes have a significant relationship with their achievement in Mathematics. The study concluded that the students' attitudes towards Mathematics have a more significant impact on affecting their academic achievement. The researchers recommend that teachers should be developed and enhance the self-confidence of students in Mathematics by involving them in class discussions and interactions through facilitating by any means.

Students fail because they do not know how to study and the study habits of students 30 years ago still ring true today (Descargar & Cardona, 2016). Descargar and Cardona's (2016) descriptive study aimed at revisiting and investigating the study habits and Mathematics performance of 108 randomly selected Grade 7 students from the three public schools of the Municipality of San Manuel, Isabela, Philippines. The study utilized a questionnaire, observation and group interview as data-gathering instruments. To enrich the data, four teachers and 70 parents were also interviewed. Data were processed using frequency and percentage distributions, mean, standard deviation, One-Way Analysis of Variance (ANOVA) and t-test, post hoc analysis using Scheffe and effect size using eta square, and regression analysis. Findings revealed that students perceived study habits as a great factor in attaining excellent academic performance in Mathematics; however, teachers perceive students nowadays to have poor study habits. Meanwhile, parents opposed to teachers' perceptions affirm their children's claim. Furthermore, students' academic performance in Mathematics is adequately explained by their study habits and their mother's occupation. However, contextually, the findings cannot be used generally in Uganda since the study was carried out in the Philippines. In addition, data was collected from Grade 7 students. For this study, data was collected from teacher trainees in selected PTCs in Southwestern Uganda.

Lein et al. (2016) examined the relationship between student engagement and seventh graders' mathematical problem-solving performances. Student engagement was operationalized regarding on-task behaviours; therefore, prior academic achievement in Mathematics was controlled. The results indicated engagement predicted performance in Mathematics problem-solving, even after their prior achievement was controlled. These findings indicated support for the relationship between student engagement and academic performance in Mathematics. However, the sample only consisted of seventh-grade students, which might not be generalized to teacher trainees. This study examined the relationship between the study habits of teacher trainees and Mathematics proficiency in PTCs in South Western Uganda.

Marx, Wolf and Howard (2016) conducted a study exploring peer-tutoring relationships and how they influenced students' self-reliance and their academic performance in Mathematics. Marx et al. examined 333 tutor and tutee pairs at a learning assistance centre in the spring of 2015. Findings from their study showed that an increase in the frequency of tutoring sessions with their peers, and the quality of the interactions between the tutor and the tutee, were probably associated with an increase in independent study habits for the tutee, and

higher college algebra academic outcomes for the treatment group as measured by end-of-semester grades. Contextually, the study was carried out in the United States of America and the findings cannot be generalized in South Western Uganda. And so, this study was carried out in the Southwestern Uganda context and findings are used to generalize PTCs in Southwestern Uganda.

Odiri (2015) examined the relationship between the study habits of students and their achievement in mathematics in Delta Central Senatorial District, Delta State, Nigeria. The method used for the study was correlation design. A sample of 500 students was randomly selected from 25 public secondary schools. Questionnaires were drawn to gather data on students' study habits. Students' results in mathematics were also collected from their various schools to gather data on their achievement in mathematics. Regression and ANOVA were used to analyse the data. The findings revealed that there was a significant relationship between students' study habits and mathematics achievement.

Other studies have determined that there is a significant correlation between metacognition and academic achievement in Mathematics and that training in the use of metacognitive skills increases achievement in Mathematics (Fong, Ramakrishnan, & Choo, 2015). Researchers have also discovered relationships between metacognition and study habits and attitudes (Özsoy, Memiş, & Temur, 2009). Conceptually, this study assessed the relationship between the study habits in terms of metacognition of teacher trainees in PTCs in Southwestern Uganda and their proficiency in Mathematics.

Eisenkopf, Hessami, Fischbacher and Ursprung (2015) studied the effects of random assignment to coeducational and single-sex classes on the academic performance of female high school students who all face the same curriculum. The student's academic performance is observed over a period of up to four years. Their estimation results show that single-sex schooling improves the performance of female students in Mathematics. This positive effect is particularly large for female students with high ex-ante ability. An accompanying survey reveals that single-sex schooling also strengthens female students' self-confidence and renders the self-assessment of their Mathematics skills more level-headed. This study assesses the effect of gender on the relationship between study habits and mathematics proficiency of teacher trainees in PTCs in Southwestern Uganda.

As far as Mathematics proficiency assessment is concerned, there are national and international important systematic studies which give evidence for positive relationships between achievement and varied classroom settings and provide a larger context for a better understanding of regional performance, extending and enriching the local picture(Pensavalle & Solinas, 2013). The information obtained by the application of this Rasch Model approach provides a clear indication for further analysis to ascertain the causes that influence Mathematics proficiency. The Rasch model was performed on 888 students coming from 28 High Schools located in the central-northern part of the Sardinia region using a questionnaire to evaluate the level of ability in procedural fluency and a second questionnaire to evaluate strategic competence. The study provides more evidence in favour of the Rasch Model as an appropriate way for teachers and researchers to obtain richer interpretations of the relationship between students' proficiency and test items. In light of preliminary results, there is a need for local schools and universities, PTCs to become attuned to the full extent of the mathematics problem.

Ubaka, Sansgiry and Ukwe (2015) evaluated cognitive factors that might influence the academic performance of students in Nigerian pharmacy schools. A cross-sectional, multi-centre survey of Nigerian pharmacy students from 7 schools of pharmacy was conducted using 2 validated questionnaires measuring cognitive constructs such as test anxiety, academic competence, test competence, time management, and strategic study habits. The findings indicate female students and older students scored significantly better on time management skills and study habits, respectively. Test anxiety was negatively associated with academic performance while test competence, academic competence, and time management were positively associated with academic performance. These 4 constructs significantly discriminated between the lower and higher-performing students, with the first 2 contributing to the most differences. The study also demonstrated the significant effects of age, gender, and marital status on these constructs. The study was conducted among pharmacy students and cannot be generalised for Mathematics proficiency. This study was conducted among teacher trainees pursuing Mathematics in PTCs in Southwestern Uganda.

