IOSR Journal of Research & Method in Education (IOSR-JRME)
e-ISSN: 2320–7388, p- ISSN: 2320-737x Volume 11, Issue 4 Ser. II (Jul. – Aug. 2021), PP 51-56
www.iosrjournals.org

Assessment to Determine Relationship between Learners' Self-Efficacy and Performance in the Topic of Probability: A Case of Selected Secondary Schools in Meru County, Kenya.

Grace Wanja Murithi
Department of Education
Education and Social Sciences of the University of Embu, Kenya

Dr. Peter Rugano
Department of Education
University of Embu, Kenya

Dr. Wangila Eric Wekesa
Department of Curriculum and Instruction,
Masinde Muliro University of Science and Technology, Kenya

Dr. Zachary Njagi
Department of Education
University of Embu

Abstract
Background: *Though Mathematics is an important and major subject taught in schools, the performance in the subject has been very poor. Learner's Self-efficacy on the topic of probability may determine their ability to tackle questions. There is insufficient empirical data on the influence of learners' self-efficacy on academic performance in the topic of Probability in Meru County. This study therefore sought to establish the relationship between learners' self-efficacy and performance in the topic of Probability. The study was guided by John Dewey's Theory of Progressive Learning. Dewey's theory mainly emphasizes pragmatism in teaching. The study was conducted in Meru County and targeted form four students and Mathematics teachers. Stratified sampling was used to select 5 secondary school Mathematics teachers and a sample of 1216 randomly selected learners from their classrooms.*
Material and methods*: Data collection instruments were survey questionnaire and an interview guide. A pilot study was conducted to check on validity and reliability of the instruments. Data analysis utilized statistical measures of central tendency and dispersion. Simple regression analysis was used to determine the statistical relationship (y=a+bx) between self-efficacy and performance in the topic of Probability. Further, Pearson correlation coefficient (r) was computed to determine the extent of the relationship between learners' self-efficacy and performance in Probability.*
Result: *This relationship was considered to be a perfect positive relationship with a value of +1%. The results indicated that there exists a strong positive correlation between learners' self-efficacy and performance in the topic of Probability in Meru County. The study hypotheses were tested using Chi-Square and t test. It was anticipated that leaners' self-efficacy was low, and correlated to the dismal performance in the topic. SPSS and Microsoft Excel were used to perform the data analysis.*
Conclusion*: The findings of this study will be crucial in helping educational stakeholders to develop suitable pedagogies to address learners' weaknesses and challenges, and provide strategies for improving learners' self-efficacy in Mathematics and other subjects as well.*
Key Words: Learners, Self-Efficacy, Probability,

Date of Submission: 02-07-2021 Date of acceptance: 17-07-2021

I. Introduction

Education is the backbone of a country's activities considered as the major strategy to help the citizens of a country to walk out of poverty. It is considered as an important tool for economic development (Skinner, 2012). It is a key economic driver in the world's economy in many parts of the world over years. It is one of the

main lifeblood sectors of countries and utilizes a larger portion of their national budget. Governments have put efforts in ensuring that there is success in the various educational programs by providing resources ranging from infrastructure, human capital, reading materials and an enabling learning environment. The state has the duty towards ensuring that educational facilities are provided without failure in collaboration with institutions like the World Bank, International Monetary Fund (IMF), United Nations Educational Scientific and Cultural Organization (UNESCO) among other relevant institutions. Many countries consider education as the most significant strategy for alleviating poverty. It is considered as a vital tool for economic, social and political progress (Armstrong, 2011). Education is recognized by many countries in the world as a major bridge to industrial development, informed citizenly and national cohesion (Manderlink, & Harackiewicz, 2014). It is therefore crucial for citizens of any country to access quality education in order to meet the nation's education objectives and goals. Some of the educational goals include promotion of nationalism, national unity, social equality and responsibility, economic, social and industrial development, cultural development and appreciation, international consciousness for other nations and attitudes towards good environmental protection. In order to achieve the educational goals, the education progression is divided in to various levels from elementary to senior learning (Ormrod, 2011). There exist several challenges in that students face while handling various problems in the specific subjects that are studied in schools. Mathematics is one of the core subjects that are taught in secondary schools and is by fact a compulsory subject (Miheso, 2012) and Osena, 2007). Despite the efforts by different participants in education, the trend in the performance of mathematics as a subject has been deteriorating over the years. According to GoK (2016), many learners find mathematics as a thorn in the flesh even in the topics that would be assumed easy to handle. Performance in mathematics has been hampered by a number of variables ranging from content, teaching materials, teacher orientation and student personality among other challenges. students have experienced difficulties in their endeavor to learn.

