

SCIENCE SELF-EFFICACY AND CAREER DECISION MAKING: A STUDY AMONG SECONDARY STUDENTS IN MURANG'A COUNTY, KENYA

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ABSTRACT

Self-confidence in science enhances the pursuance of science-related fields. Low self-belief in students' ability to perform in science subjects has been cited as a factor that has led to declined examination grades. Consequently, impeding admission of students in Murang'a County, into career courses that require science subjects. This study embarked on investigating students' self-efficacy in science and career decisiveness among students in secondary schools in Murang'a County Kenya. The study explored the cognitive domain of the Social Cognitive Career Theory (SCCT). Correlations were established between the variables. A sample population of 498 form three students in public schools was derived by Cochran's sample size formula. The sample included boys, girls, and coeducational schools, selected using purposive and proportionate sampling. The science self-efficacy scale and career decision scale (CDS) were utilized to collect data. Inferential data was analyzed by SPSS determining associations between the variables. Positive relationships were realized between low science self-efficacy and Career decision making. High science self-efficacy had a negative correlation with students' ability to decide on a career option. The findings suggest the significance of science self-efficacy in stimulating students' decisions in science.

Keywords: Science self-efficacy, Career decision making, Science-related careers.

Introduction

Science self-efficacy is defined as self-belief that one can accomplish tasks in science. Greater self-confidence would enhance interest to perform science-related tasks. Tasks in science

subjects will be spurned by students where there is inadequate self-belief in their achievement. This is evidenced in African Americans in high schools in the USA, who have lower attainments in science subjects than their white counterparts. Lower social-economic status and a limited number of working role models have led to a diminished worth of education and interest in science careers (Falco & Summers, 2019). In Australia, in response to low self-efficacy, programs have been designed to enhance science self-efficacy in undergraduates. These programs are successfully improving the student's confidence in their ability to be employed (Reddan, 2015) Similar circumstances exist in Asia, where the acquisition of a profitable job, is dependent on excellence in examinations. Students consider science subjects as difficult hence their motivation to learn science declines. To mitigate the situation, students are provided with opportunities to explore science career options to motivate interest in science (Shin et al., 2017). In Africa, limited resources in schools and families, lessen students' certainty in their ability to succeed. Miles, (2015) observes that a post-apartheid mentality in South African students, diminishes their self-efficacy. He proposes the development of programs in schools that will stimulate self-confidence in students.

Studies in Murang'a County find that low performance in science subjects hinders students from qualifying for entry into science career courses. This is despite the introduction of SMASSE (Gachahi, 2015) programs which intended to stimulate interest in science subjects. Students also face difficulties in choosing career options that are congruent with their academic abilities. The contribution of self-efficacy in students' science career decisions in the county has not been emphasized. It, therefore, prompts a study of students' science self-efficacy concerning career decisions.

In Kenya, scholars have identified challenges concerning science career choice by students in secondary schools. Although some students attain superior grades in science subjects, the majority prefer careers in humanities and social sciences. While parents expect their educated children to access gainful employment, most school leavers and fresh graduates exemplify gaps in relation to skills required by the contemporary job market. An overwhelming majority of students continue to avoid studies that could open science career paths despite, resolutions to avert the trend being proposed locally and internationally.

The escalating gap in the uptake of science courses in Murang'a County prompted the adoption of the integrated development plan (2018-2022) to evaluate the efficacy of the informal world of work (Jua kali) and agricultural sectors, in providing employment. The report revealed that there is an increased number of students graduating from high school and colleges ill-prepared to work in the informal job market and agricultural sector. Equally, the IDP (2018-2022) study on Murang'a education, informs that agriculture is regarded as degrading by parents and students, influencing their children to avoid agricultural science subjects in secondary school.

Objectives of the Study

To find out the relationship between students' science self-efficacy and their career decision making

Theoretical Framework

Students' career decisions are impacted by cognitive factors such as efficacy beliefs. The critical facets such as mastery of academic tasks, observation of success in academic tasks, receipt of affirmation from parents and teachers, and firm belief in success, reduce stress and anxiety. As competence in science subjects corresponds with increased belief in success, a lack of self-confidence prompts students to avoid science subjects. High science self-efficacy in students motivates career choices in science courses as revealed by Sha et al. (2016) and Aurah (2017).