3. Methodology

3.1 Research Design

A correlational study design was adopted to determine the relationship between the study habits of primary teachers' trainees and their Mathematics proficiency. The design is considered appropriate for this study because of its ability to test relationships between variables(Bhandari, 2021).

The study applied quantitative approaches in data collection and analysis. Quantitative research approach places emphasis on numbers and figures in the collection and analysis of data. It also uses scientific methods for data collection and analysis make generalization possible. Quantitative research is also cheaper in terms of data collections. The issue of the researcher being biased with either his data collection or data analysis was highly eliminated when the researcher is not in direct

contact with the participants, that is, he collects his data through either telephone, internet or even pencil-paper questionnaire (Eyisi, 2016).

3.2 Study Population

The target population of the study was 750 teacher trainees in PTCs in Southwestern Uganda. This study specifically considered teacher trainees in the second year. As of April 2022, Bishop Stuart Core PTC Kibingo had 124 teacher trainees (Bishop Stuart Core PTC Director of Studies, 2022), Bulera Core PTC had 106 (Bulera Core PTC Director of Studies, 2022), Bushenyi Core PTC had 151(Bushenyi Core PTC Director of Studies, 2022). In addition, Canon Apolo Core PTC had 130(Canon Apolo Core PTC Director of Studies, 2022), Kabale-Bukinda Core PTC had 119(Kabale-Bukinda Core PTC Director of Studies, 2022), and St. George's Core PTC had 120(St. George's Core PTC Director of Studies, 2022) teacher trainees. Thus, a population of 750 teacher trainees was considered for this study.

3.3 Sample Size

The size of a sample should not be too enormous nor excessively little to satisfy the necessity of reliability, effectiveness, adaptability and representativeness (Francis et al., 2010). According to Field (2013), when the population of the study is greater than 30, it is prudent that one takes a sample. The sample size was determined using Krejcie and Morgan's (1970) tables as indicated in Appendix IV. According to Krejcie and Morgan (1970), a population of 750 gives a sample of 254. Thus, a sample of 254 teacher trainees was considered.

3.4 Sampling Techniques

This study employed stratified sampling in deciding the participants that were relevant to this study. The group of interest was teacher trainees stratified into different PTCs. The basis of stratification was based on the PTC in which each teacher trainee falls. Six (6) different strata were formed according to the PTCs. According to Kothari (2004), a stratum can be formed using the formula below.

$$n_s = n * N_s$$

Where n_s is the sample size of the stratum, n is the sample size of the study, and N_s is the population proportion of the stratum.

For example, for Bishop Stuart Core PTC Kibingo, the sample size of the stratum is

$$n_{Bishop} = 254 * \frac{124}{750} = 42$$

Table 1: Sampling and Sample Size

PTC	Population	Sample size
1. Bishop Stuart Core PTC Kibingo	124	42
2. Bulera Core PTC	106	36
3. Bushenyi Core PTC	151	51
4. Canon Apolo Core PTC	130	44
5. Kabale-Bukinda Core PTC	119	40
6. St. George's Core PTC	120	41
Total	750	254

3.5 Data Collection Methods

The researcher used mixed methods in collecting and analysing data. According to Sami (2016), the mixed strategy approach handles both quantitative and qualitative data concurrently. Mixed methods involved collecting, analysing and interpreting quantitative data through questionnaires and qualitative data through a proficiency test. The qualitative approach according to Mc Cusker and Sau (2015), is deemed fit when carrying out a study to accomplish research goals, which require diverse information. In this study, therefore, it was envisaged that the use of different data collection methods helped in dealing with the complexities of using one method. Methods that were used to collect the data include questionnaires and proficiency tests. This helped the researcher to do away with the weakness of using a single strategy approach.

3.6 Data Collection Instruments

Data collection instruments that were used here include a questionnaire and a written test both for students' categories. The teacher trainee questionnaire was used to collect data on demographic variables and study habits of teacher trainees. A questionnaire can be used to collect data in a short time. Students' Study Habit Assessment Scale (SSHAS) (Charles-Ogan, 2013) was adapted from the University of Puget Sound Learning Centre which is a structured Likert Scale-type questionnaire comprising 19 close-ended questions; these items were used for students' self-rating exercise, to describe their study habit in Mathematics.

A written test comprising 11 numbers mathematically tested (adapted from ACAE Mathematics Proficiency Test (2017). Teacher trainees were allowed to circle the best answer to several questions in 40 minutes after analysing the questions which require high reasoning. This helped the researcher get first-hand information

from teacher trainees about their proficiency in Mathematics. Clopper Pearson confidence interval was used on 11 questions whereby very high proficient trainees score between 11 to 9 marks, High scores between 8 to 6, a low score between 5 to 3 and very low proficient trainees score between 2 to 0 marks.

3.7 Validity and Reliability of Research Instruments

3.7.1 Validity of the Instruments

Validity refers to the extent to which questions in an instrument accurately measure the variables therein (Hair et al., 2003). Validity determines whether the research instrument truly measures what it is intended to measure (Mugenda & Mugenda, 2003). Adopting measurement scales reported in the literature guaranteed content validity. Content validity is an indication of how well a measure assesses a concept. By using measurement scales that have been tested and reported on in the literature, the researcher can be sure that the measure is valid and reliable, and that it is assessing the concept accurately.