The performance in Meru County in Mathematics dropped from 28.3% in 2016 to 25.8 % in 2017 (Meru County Education Office, 2017). One of the factors that affect performance is self-efficacy, which is an attribute that predicts an individual's learning outcomes in specific study areas more comprehensively than skills alone (Alexander, Nuchols, Bloom, & Lee, 2010). Even when the fluctuations in performance in Probability can be explained by fluctuations in student's self-efficacy on the topic, it is not clear how and to what extent self-efficacy on this topic affects students' performance in Meru County. This study investigated self-efficacy and its effects on performance in Mathematics in the topic of Probability in Meru County by determining the relationship between learners' self-efficacy and performance.

Construct of Self-Efficacy

Self-efficacy (SE) refers to an individual's belief that they are able to succeed given any task that they encounter (Bandura, 2007). Self-efficacy is a major agency mechanism in that it affects the way individuals think and behave, especially in difficult situations. In academic contexts, self-efficacy can induce learners' motivational, cognitive, and behavioral engagements in instructional activities. We ought to pay extraordinary attention to self-efficacy when setting objectives to make sure that our efficacy beliefs are in line with our aims and not working against them. What people aim to do is envisaged in their belief in their ability and if the effort expended on a certain goal in life will bring the desired results or not.

The self-efficacy construct is derived from social cognitive theory (SCT) by Albert Bandura. Social Cognitive Theory (SCT) started as the Social Learning Theory (SLT) in the 1960s by Albert Bandura (Bandura 2007). It developed into the SCT in 1986 and posits that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior. The unique feature of SCT is the emphasis on social influence and its emphasis on external and internal social reinforcement. SCT considers the unique way in which individuals acquire and maintain behavior, while also considering the social environment in which individuals perform the behavior (Marsh *et al.*, 2013).

Environments and social systems influence human behavior through psychological mechanisms of the self -system. Hence, social cognitive theory posits that factors such as economic conditions, socioeconomic status, and educational and familial structures do not affect human behavior directly. They influence people's aspirations, self-efficacy beliefs, personal standards, emotional states, and other self-regulatory influences. This social cognitive view of human and collective functioning have a profound influence on psychological thinking and theorizing during the last two decades of the twentieth century and into the new millennium (Derbitzin *et al.,* 2013).

II. Material And Methods

Research Design

This descriptive research adopted both qualitative and quantitative strategies to establish the impact of learners' self-efficacy on performance. Kothari (2004) explains that a descriptive research is one that aims at describing the characteristics of a population. The study thus determined the self-efficacy of the learners and

how this correlated to performance in the topic of Probability. The design was crucial in helping to compare the various responses, check their errors and objectively select those which were more significant in helping draw several inferences on learners' SE and performance. Flexibility of the design to employ various scientific approaches towards analyzing results ensured that the results indicated here could be more reliable and valid.

Target Population

The study targeted all Mathematics teachers and learners from the 211 public secondary schools in Meru County. The population of public secondary schools' learners and teachers in Meru County is 54,682 and 4,927 respectively (CIDP, Meru). However, this study only targeted 12,491 form four learners and 456 Mathematics teachers in public secondary schools.

Sample Size

An optimum sample is one which satisfies the essentials of efficiency, representatives, reliability and flexibility (Kothari, 2014). Thus the required sample size for the schools was 152 schools out of the 211 public secondary schools as depicted in table 3.2 Sampling of schools will follow Sub-County geo-political classification such that a proportionate number of school in each cluster will be selected from each sub county.