Research design

The study employed a correlational research design. Kothari and Garg (2018), suggest that a correlational design is used in situations where the variables can't be controlled. The design allowed the researcher to study probable relationships among the study variables.

Study Population

Schools in Murang'a County were grouped according to school type. The proportionate stratified formula was used to identify the sample size of 498 students, which was proportionately allocated to each school category. Random sampling was used to identify 2 boys' schools, 2 girls' schools, and 7 co-educational schools in the County. The total sample hence consisted of 82 students from Boys' schools, 96 students from Girls' schools, and 161 boys and 159 girls selected from co-educational schools. Form three students were purposively selected for the study sample.

Research Instruments

The Science self-efficacy scale consisted of five items and was adapted from previous research done by Chen & Usher, (2013) on secondary school students. The scale was modified to adapt to the Kenyan context hence items were adjusted to measure confidence in an average performance in science at KCSE exams. High science self-efficacy was determined by high scores on a 5-point Likert scale on students' confidence that they will attain grades A, B, and C, and low self-efficacy was measured by high scores on grades D and E.

The career decision scale (CDS) (Osipow et al, 1976) measured the students' decision-making status. Questions 1 and 2 measured students' certainty in making a career decision. Questions 3-

18 measured students' career indecision. The career decision making scale established a Cronbach's alpha of 0.683 in the present study.

Results of the study

The study hypothesis aimed to establish whether there is a significant association between career decision-making and student science self-efficacy.

Auxiliary hypotheses were formulated based on the two subdomains of student science self-efficacy to enrich the testability of the hypothesis.

H_{01.1}: There is no significant relationship between high students' science self-efficacy and students' career decision making.

H_{01.2}: There is no significant relationship between low students' science self-efficacy and students' career decision making.

The researcher established the correlation by performing Pearson's correlation on the career decision-making and students' self-efficacy domains individually and collectively. The results are presented in Table 1

Table 1. Relationship between students' career decisions, high students' science self-efficacy, and low students' science self-efficacy

Sub Domain of Student's Science Self-Efficacy	Students Career Decision
High Students' Science Self-Efficacy	-0.125**
Low Students' Science Self-Efficacy	0.277**
Students' Science Self-efficacy	0.208*

Note: N=482, ** p<0.01

Table 1 reveals that the high students' self-efficacy domain had a negative significant linear relationship with students' career decisions given by $r = -0.125$; $p = .006$. This could be interpreted to mean that increase in high science self-efficacy was associated with a decrease in levels of students' career decision making. The results also revealed a positive and significant relationship between low science self-efficacy and students' career decision making ($r = 0.277$; $p = 0.000$). An increase in low science self-efficacy leads to an increase in levels of students' career decision making. Students' science self-efficacy (high and low collectively) had a significant and

positive correlation ($r = 0.208$; $p = 0.000$) on students' career decisions. When there is an increase in the level of students' science self-efficacy their level of career decision making also increases.

Multiple linear regression analysis was then used with low-science self-efficacy and high-science self-efficacy as predictors of students' career decisions. The results are presented in Table 2.

Table 2. ANOVA for students' career decisions, high students' science self-efficacy, and low students' science self-efficacy

Model	Sum of squares	Df	Mean square	F	Sig.
Regression	7.064	2	3.532	24.242	.000 ^b
Residual	69.787	479	.146		
Total	76.851	481			

R= 0.303 R²=0.092 Δ R²= 0.088

Note. N=482

The regression equation was significant, $F(2, 479) = 24.242$, $p = .000$. This meant that the two variables collectively had significantly predicted students' career decisions. The study went further to investigate the predictive values of each of the two domains of students' science self-efficacy on students' career decision making. The results are presented in Table 3.

Table 3. Beta coefficients for students' career decisions, high students' science self-efficacy, and low students' science self-efficacy

Model	Unstandardized		Standardized	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	3.058	.190		16.097	.000
High Self-efficacy	.117	.041	.185	2.826	.005
Low Self-efficacy	.178	.028	.416	6.339	.000

Results presented in Table 3 above show that high science self-efficacy ($\beta = .117$, $p = .005$) and low self-efficacy ($\beta = .178$, $p = .000$) were positive and significant predictors of students' career decision making. This could be interpreted that both high science self-efficacy and low science self-efficacy had a significant effect on students' career decision making. Low science self-efficacy was a greater predictor of career decision making than higher science self-efficacy.