3.7.2 Reliability of the instruments

Reliability refers to the degree to which a set of variables are consistent with what they are intended to measure (Amin, 2005). Reliability refers to the extent to which results are consistent over time. According to Tavakol and Dennick (2011), Cronbach's alpha is a test reliability technique that requires only a single test administration to provide a unique estimate of the reliability of a given test, whereas internal consistency describes the extent to which all the items in a test measure the same concept. The reliability of the Students' Study Habit Assessment Scale (SSHAS) was 0.86 calculated using Kuder-Richardson 21 for measurement of the internal consistency of the items Stephanie (2016). The supervisors indicated the areas where the content needs adjustment. The adapted instrument had reliability of 0.86 which was calculated using Kuder-Richardson 21 for the internal consistency of the items. Pre-testing and Pilot-testing were carried out to assess the reliability of the tool in the context of teacher trainees in PTCs in western Uganda. The survey tool was administered to participants selected from 10% of sample size. Thus, this study selected 23, year one teacher trainees of Bishop Stuart Core PTC to assess the reliability of the instrument using Cronbach alpha. The selected teacher trainees were not selected in the final study. The reliability of the 19 items that were used to assess study habits among teacher trainees in PTCs in South Western Uganda is presented in **Error! Reference source not found.**.

The Cronbach Alpha value of .844 was greater than the recommended value of 0.7. Thus, the items were reliable to be adopted and used for further analysis.

3.8 Data Collection Procedure

The researcher sought approval from the Department of Educational Foundation and Psychology, which was submitted together with the research proposal to the Research Ethics Committee (REC) of Mbarara University of Science and Technology. After clearance from REC, an introductory letter was obtained from the Dean, Faculty of Science, Mbarara University of Science and Technology (MUST), introducing the researcher to the principals of sampled Colleges, who eventually enabled him to access teacher trainees.

The researcher then oriented the student teachers of year 2 for 20 minutes about the nature and purpose of the study and sought their consent. Concerns and questions related to the study were dealt with, cooperation was sought and a guarantee of confidentiality was given to the participants.

3.9 Data Management and Analysis

Once the data was collected, it was cleaned. This involved determining inaccurate, incomplete, or unreasonable data to improve the quality through the correction of detected errors and omissions. Both the questionnaire and the marks from the proficiency test were given codes (1 to represent a correct answer and 0 for a wrong answer) to generate quantitative data. This data and its codes were then entered into Ms Excel, cleaned and exported to SPSS 26.0 program for analysis.

Data about the study habits of teacher trainees in Mathematics was generated using the five-point Likert scale in the study questionnaire. This mainly focused on the teacher trainees' self-rating in study habits in Mathematics. The responses in the scale will be rated and scored respectively as; Never (N) = 1, Rarely (R) = 2, Sometimes (S) = 3, Frequently (F) = 4 and Always (A) =5. The mean of the responses in each item from N to A for each respondent was computed. This generated a single construct to represent the study habits of teacher trainees. A scale of 0 to 2 to represent very low proficiency, 3 to 5 to represent low proficiency, 6 to 8 to represent high proficiency, and 9 to 11 to represent very high proficiency.

To find out the relationship between study habits and Mathematics proficiency tested using Pearson Correlation coefficient and regression analysis. Descriptive statistics were also used to describe the key characteristics of study participants.

4. Results and Discussion

4.1 Descriptive statistics for the study variables

The descriptive statistics were used to determine the levels of scores for each variable. That is to determine whether the scores in the variables were low, moderate

or high. The data was aggregated to arrive at totals for each item after which the mean for the item totals was computed to tell the overall level for each variable. The levels were interpreted using the standard brackets from which the tools (questionnaire) were adopted. The results were indicated in Table 2

Table 2: Descriptive Statistics for the study variables

Variable	N	Minimum	Maximum	Mean	SD	Skewness	Kurtosis	p
Study habits	254	1.105263	3.7895	2.562	.3837	0.7215	.1186	0.2750
Mathematics Anxiety	254	1.000	9.000	5.69685	1.4926	0.1402	.8747	0.3299

The results from Table 2 showed that all the study variables were normally distributed following the general rule of thumb of skewness or kurtosis being less than 1 (George & Mallery, 2010). Additionally, the statistical significance ($p>0.05$) confirming that both variables in the study were normally distributed and thus parametric analyses were used throughout in order to achieve study objectives. Specifically, mean, standard deviation and pearson product moment correlation were used to achieve all the study objectives.

4.2 Level of Study Habits among Teacher Trainees in PTCs

The first objective aimed at establishing the level of the study habits among teacher trainees in PTCs in South Western Uganda. Table 2 revealed that study habits among teacher trainees in PTCs in South Western Uganda was generally low (mean=2.562, std deviation= .3837).

4.3 The Level of Mathematics Proficiency

The findings in table 2 reveal that the mathematics proficiency among teacher trainees in South Western Uganda is low as evidenced by the Mean value of 5.6969 with a standard deviation of 1.49261. This is because a range of 0 to 2 to represent very low proficiency, 3 to 5 to represent low proficiency, 6 to 8 to represent high proficiency, and 9 to 11 to represent very high proficiency is used to interpret the findings in Table 2.

4.4 Relationship between Study Habits and Mathematics Proficiency

The third objective aimed at determining the relationship between study habits and Mathematics proficiency of PTC Trainees in South Western Uganda. Pearson correlation analysis was run in order to establish the relationship between the study variables followed by linear regression. The study findings were as shown in Table 3.

Table 3: Relationship between Study Habits and Mathematics Proficiency

Dependent Variable	Predictor	B	SE	*Beta*	R	R^2	Adj R^2	Sig	F
Mathematics proficiency	Study habits	1.636	.109	.686	.686	.471	.469	.000	224.178

In the correlation model, study findings in Table 3 indicated a high positive and statistically significant ($R = .686^{**}$, $p = .000$). Since the p-value < 0.05, the hypothesis "there is a significant relationship between study habits and Mathematics proficiency among teacher trainees in PTCs in South Western Uganda" was retained. This implies that an improvement in study habits is associated with an improvement in and Mathematics proficiency among teacher trainees in PTCs in South Western Uganda.