Sample Size Calculation

Data screening was done by scrutinizing the completed questionnaires and face validity of the responses in an effort to identify and minimize, as far as possible errors, incompleteness, misclassification and gaps in the information obtained from the respondents. This helped in providing reliable and dependable inferences from the data collected to give valid findings, conclusions and recommendations. Students' demographic data was computed and represented on frequency distribution tables. The Likert scale items were used to estimate the learners SE. The mean and standard deviation for the SE was also computed against the student's performance. The demographics of teachers were also presented using frequency distribution tables. The teacher's factors that influence SE in Probability such as their persuasion, mastery of content, vicarious nature and psychological status were coded, categorized and analyzed using simple regression analysis to obtain the regression coefficients. Correlational analysis was conducted to see if SE is determined by family background, peers and the learners' psychological mind set. Pearson's moment correlation (r) was used to establish the relationship between the learners' self-efficacy and performance in the topic of Probability. Data was analyzed using the (SPSS) V 20.0 and Microsoft Excel 2007 software.

Procedure Methodology

Convenient sampling method was used to select the study area (Meru County) as a representation of other counties. It simplified the data collection process for the researcher in terms of coverage and cost (Kombo & Tromp, 2006). Thus the researchers' familiarity, security, and accessibility to the respondents justified the use of convenient sampling technique. Cluster sampling was used to select the schools based on category of national, extra-county, county and sub-county schools. The method was suitable because the data from the specific aspects of study elements like indicators of SE, determinants of SE and influence of the teachers on SE and performance were collected separately and the results were compared with those of other elements as is intimated by Sharma (2006).

III. Result S

Relationship between learners' self-efficacy and performance in the topic of Probability in Meru County secondary schools.

The table 1 below represents the learners SE and performance in Meru County secondary schools. The findings in this section were crucial in determining the link or connection between SE and performance in the topic of Probability. The findings of this study show that most (99.4%) of the total number of respondents considered learners' SE to have a positive relationship on performance in the topic of Probability in Meru County. On the other side only less than 1% of the respondents failed to associate learners' SE and performance in the topic of Probability. None of the respondents however showed any negative relationship between SE and performance in the topic of Probability in Meru County.

Table 1. Learners' Self-efficacy and Performance in Probability

Type of Respondent (x)	Scale	Positive Relationship (y1)	No Relationship (y2)	Negative Relationship (y3)	Totals
Learners	2	1214 (99.4%)	2 (0.1%)	0 (0%)	1216
Mathematics Teachers	1	5(99%)	0 (0.4%)	0 (0%)	05

Total	1219	0 (0%)	1219
Pearson Moment Correlation (r)	+1.00		

Source (Author, 2020)

These results therefore imply that learners' SE has a positive relationship with performance in Probability. Conducting a regression analysis to establish the relationship between SE and performance in Probability, the regression line y=a+bx (where a is the intercept and b the slope) was y=1204+0.0008x. The correlation coefficient resulted in +1 which is a perfect positive correlation. This means that as a learner's SE increases then the performance in the topic of Probability also increases and vice versa. The perfect correlation coefficient indicates that the aspects that influence learners' SE in Probability also affects their performance in Meru County secondary schools. It is therefore evident that unless on extreme conditions beyond human control like mental disability then dictates performance in various subjects and/or subjects. This is a verification of Bandura (2006), Honicle & Broadbent (2016) and Kanopy (2014) findings on earlier studies that learners' SE determines the learning outcomes and grades that a learner scores in school. The various variables associated with developing a learner's SE such as the teacher attributes, learner's attributes, learning environment, the national curriculum and the syllabi provided and learning materials determine academic performance of learners as corroborated by Green, Nelson, & Marsh (2012). Performance in the topic of Probability is a function of these variables which molds SE in learners hence academic results.