Discussion of results

The study results revealed that the students' high science self-efficacy domain had a negative significant linear relationship with students' career decisions given by $r = -0.125$; $p = .006$. According to Turner et al., (2019), science had more opportunities than art. Highly efficacious students in science-related subjects had vast career opportunities to explore the world of work compared to those with low science self-efficacy. The current study conclusions indicate that for three students' increase in their self-efficacy led to indecision in their career choice.

A significant correlation between low science self-efficacy and career decision-making ($r = 0.277$; $p = 0.000$) was established suggesting that as the students' low science self-efficacy improves, their decidedness on career choice also increases. Wang et al., (2017) observed that low efficacious students in science could easily decide their future careers, as they had less inclination to science careers.

Falco and Summers (2019) findings enlighten that students experiencing success in their science subject performance are more likely to have high science self-efficacy and select science-related careers. Equally, Mathwasa and Sibanda (2020) (Mathwasa & Sibanda, 2020) observe that students with low performance in their science subjects are skeptical of challenging tasks, hence shy away from science-related careers. Proficiency in science is highlighted as fostering self-efficacy (Tzu-Ling, 2019), while Blotnicky et al., (2018) advocate for the attainment of skills and interests as essential in the improvement of confidence in sciences. Nduta, (2020) adds that pedagogical methods, knowledge of the course content, expectations, and outcomes, enhance self-efficacy in accounting students. In retrospect, understanding science is crucial to the enhancement of self-certainty in science attainments.

A study by Wang et al., (2017) determined that performance in science subjects was not a determinant of self-efficacy or intent to choose science careers. Low achieving students had higher efficacy in science and more inclination to opt for science careers. Blotnicky et al., (2018) further support these findings, in that only a minority of students in Canada preferred science over creative arts. High achievers in science were able to consider either arts or science. Ogotu et al., (2017) identified students confident in their academic performance to be undecided about career options, alluding to stressors as impediments.

Students will seek out models with career achievements that they admire and aspire to emulate, and most are not in science-related fields. A study by Blotnicky et al., (2018) highlights this concern, as students with high self-efficacy in Canada, opted for lucrative non-science occupational preferences. In the current study, most indecision about science-related careers among students with high science self-efficacy is attributed to student perception of the possibility of accessing rewarding jobs in the job market.

Students with high science self-efficacy are more susceptible to stress, and the emotional status of an individual induces anxiety in decision-making reveals a study by García-Pérez et al., (2020). The availability of diverse prospects tends to trigger stress in students capable of high performance in science. Distress may additionally occur when the student prefers a career that displeases significant others, making them incapable of deciding. Adverse thoughts about a career choice increased low self-efficacy and prevented commitment to a particular career choice. In the current study, the students indicated to have already identified the course they intended to undertake however, they required more support.

High self-efficacy among students fostered certainty in a career of choice while exhibiting uncertainty in actual decision-making. Chasanah & Salim, (2019) observed that other factors might influence the student's ability to make a career choice, including familial and cultural expectations (Peace, 2017), stereotypical roles (Nduta, 2020), and absence of career guidance as depicted by Ulas-Kilic et al., (2020).

Study Conclusions

The findings indicated students' science self-efficacy significantly correlated with students' career decision making. Science self-efficacy is therefore an important factor in motivating students' decisions on a science career. Students with greater confidence in passing their science subjects at KCSE were however uncertain about the career to opt for implying other factors influence the students' career choices. An increase in self-efficacy for students with low science self-efficacy led to an increase in the certainty to make a career decision. Other factors may also have led to undecidedness among the students with high self-efficacy in science. The results may explain a large number of students in public universities undertaking courses they have no interest in and those in unfulfilling jobs.

Recommendations

- i. The knowledge gained on science self-efficacy can be instrumental to educators and heads of secondary schools to improve the uptake and performance of science subjects in Murang'a County.

- ii. Programs on the development of self-efficacy in science could be developed by educational organizations to enhance students' decisions toward science fields.
- iii. The study provides a basis for researchers to explore factors associated with self-efficacy in science and career within and outside the study location.