In regression model, findings in table 4.4 indicate that study habits contribute a statistically significant ($p < 0.05$ level) variation of 46.9% in explaining mathematics proficiency among teacher trainees in PTCs in South Western Uganda.

4.5 Discussion of findings

4.5.1 Level of Study Habits among Teacher Trainees

The study established that the study habits of teacher trainees were generally low. Similarly, in a study to investigate pre-service teachers' conceptions of online learning during the transition from face-to-face to emergency distance education in Italy, Sweden and Iran

was conducted (Tarchi et al., 2022) reported that conceptions of online learning were found to be underdeveloped. However, this was a study based on conceptions of online learning among pre-service teachers defined online learning, the self-regulated learning skills associated with it and how they compared it to face-to-face education. Besides, Tarchi et al. (2022) asked about the characteristics of their online courses, yielding information about the online learning conditions and experiences. in a similar way recommended that pre-service teachers needed to develop a flexible approach to self-regulated learning skills taking into consideration of the demands of the specific educational setting.

In addition, some study habits are considered to be more desirable than others from the view of academic achievement (Arora, 2016). Although variations exist among the students, some good study habits will lead to academic achievement. Good study habits are the practices that could improve students' concentration, remembering, organizing time, studying, listening and taking notes, taking tests and motivation (Llavore et al., (2015).

According to Sharma and Vyas (2016), study habits refer to the way of exercising students' abilities in the process of learning. The general belief is that students who exercise good study habits are expected to excel more than those with bad study habits (Arora, 2016). For study habits of teacher trainees, the obtained moderate study habits were measured in terms of the eight domains which include time management, physical status, and study aids/note taking, testing strategies, and learning motivation, reading ability, memory and health.

Students who have good study habits are organized, keep good notes, read textbooks, listen in class, and come to class every day (Verma, 2016). Charles-Ogan and Alamina (2014) found in their study that the majority of the students in the public secondary schools in the Port Harcourt Local Government Area have good study habits. Hence, teachers should provide ways in improving the student's study habits by capitalizing on the student's strengths and working on their weaknesses by preparing activities that match their cognitive abilities and time for independent learning must be used properly to increase Mathematics proficiency (Dela Cruz, 2018). However, Arora (2016) revealed that proper study habits should be taught at the early stage students and efforts should be made both by parents and the school authorities to provide a suitable environment to develop good study habits among the students to stop academic failure. Therefore, it can be said that learning how to study or develop good study habits is a lifelong process, and one should be ready to modify one's method of study according to the need of time (Lawrence, 2014).

Studies claimed that the continual trend of poor achievement in mathematics is a function of cross-factors related to students, teachers, and schools. It is evident from several studies that student, teacher, and curriculum factors seem to have a significant effect on mathematics achievement. Crow and Crow (1992) stated that effective study habits include plan/place, a definite timetable and taking brief well-organised notes.

A student who cultivates certain study habits will perform differently from a student who has another set of study habits. It is believed that a student who lacks effective and efficient means of studying would be building on a shaky foundation and consequently will have a weak foundation. The teachers teach all the students collectively, but all the students do not have the same grades, here we see underachievers and high achievers in mathematics. Findings by Oluwatimilehin and Owoyele (2012) revealed that of all the study habits teacher consultation, was most influential while time allocation, exercise, concentration, note-taking, reading and assignments were regarded as less integral to students' academic performance.

4.5.2 Mathematics Proficiency among Teacher Trainees

The findings of this study indicate that Mathematics proficiency among teacher trainees in PTCs in South Western Uganda is low. The low mastery in Mathematics has become a great concern for parents, educationists, and the government of Uganda. The continuing trend of low proficiency in mathematics in PTCs raises concerns to the Ugandan government and the stakeholders on whether or not the Ugandan education system can supply graduates who possess the essential skills to enable them to cope with the ever-evolving technological society. Researchers and educationists have made frantic efforts to find out the causes of low achievement in the subject. Similarly, in a study in pre-School Teachers in Teaching Mathematics in Nigeria to determine how frequently pre-school instructors used the scaffolding teaching style when instructing math, ex-post-facto research was used whereby both descriptive and inferential approaches were used to examine the data found out that low math proficiency was linked to limited use of scaffolding (Afolabi & Yakubu, 2022). Besides, the study advised maintenance of focus on ongoing instruction in the approach during in-service training in order to increase math performance.

In concurrence to the findings that mathematics proficiency was low, Ngware and Mutisya (2022) revealed that there was dominance of teaching activity in math lessons where individual seat work in Kenya and whole class chorus in Uganda was preferred. Such teaching methods were considered ineffectiveness implying that education systems in sub-Saharan Africa needed to reinvigorate teaching practices and any efforts to increase daily learning hours were counterproductive. However, this was a study examining the teaching styles and active teaching in East Africa in an attempt to examine what accounts for differences in performance between schools, and provide some lessons for sub-

Saharan Africa using data from 428 teachers in primary schools in Kenya and 157 teachers in primary schools in Uganda (Ngware & Mutisya, 2022). Moreover, findings showed that teaching practice in math is inclined towards the command and task styles that do not promote critical thinking among learners. Thus, these findings show a vicious cycle of mathematics proficiency in Uganda and Africa at large.