IV. Discussion

It has been established that learners' self-efficacy influences academic performance in school (Honicle & Broadbent, 2016). Although self-efficacy cannot be presumed as the direct reason for the academic achievement, however, it will be the self- regulation that causes the academic achievements. The self-efficacy will cause the use of self- regulation and therefore the relation between self-efficacy and the self- regulation may be considered as self-efficacy for self- regulated learning. The self-efficacy for self- regulated learning lead to the application of the self- regulation processes such as the goal setting, self-monitoring, strategy use, self-evaluation and self- reaction (Burden, 2019). The level of cognitive ability, prior education preparation, attainment, gender, and attitudes towards academic activities, along with the level of perceived self-efficacy, influence academic achievement. Setting short term, rather than long term goals, helps students to develop their academic self-efficacy faster. Students work more eagerly at performing tasks when the goals are short term, instead of establishing long term goals that allow students to postpone difficult tasks until a later time. Mosier (2018) reported that there is a positive relationship between higher level of self-efficacy and increased academic achievement. His research found that students with higher levels of academic self-efficacy achieved higher grades and persisted in their academic major longer than those with lower perceived academic self-efficacy (Rutkowski *et al.,* (2012). Rutkowski and colleagues,, study also revealed that there is a relationship among academic self-efficacy and standardized tests and high school rankings; they also found a significant correlation among levels of academic self-concept, self-efficacy and achievement. Another study conducted by Rahil, Elias, Cheong, Muhamad, Noordin and Abdullah (2006) aimed to find out the relationship between students' self-efficacy and their English language achievement in Malaysia. They found that 51 percent of students had high self-efficacy while 48 percent showed low self-efficacy. Correlational analysis showed positive correlations between several dimensions of self-efficacy that is, academic achievement efficacy, other expectancy beliefs and self-assertiveness with academic performance in English language. Self-efficacy functions as the internal motivator for gifted students to endure challenges and achieve goals. Gifted students are more likely to attribute success to their own ability and effort and attribute failure to bad luck or inappropriate strategy choice (Andrade & Heritage, 2018). Even when gifted students experience failure, they do not relate the experience to a lack of intelligence or ability. Most likely, gifted students will not allow the experience to affect their self-efficacy for future challenges. The development of high abilities and high levels of achievement are all dependent on motivation in general but on intrinsic motivation in particular

. Further, Zhang (2015) establishes that intellectually gifted students portray greater levels of intrinsic motivation. Intellectually talented students showed more intrinsic motivation for reading, writing, and solitude" when compared with average students. Whereas students' self-efficacy acts as an intrinsic motivator, average students may question their ability to achieve and rely upon extrinsic motivation to succeed. As educator's prompt students to take ownership of their learning, the students will be able to monitor their academics by using intrinsic motivation. In a practical sense, educators can create personal checklists for students or model the process of thinking aloud (Buss, 2012). As students learn to take responsibility for their education, they are more likely to exhibit a greater belief in their academic abilities. Extrinsic motivation is not to be forgotten either, as it is an important component to goals and achievements. However, a classroom where intrinsic motivation is cultivated will have positive long-lasting effects on the students' metacognition. Intrinsic

motivation seems to be a more powerful indicator for success rather than the extrinsic model which is produced by point systems or treasure box rewards (Axtell & Parker, 2013). Assignments which involve independent research provide the gifted student with the opportunity of investigating a topic which peaks the student's interest. Students can be held accountable for monitoring their education. If they have a question concerning the relation between topics, they should be prompted to search for the answers. Gifted students are more likely to succeed when they are challenged academically. On the other hand, the impact of an average curriculum on gifted students may decrease their levels of self-efficacy (Quimbo, 2010). Typically, teachers assign gifted students with struggling students for group work; however, gifted students need the opportunity to learn at a higher scaffold. When gifted students are working with struggling students, they are often emphasizing concepts and skills which they already understand. Occasionally gifted students can be paired with struggling students because cooperative work is still beneficial. Research suggests that gifted students should partake in problem solving, creativity, student-directed activities, and independent research on a given topic or concept. Educators acknowledge some precautions for teaching gifted students. If educated on the same level as other students, gifted students may become tempted to constantly perfect their schoolwork. The students may become dissatisfied with the work that they produce and unwilling to have it represent them academically. Dawson (2012) concludes that although possessing high standards may be considered positive, perceiving higher discrepancy between one's perceived standards and performance has been identified as a core negative aspect of perfectionism associated with higher levels of depression, anxiety, and lower self-efficacy.