REFERENCES

- Blotnicky, K. A., Franz-Odenaal, T., French, F., & Joy, P. (2018). A study of the correlation between STEM career knowledge, mathematics self-efficacy, career interests, and career activities on the likelihood of pursuing a STEM career among middle school students. *International Journal of STEM Education*, 5(1), 1–15.
- Chasanah, A. M., & Salim, R. M. A. (2019). Parental support, career exploration, and career decision-making self-efficacy in Junior High School students. *ANIMA Indonesian Psychological Journal*, 34(4), 211–221.
- Chen, J. A., & Usher, E. L. (2013). Profiles of the sources of science self-efficacy. *Learning and Individual Differences*, 24, 11–21.
- Falco, L. D., & Summers, J. J. (2019). Improving career decision self-efficacy and STEM self-efficacy in high school girls: Evaluation of an intervention. *Journal of Career Development*, 46(1), 62–76.
- Gachahi, M. W. (2015). *Relationship Between Headteachers'and Smase-Trained Teachers'variables and Primary School Pupils'mathematics and Science Achievement in Murang'a County, Kenya* [Ph.D. Thesis].
- García-Pérez, O., Inda-Caro, M., Fernández-García, C.-M., & Torío-López, S. (2020). The influence of perceived family supports and barriers on personal variables in a Spanish sample of secondary school science-technology students. *International Journal of Science Education*, 42(1), 70–88.
- Mathwasa, J., & Sibanda, L. (2020). Enhancing students' self-efficacy: Implication for high school guidance and counselling educators. In *Counseling and Therapy*. IntechOpen.
- Miles, J. (2015). *The impact of a career development programme on the career self-efficacy and academic motivation of Grade 11 learners from diverse socio-economic backgrounds* [Ph.D. Thesis]. Stellenbosch: Stellenbosch University.

- Nduta, M. M. (2020). Gender Differences in Career Aspiration among Public Secondary Schools Students in Nairobi County, Kenya. *American Journal of Multidisciplinary Research & Development (AJMRD)*, 2(9), 16–25.
- Ogutu, J. P., Odera, P., & Maragia, S. N. (2017). Self-Efficacy as a Predictor of Career Decision Making among Secondary School Students in Busia County, Kenya. *Journal of Education and Practice*, 8(11), 20–29.
- Peace, T. A. (2017). Determinants of students' Career Choices in Secondary Schools from Southwestern Uganda; Insights from a domestic chores Perspective. *International Journal of Science and Research*, 6(9), 1810–1816.
- Reddan, G. (2015). Enhancing Students' Self-Efficacy in Making Positive Career Decisions. *Asia-Pacific Journal of Cooperative Education*, 16(4), 291–300.
- Sha, L., Schunn, C., Bathgate, M., & Ben-Eliyahu, A. (2016). Families support their children's success in science learning by influencing interest and self-efficacy. *Journal of Research in Science Teaching*, 53(3), 450–472.
- Shin, S., Lee, J.-K., & Ha, M. (2017). Influence of career motivation on science learning in Korean high-school students. *EURASIA Journal of Mathematics Science and Technology Education*, 13(5), 1517–1538.
- Turner, S. L., Joeng, J. R., Sims, M. D., Dade, S. N., & Reid, M. F. (2019). SES, gender, and STEM career interests, goals, and actions: A test of SCCT. *Journal of Career Assessment*, 27(1), 134–150.
- Tzu-Ling, H. (2019). Gender differences in high-school learning experiences, motivation, self-efficacy, and career aspirations among Taiwanese STEM college students. *International Journal of Science Education*, 41(13), 1870–1884.
- Ulas-Kilic, O., Peila-Shuster, J. J., Demirtas-Zorbaz, S., & Kizildag, S. (2020). Career decision-making self-efficacy of young adolescent students in Turkey. *International Journal of School & Educational Psychology*, 8(sup1), 38–48.
- Wang, M.-T., Ye, F., & Degol, J. L. (2017). Who chooses STEM careers? Using a relative cognitive strength and interest model to predict careers in science, technology, engineering, and mathematics. *Journal of Youth and Adolescence*, 46(8), 1805–1820.