4.5.3 Relationship between Study Habits and Mathematics Proficiency

This study established a high positive relationship between study habits and mathematics proficiency. Educators are increasingly recognizing the importance of improving students' proficiency in Mathematics. With this in mind, the researcher focused on the study habits as an influence on this proficiency by conducting both the bivariate correlation and linear regression. The results of bivariate correlation reveal a substantial significant positive correlation between study habits and Mathematics proficiency among teacher trainees in PTCs in South Western Uganda. Thus, teacher trainees with good study habits perform well in Mathematics and students with poor study habits perform badly in Mathematics. Moreover, Sharma and Vyas (2016) stated that good study habits will result in good academic achievement, whereas bad study habits will result in poor academic achievement. For instance, students who take notes in class, review material regularly, and study in a quiet environment tend to perform better academically than those who do not. This is because taking notes and reviewing the material regularly helps students to better internalize and understand the concepts they are learning. Additionally, studying in a quiet environment helps students to remain focused and prevent distractions which can interfere with their ability to absorb information. Furthermore, regular studying and note-taking also improve recall, allowing students to better remember and apply the information they have learned in the future. Therefore, the regular practice of note-taking and studying in a quiet environment can lead to improved understanding, focus, and recall of the material.

Additionally, good study habits lead to better mathematics achievement and a lack of good study habits results in poor mathematics achievement (Odiri, 2015). This is because good study habits, such as taking notes, reading course materials, and practising mathematics problems, help students to better understand the material and build the skills needed for mathematics success. Good study habits include setting aside dedicated study time, breaking down large tasks into smaller tasks, and seeking help from instructors or tutors when needed. For instance, when studying for a math test, students should review their notes and practice math problems each day during their dedicated study time, instead of cramming the night before the test. Additionally, they should plan out a specific timeline for when they will review topics and complete practice problems, so they can ensure they are adequately prepared for the test.

This study contradicts a study by Villa and Sebastian (2021) who found that study habits had no significant relationship with students' mathematics achievement. The study by Villa and Sebastian (2021) was conducted among 258 freshman students enrolled in the subject mathematics in the Modern World taking at a certain state university in Southern Luzon, Philippines. This study was conducted among a different population of students, which may explain why the results are different. The participants in this study were teacher trainees in PTCs in western Uganda, which is a more diverse environment than the one studied by Villa and Sebastian (2021). Additionally, this study employed a different methodology, which could also explain the discrepancy in results.

The findings of this study reveal that there is a significant positive relationship between study habits and Mathematics proficiency among teacher trainees in PTCs in South Western Uganda. The findings are consistent with Odiri (2015) who found a significant relationship between study habits and Mathematics achievements in Delta Central Senatorial District, Delta State, Nigeria. The study habits of teacher trainees play a vital role in reflecting the standard of education and their proficiency in Mathematics. The teacher trainees cannot be expected to learn everything needed about the subject from their tutors in the classroom alone, it is the combination of both classroom learning and out-of-classroom learning that make up students' study habits.

Several studies have attributed students' low proficiency in mathematics to the student, teacher, and curriculum factors. For this study, study habits among teacher trainees in PTCs in South Western Uganda were assessed to determine their influence on their mastery of Mathematics.

The findings of this study further revealed that if the study habits of teacher trainees are enhanced, their proficiency in Mathematics also increases. Improving study habits among students may enhance their mathematics achievement (Daniel, 2015). Therefore, the focus should be on improving study habits to enhance the mathematics proficiency of teacher trainees. For instance, by utilizing effective planning methods such as goal setting, time management and breaking tasks into smaller, more manageable segments, teacher trainees can improve their Mathematics proficiency. The results of this study also show that study habits significantly contribute to Mathematics proficiency among teacher trainees in PTCs in South Western Uganda. This is likely because students who have better study habits, such as studying more regularly and for longer periods, are more likely to understand and retain the material presented in the course. Additionally, studying with others reinforces the material and helps to further increase comprehension. Riaz et al (2002) observed that there is a positive

relationship between study habits and mathematics achievement. Students fail to make sufficient effort to learn what their teachers teach them at school. They also do not study at home because they fail to recognise the importance of study habits to their academic achievement. This is because they are not aware of the long-term benefits of their study habits and the potential impact they can have on their academic achievement. By not studying, they are missing out on the opportunity to build their knowledge and understanding which can be beneficial for their future learning. For instance, students who don't study regularly often struggle to keep up with the pace of their classes and may have difficulty understanding more complex topics. As a result, these students often find themselves falling behind in their studies and unable to catch up, leading to lower grades and a poorer quality of education. With these, this study can conclude that study habits are a predictor of teacher trainees' proficiency in Mathematics and that for a student to do well in the subject he/she must use an appropriate method for studying the subject Mathematics.

5. Conclusion and Recommendations

5.1 Conclusion

Most of the second-year teacher trainees in PTCs in South Western Uganda have averagely effective study habits. It can be concluded that teacher trainees in PTCs in South Western Uganda have moderate study habits. Desirable study habits mean that the teacher trainees know the importance of study habits in his or her proficiency in Mathematics.

It can also be concluded that Mathematics proficiency in general arithmetic skills among teacher trainees in PTCs in South Western Uganda is still low. This is evidenced by the fact that over half of the teacher trainees were unable to correctly answer questions that tested their general arithmetic skills. This indicates that teacher trainees in PTCs in South Western Uganda lack the necessary knowledge and skills in math to provide effective teaching.

There is a significant positive relationship between study habits and Mathematics proficiency among teacher trainees in PTCs in South Western Uganda. It can be concluded that teacher trainees with better study habits are proficient in Mathematics and vice versa. This is backed up by the results of this study conducted among teacher trainees in the region, which revealed that those with better study habits tended to have better grades in Mathematics. Furthermore, this study also showed that those who put in more effort in studying Mathematics by dedicating more time to it and taking advantage of available resources had higher scores in Mathematics proficiency tests.

5.2 Recommendations

From this study, it is recommended that regular counselling services be provided to train teacher trainees on strategies of study habits to boost their study habits and enhance their proficiency in Mathematics. The researcher recommends that the PTCs should monitor or revisit the methods of teaching and learning Mathematics in line with the study habits of teacher trainees. Knowledgeable Mathematics specialists and advisers could be enlisted for regular visits to the institutions to assist the teacher trainees.