If the gifted students do not earn a perfect score on their graded work, they may feel as though they are failures. This is more likely to negatively impact a gifted students' self-efficacy than previous failures. On the other hand, if intellectually gifted students are not challenged with their course work, some students will lose interest in the subject. Underachievement of the student is the probable outcome of an unchallenging environment (Andrews, 2017). In the cases that schools are unable to offer above-grade-level classes, educators should intentionally differentiate the instruction to provide a challenging curriculum. Interestingly, students are likely to show perfectionism qualities if those same qualities have been present in their parents. Self-efficacy determines the nature of the relationship that exists between teachers and learners and amongst learners themselves. It is important for learners to develop and maintain a positive self-efficacy in school. All educational stakeholders play a fundamental role in developing and sustaining SE among learners. When parents, teachers and the learners engage themselves in the creation of an environment and behavior that promote SE, better academic results will be achieved not only in Mathematics and Probability but also in other subjects undertaken by individual learners (Wang, 2018). In addition, teachers should possess relevant knowledge and skills required to effectively deliver the content set in the national curriculum as well as be able to handle learners' challenges in school. From the literature highlighted, learner's SE is indicated by their behavior and motivation in learning. Proactive participation and reduction of negative behavior like smoking, alcoholism and missing lessons are good indicators of positive self-efficacy. Teachers' attributes like communication skills and perceptions determine learners' SE (Beattie *et al.*, 2015). Group dynamics also has influence on the learners' SE. Increased assignments provide learners with better experiences which in turn leads to positive SE and improved performance as well. Learners' SE improves learning motivation and this has a great influence on performance.

V. Conclusion

Learners SE in Probability is highly influenced by gender and the type of school he or she studies in and also Learners' SE influences performance in the topic of Probability and those learners who exhibit positive SE perform better in Probability. Self-efficacy is therefore directly proportional to performance. Self-efficacy can be improved by individuals to achieve better academic results among learners in secondary schools.

Recommendations

The national curriculum should be revised so that the topic of Probability is split in to two so that it is taught in phases (form two and three) in secondary schools.

Further Research

Identify the contribution of learners' SE in private secondary schools to add more input to the findings of this study.

References

[2]. Alexander, J., Nuchols, B., Bloom, J., & Lee, S. (2010). Organizational demography and turnover: An examination of multiform and nonlinear heterogeneity. *Human Relations*, *48*(12), 1455- 1480.doi: 10.1177/001872679504801204.
[4]. Andrade & Heritage, M. (2018). *Using formative assessment to enhance learning, achievement, and academic self-regulation*.
[6]. Andrews, K. Q., Castelli, D. M., & Loukas, A. (2017). *Effects of joint-use after school physical activity programs*.
[8]. Armstrong, M. (2011). *A handbook of educational psychology* (10th ed.). London: Kogan page limited.
[9]. Axtell, C. & Parker, S. (2013). *Promoting role breadth self-efficacy through involvement, work redesign and training. Human relations*. Thousand Oaks, CA: Sage Publications.

[10]. Bandura, A., Huberman, B., & Evans, R. I. (2016). Guide for constructing self-efficacy scales. *Information Age Publishing*, 8(2), 307-337. Retrieved from https://www. -researchgate.net/publication/233894825GuideforConstructingSelf-EfficacyScales- Revised

[12]. Beattie, S., & Davies, M. (May 01, 2013). A test of engagement versus disengagement in catastrophe models. *British Journal of Psychology, 101*, 2, 361-371.

[16]. Braider, L. L. (2009). *Verbalizations, cognitions, and affect as a function of demand in low efficacy mothers during parent child interactions*.