The PTCs should ensure that their educators are adequately qualified to teach mathematics as a subject as well as being able to teach their learners in a way that they understand the subject. In addition, teachers who are knowledgeable in teaching mathematics should be appointed to teach mathematics. The PTCs should also ensure that compulsory workshops are provided for Mathematics teachers at the school level. In addition, PTCs should ensure that educators can identify learners that are underperforming, monitor the utilisation of study time and assist in resolving problems regarding the poor performance of such individual learners.

References

Ahimbisibwe, P. (2021, January 15). Government hikes teachers' entry grades to colleges. Retrieved 13 April 2022, from Monitor website: https://www.monitor.co.ug/uganda/news/national/government-hikes-teachers-entry-grades-to-colleges-1687220

Afolabi, T. A., & Yakubu, C. (2022). Use of Scaffold Method by Pre-School Teachers in Teaching Mathematics in Nigeria. *Journal of Education and Teaching Methods, 1*(1), 27-39.

Alordiah, C. O., Akpadaka, G., & Oviogbodu, C. O. (2015). The Influence of Gender, School Location and Socio-Economic Status on Students' Academic Achievement in Mathematics. *Journal of Education and Practice*, *6*(17), 130–136.

Arora, M. R. (2016). Academic achievement of adolescents in relation to study habits. *International Journal of Indian Psychology*, *3*(2). https://doi.org/10/gq6jhc

Baruch, Y., & Holtom, B. C. (2008). Survey response rate levels and trends in organizational research. *Human Relations*, *61*(8), 1139–1160.

Bhandari, P. (2021, July 7). An introduction to correlational research. Retrieved 8 April 2022,

from Scribbr website: https://www.scribbr.com/methodology/correlational-research/

Blaich, C., Wise, K., Blaich, C., & Wise, K. (2011). *From gathering to using assessment results: Lessons from the Wabash national study (NILOA Occasional Paper No*.

Bland, M. (2015). *An introduction to medical statistics*. Oxford university press.

Byrnes, J. P., & Wasik, B. A. (2009). Factors predictive of mathematics achievement in kindergarten, first and third grades: An opportunity–propensity analysis. *Contemporary Educational Psychology*, *34*(2), 167–183. https://doi.org/10.1016/j.cedpsych.2009.01.002

Chand, S., Chaudhary, K., Prasad, A., & Chand, V. (2021). Perceived causes of students' poor performance in Mathematics: A case study at Ba and Tavua secondary schools. *Frontiers in Applied Mathematics and Statistics*, *7*(6), 1–13.

Charles-Ogan, G., & Alamina, J. (2014). Differential students' study habit and performance in Mathematics. *Journal of Education and Practice*.

Clemence-Mkhope, D. P., Varatharajah, P., Oldham, J. M., Tankersley, B., & Seongtae, K. (2019). SCALE-UP Instructional Redesign of a Calculus Course at an HBCU. *International Journal for Innovation Education and Research*, *7*(1), 31–44. https://doi.org/10.31686/ijier.vol7.iss1.1279

Cooper, D.R. & Schindler, P. S. (2014). *Business Research Methods* (12th ed.). New York: McGraw-Hil.

Cortez, S. R. (2019). *The impact of veteran peer-tutoring on Mathematics course performance* (PhD Thesis). Texas State University, San Marcos.

Cuy, N. A., & Salinas, E. M. (2019). Aspiration and Readiness of Filipino Senior High School Students in Pursuing College Degree. *Open Journal of Social Sciences*, *7*(5), 143–152. https://doi.org/10.4236/jss.2019.75012

Daniel, A. (2015). Influence of achievement motivation and study habits on students academic achievement in Mathematics. *Indian Journal Of Applied Research*, *5*(8), 562–565.

Deci, E., & Ryan, R., M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum Press.

Descargar, A., E., & Cardona, R., S. (2016). Revisiting the study habits and performance in Math of grade 7 students: A basis for a proposed enhancement program. *Researchers World : Journal of Arts, Science and Commerce*, *VII*(2), 77–82. https://doi.org/10.18843/rwjasc/v7i2/07

Diaz, E. D., & Dio, R. V. (2017). Effectiveness of Tri-in-1 strategic intervention materials for grade 9 students through solomon four-group design. *Published in Asia Pacific Journal of Education, Arts and Sciences*, *4*(1).

Dolan, C. (2009). *Social torture: The case of northern Uganda, 1986–2006*. Oxford: Berghahn Books.

Eisenkopf, G., Hessami, Z., Fischbacher, U., & Ursprung, H. W. (2015). Academic performance and single-sex schooling: Evidence from a natural experiment in Switzerland. *Journal of Economic Behavior & Organization*, *115*, 123–143. https://doi.org/10.1016/j.jebo.2014.08.004

Eyisi, D. (2016). The usefulness of qualitative and quantitative approaches and methods in researching problem-solving ability in science education curriculum. *Journal of Education and Practice, 7*(15), 91-100.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). Newcastle: Sage.

Fong, H. K., Ramakrishnan, C., & Choo, M. (2015). *Math in focus: Singapore math by Marshall Cavendish*. Marshall Cavendish Education.

Francis, J. J., Johnston, M., Robertson, C., Glidewell, L., Entwistle, V., Eccles, M. P., & Grimshaw, J. M. (2010). What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychology and Health*, *25*(10), 1229–1245.

George, D. (2011). *SPSS for windows step by step: A simple study guide and reference, 17.0 update, 10/e*. Pearson Education India.

George, D., & Mallery, P. (2010). SPSS for Windows step by step: A simple guide and reference, 14.0 update. *(No Title)*.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486–489.