[19]. Burden, R. L. (2019). *Dyslexia and self-concept: Seeking a dyslexic identity*. London: Whurr.

[27]. Buss, A.H. (2012). *Pathways to Individuality: Evolution and development of personality traits*. Washington, DC: American Psychological Association.

[28]. Dawson, C. (2012). *Practical Research Methods, A user-friendly guide to mastering research techniques and projects*. How To Books Ltd, 3 Newtec Place: United Kingdom.

[30]. Derbitzin, M. L., Bates, K. A., & Gainey, R. R. (2013). *Deviance and social control: A sociological perspective*. Los Angeles: SAGE.

[31]. Government of Kenya (2016). *Ministry of education report on the performance of secondary school learners in sciences and mathematics*. Nairobi: Government Printers.

[32]. Green, J., Nelson, G., A.J., M., & Marsh, H. (2012). The causal ordering of self-concept and academic motivation and its effect on academic achievement. *International education journal*,*7*(4),534-546.Retrieved fromhttps://www.researchgate.net/publication/ 228469263 The causal ordering of self-concept and academic motivation and its_ effect on academic achievement.

[33]. Heidi, L. L. (2017). *Self-Efficacy, student engagement, and student learning in introductory statistics*. Bozeman, Montana: Montana State University

[34]. Honicle, T., & Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: A systematic review. *Education Research Review,17*, 63-84. doi: 10.1016/j.edurev.2015.11.002.

[35]. Kanopy (Firm). (2014). *Albert Bandura on behavior therapy, self efficacy & modeling*.

[36]. Kombo, D.K., & Tromp, D.L.A. (2006). *Proposal and thesis writing. An introduction*. Nairobi: Pauline's Publication Africa.

[38]. Kothari C. R., (2004). *Research methodology: Methods and techniques* (2nd Ed.). New Delhi: New Age International limited.

[41]. Manderlink, G., Harackiewicz, J. M., & Educational Resources Information Center (U.S.). (2014). *Competence Information and Intrinsic Motivation: A Process Approach*. Washington D.C: ERIC.

[43]. Marsh, H. W., Craven, R. G., & McInerney, D. M. (2003). *International advances in self research*. Greenwich, Conn: Information Age Pub.

[46]. Miheso, M.K.O. (2012). Factors affecting learners' performance in mathematics in Nairobi province, Kenyatta University.(Unpublished Thesis).Retrieved from https://books.- google.com/books.

[49]. Ormrod, J. E. (2011). *Educational psychology*. Upper Saddle River, N. J: Prentice Hall.

[50]. Osena, C. (2007). Factors affecting learners' performance in Mathematics in Secondary Schools. A Case of Uasin Gishu District. University of Nairobi.(Unpublished Thesis).Retrieved from https://books.google.com/books.

[52]. Quimbo, S. L. A. (2010). *Explaining Math and Science Achievement of Public School Children in the Philippines*. Philippine Review of Economics: Philipines.

[54]. Rahil, M., Habibah, E., Loh, S. C., Muhd, F. M., Nooreen, N., & Maria, A. (January 01, 2006). The relationship between students' self efficacy and their English language achievement.

[57]. Rutkowski, E. M., & Connelly, C. D. (January 01, 2012). Self-efficacy and physical activity in adolescent and parent dyads. *Journal for Specialists in Pediatric Nursing, 17*, 1, 51-60.

[60]. Sharma, S. (2010). *Quantitative techniques*. Jaipur, India: ABD Publishers.

[61]. Zhang, J. X., &Schwarzer, R. (2015). Measuring optimistic self-beliefs: A Chinese adaptation of the general self-efficacy Scale. *Psychologia: An International Journal of Psychology in the Orient, 38*(3), 174-181. Retrieved from https://psycnet.apa.org/ record/1996-35921-001

Grace Wanja Murithi, et. al. "Assessment to Determine Relationship between Learners' Self-Efficacy and Performance in the Topic of Probability: A Case of Selected Secondary Schools in Meru County, Kenya." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 11(4), (2021): pp. 51-56.