Gjicali, K., & Lipnevich, A. A. (2021). Got math attitude? (In)direct effects of student mathematics attitudes on intentions, behavioral engagement, and mathematics performance in the U.S. PISA. *Contemporary Educational Psychology*, *67*, 102019. https://doi.org/10.1016/j.cedpsych.2021.102019

Guest, D. E. (2011). Human resource management and performance: still searching for some answers. *Human resource management journal*, *21*(1), 3-13.

HAIR, J. F. J., BABIN, B., MONEY, A. H., & SAMOUEL, P. (2003). *Essential of Business Research Methods*. New Jersey: JohnWiley & Sons.

Hayes, S. C., Ciarrochi, J., Hofmann, S. G., Chin, F., & Sahdra, B. (2022). Evolving an idionomic approach to processes of change: Towards a unified personalized science of human improvement. *Behaviour Research and Therapy*, 104155.

Kelderman, B. (2021). *Students' definitions of academic success* (PhD Thesis). University of Nebraska, Lincoln.

Kilpatrick, J., Swafford, J., & Findell, B. (2003). *Adding it up: Helping children learn mathematics* (3rd ed.). Washington, DC: National Academy Press.

Kisekka, C. (2021, October 20). 23 Colleges to Close as Gov't Phases Out Grade III, V Teaching Qualifications : Retrieved 8 April 2022, from Uganda Radio Network website: https://ugandaradionetwork.net/story/23-colleges-to-close-as-govt-phase-out-grade-iii-v-teaching-qualifications

Kitubi, M. (2021, October 21). Shimon becomes teachers' university, 23 PTCs phased out. Retrieved 8 April 2022, from New Vision website: https://www.newvision.co.ug/articledetails/117878

Kothari, C. R. (2004). *Research methodology: Methods and techniques*. New Delhi: New Age International (P) Limited.

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607–610.

Lacaba, A. B., Magalona, J. D., & Lacaba, T. V. G. (2018). "Peer Teaching Strategy To Increase Mathematics Proficiency Level" (An Action Research) (Eastern Samar State University). *International Journal of Scientific Research and Management*, *6*(08), M–79. https://doi.org/10.18535/ijsrm

Lein, A. E., Jitendra, A. K., Starosta, K. M., Dupuis, D. N., Hughes-Reid, C. L., & Star, J. R. (2016). Assessing the Relation Between Seventh-Grade Students' Engagement and Mathematical Problem Solving Performance. *Preventing School Failure: Alternative Education for Children and Youth*, *60*(2), 117–123. https://doi.org/10.1080/1045988X.2015.1036392

Lester, F. K. (2007). *Second Handbook of Research on Mathematics Teaching and Learning: A Project of the National Council of Teachers of Mathematics*. Charlotte: IAP.

Ma, X. (1999). A Meta-Analysis of the Relationship between Anxiety toward Mathematics and Achievement in Mathematics. *Journal for Research in Mathematics Education*, *30*(5), 520–540. https://doi.org/10.2307/749772

Maiyo, J., & Atsiaya, E., Siahi. (2015). Study of the relationship between study habits and academic achievement of students: A case of Spicer Higher secondary school, India. *International Journal of Educational Administration and Policy Studies*, *7*(7), 134–141. https://doi.org/10.5897/IJEAPS2015.0404

Marx, J., Wolf, M. G., & Howard, K. (2016). A spoonful of success: Undergraduate tutor-tutee interactions and performance. *Learning Assistance Review*, *21*(2), 85–108.

Mayes, S. D., Calhoun, S. L., Bixler, E. O., & Zimmerman, D. N. (2009). IQ and neuropsychological predictors of academic achievement. *Learning and Individual Differences*, *19*(2), 238–241. https://doi.org/10.1016/j.lindif.2008.09.001

Mnyandu, P. T. (2009). *The relations between self-determination, achievement motivation and academic achievement* (Thesis). Retrieved from https://uir.unisa.ac.za/handle/10500/2491

Mugenda, O. M., & Mugenda, A. G. (2003). *Quantitative and qualitative approaches*. Nairobi: African Centre for Technology Studies Press.

Namamba, A., & Rao, C. (2017). Preparation and professional development of teacher educators

in tanzania: Current practices and prospects. *Journal of Education and Practice*, 10.

Namwanje, S. (2022, February 22). Primary Teachers' Colleges to be phased out by July. Retrieved 7 April 2022, from Nile Post website: http://nilepost.co.ug/2022/02/22/primary-teachers-colleges-to-be-phased-out-by-july/

Nandwa, O. M., Wasike, D. W., & Wanjala, T. W. (2015). Influence of instructional practices on secondary school students' achievement in Mathematics. *Journal of Education and Practice*, *6*(26), 29–36.

Nargloric, C., Utanes. (2019). α,β,γ,… of mathematics proficiency: Constructs of excellence by highly mathematical proficient. *The Asian Intellect Research and Education Journal*, *12*(8), 64–72.

National Council of Teachers of Mathematics (NCTM). (2014). *Principles to actions: Ensuring mathematical success for all*. Reston, VA: Author.

National Research Council. (2001). *Read "adding it up: Helping children learn Mathematics*. Washington, DC: The National Academies Press. https://doi.org/10.17226/9822

Newbert, S. L. (2007). Empirical research on the resource-based view of the firm: An assessment and suggestions for future research. *Strategic Management Journal*, *28*(2), 121–146.

Ngware, M. W., & Mutisya, M. (2022). Math pedagogical practices in Kenya and Uganda, and their implications to learning in sub-Saharan Africa. *Journal of Applied Learning and Teaching, 5*(Sp. Iss. 2).

Niepel, C., Burrus, J., Greiff, S., Lipnevich, A. A., Brenneman, M. W., & Roberts, R. D. (2018). Students' beliefs and attitudes toward mathematics across time: A longitudinal examination of the theory of planned behavior. *Learning and Individual Differences*, *63*, 24–33. https://doi.org/10.1016/j.lindif.2018.02.010

Núñez, J. C., Suárez, N., Rosário, P., Vallejo, G., Valle, A., & Epstein, J. L. (2015). Relationships between perceived parental involvement in homework, student homework behaviors, and academic achievement: Differences among elementary, junior high, and high school students. *Metacognition and Learning*, *10*(3), 375–406. https://doi.org/10.1007/s11409-015-9135-5

Odiri, O. E. (2015). Relationship of study habits with Mathematics achievement. *Journal of Education and Practice*, *6*(10), 168–170.

Oluwatimilehin, J. T. B., & Owoyele, J. W. (2012). Study habits and academic achievement in core subjects among junior secondary school students in Ondo state, Nigeria. *Bulgarian Journal of Science and Education Policy*, *6*(1), 16.

Opdenakker, M.-C., & Van Damme, J. (2007). Do school context, student composition and school leadership affect school practice and outcomes in secondary education? *British Educational Research Journal*, *33*(2), 179–206. https://doi.org/10.1080/01411920701208233

Osborne, J. W., Christianson, W. R., & Gunter, J. S. (2001, April). *Educational psychology from a statistician's perspective: A review of the quantitative quality of our field*. Presented at the Paper presented at the Annual Meeting of the American Educational Research Association, Seattle. Seattle.

Osborne, J., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical Assessment, Research, and Evaluation*, *8*(1).

Özsoy, G., Memiş, A., & Temur, T. (2009). Metacognition, study habits and attitudes. *International Electronic Journal of Elementary Education*, *2*(1), 154–166.

Pensavalle, C. A., & Solinas, G. (2013). The Rasch Model Analysis for Understanding Mathematics Proficiency—A Case Study: Senior High School Sardinian Students. *Creative Education*, *4*(12), 767–773. https://doi.org/10.4236/ce.2013.412109

Peteros, E., Columna, D., Etcuban, J., Almerino, J., & Almerino, J. (2019). Attitude and Academic Achievement of High School Students in Mathematics Under the Conditional Cash Transfer Program. *International Electronic Journal of Mathematics Education*, *14*. https://doi.org/10.29333/iejme/5770

Riggers-Piehl, T., Lim, G., & King, K. (2018). Fostering academic and social engagement: An investigation into the effects of all-girls education in the transition to university. *Higher*

Education Research Institute at University of California, Los Angeles.

Rogelberg, S. G., & Stanton, J. M. (2007). *Introduction: Understanding and dealing with organizational survey nonresponse*. Sage Publications Sage CA: Los Angeles, CA.

Rossides, N. (2022). *Engaging the Workforce: The Grand Management Challenge of the 21st Century*: Taylor & Francis.

Ryan, R. M., & Deci, E. L. (2019). Brick by brick: The origins, development, and future of self-determination theory *Advances in motivation science* (Vol. 6, pp. 111-156): Elsevier.

Ryan, R. M., & Vansteenkiste, M. (2023). Self-Determination Theory: Metatheory, Methods, and Meaning. *The Oxford Handbook of Self-Determination Theory*, 3.

Ryan, R. M., Deci, E. L., Vansteenkiste, M., & Soenens, B. (2021). Building a science of motivated persons: Self-determination theory's empirical approach to human experience and the regulation of behavior. *Motivation Science, 7*(2), 97

Sawyer, A. G. (2018). Factors influencing elementary Mathematics teachers' beliefs in reform- based teaching. *The Mathematics Educator*, *26*(2), 26–53.

Sharma, G., & Vyas, C. (2016). *A review on study habits of school going children in relation to their academic achievement*. *2*(5), 166–171.

Singh, P. (2015). Interaction effect of brain hemispheric dominance and self concept on academic achievement in Mathematics. *International Journal of Engineering and Science*, *5*(9), 27.

Sinyosi, L. B. (2015). *Factors affecting grade 12 learners' performance in mathematics at Nzhelele East circuit: Vhembe District in Limpopo* (PhD Thesis, University of South Africa). University of South Africa, Pretoria. Retrieved from https://uir.unisa.ac.za/handle/10500/20245

Sithole, A., Chiyaka, E. T., McCarthy, P., Mupinga, D. M., Bucklein, B. K., & Kibirige, J. (2017). Student attraction, persistence and retention in stem programs: Successes and continuing challenges. *Higher Education Studies*, *7*(1), 46–59.

Steinmayr, R., & Spinath, B. (2009). The importance of motivation as a predictor of school achievement. *Learning and Individual Differences*, *19*(1), 80–90. https://doi.org/10.1016/j.lindif.2008.05.004

Tarchi, C., Brante, E. W., Jokar, M., & Manzari, E. (2022). Pre-service teachers' conceptions of online learning in emergency distance education: How is it defined and what self-regulated learning skills are associated with it? *Teaching and Teacher Education*, *113*, 103669.

TAVAKOL, M., & DENNICK, R. (2011). Making Sense of Cronbach's Alpha. *International Journal of Medical Education*, *2*, 53.

Ubaka, C. M., Sansgiry, S. S., & Ukwe, C. V. (2015). Cognitive Determinants of Academic Performance in Nigerian Pharmacy Schools. *American Journal of Pharmaceutical Education*, *79*(7), 101. https://doi.org/10.5688/ajpe797101

Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions (Vol. 44, pp. 1-31): Springer.

Villa, E. A., & Sebastian, M. A. (2021). Achievement Motivation, Locus of Control and Study Habits as Predictors of Mathematics Achievement of New College Students. *International Electronic Journal of Mathematics Education*, *16*(3), em0661. https://doi.org/10/gq6fjb

Were, C. A. (2020). *Factors influencing the retention of female students in science, technology, engineering and mathematics (stem) courses, at the technical university of Kenya* (PhD Thesis). University of Nairobi, Nairobi.