Relationship Between Task Value And Academic Achievement In Biology Among Form Three Students In Kitui County, Kenya

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Abstract: Academic achievement in Biology in secondary schools in Kitui County, Kenya, has for a long time been below average with many students getting a D+ or lower in Kenya Certificate of Secondary Education (KCSE). Prior studies on the factors associated to this problem have paid little attention to task value. This study examined the relationship between task value and academic achievement in Biology among the Form Three students in Kitui County. It used Expectancy-Value Theory developed by Eccles and Wigfield (2002). The target population was 30600 students in 300 public secondary schools located in Kitui County in the year 2024. Purposive sampling was used to select Kitui County and form three students. Stratified sampling was used to select the secondary schools from each school category. Simple random sampling technique was used to select students from each school. Slovin's formula (1958) was used to obtains a sample of 470 students from the target population. The task value scale was used in conjunction with interviews to collect data from the students. Descriptive and inferential statistics were used to analyze quantitative data while qualitative data was analyzed thematically. The results revealed that there was a significant positive relationship between task value and academic achievement in Biology, r (456) = 0.60, p < 0.05. The subscale analysis of the presented results showed that interest and utility were significant predictors of academic achievement in Biology. Based on the results, teachers and parents should always guide students to link Biology concepts to everyday life and potential career paths in order to enhance their task value for better academic achievement in the subject.

Keywords: Task value; Academic achievement; Biology; Secondary school students.

I. INTRODUCTION

Over the years, academic achievement in Biology in Kenyan secondary schools has continuously been below average. According to Gakii et al. (2018), secondary school students in Makueni County in particular continue to receive low academic accomplishment scores in Biology on national examinations. Poor academic achievement in the subject has been linked to negative attitude toward it, unmotivated teachers, and insufficient administrative assistance. In Busia County, a related study by Aji and Alhaji (2023) found that largely secondary school students' performance in science courses was below average. The study identified several reasons for this state of affairs, including low student morale, negative attitude, low school attendance, unfavorable home

environments, insufficient parental support, inadequate learning resources, and ill-equipped laboratories.

Three counties in Kenya's lower east, Machakos, Makueni, and Kitui, have been registering below-average academic achievement in Biology in the KCSE. According to statistics from the Ministry of Education, the mean scores for Machakos County were 3.41, 3.53, 3.32, 3.68, and 3.46 in 2019, 2020, 2021, 2022, and 2023 respectively. Equally, Makueni County's academic achievement in Biology from 2019 to 2023 was also below average. Over the same period, the county's mean scores were 3.34, 3.64, 3.48, 3.21, and 3.11 respectively. Kitui County was placed among the bottom three counties throughout this time. The mean scores in the KCSE for the years 2020, 2021, 2022, and 2023 were 3.11 (D), 3.15 (D), 2.81 (D), 3.13 (D), and 3.34 (D). According to the statistics,

most of the Biology students in the three counties scored grade D+ or lower during the course of the four-year period, with Kitui County having the lowest mean grade of D. This suggests that most of the students are doing far worse than they should. Therefore, in order to create a long-term solution aimed at raising the standard of academic accomplishment in the subject, it was vital to identify the factors that may be contributing to this type of low academic achievement in Biology.

This problem and some of the factors linked to below-average academic achievement in Biology have been the subject of studies at the local, regional, and international levels. Jean et al. (2021) claims that a poor attitude toward Biology and a lack of resources for learning are two of the reasons why students perform poorly in the subject. In the same vein, Kanwal et al. (2023) found that instructors' excessive workloads contribute to poor performance in the subject. Christopher and Imanda (2023) further contended that poor Biology performance is a result of both insufficient practical instruction and teachers' lack of qualifications. Poor Biology performance is often caused by a lack of desire on the part of both teachers and students (Aji & Alhaji, 2023). Similarly, low academic achievement in Biology has been attributed to lack of professional development opportunities for instructors (McCourt et al., 2018). Inadequate administrative assistance also results in poor Biology performance (Uminski et al., 2023). According to AlSayyari and AlBuhairan (2020) low performance in Biology has also been linked to student absenteeism. The United Nations assessment report of 2022 indicated that inadequate instructional materials, student absenteeism, and a lack of parental or guardian assistance contributed to low performance in Biology. Although a lot of research has been done to identify the factors linked to below-average academic achievement in Biology, few studies have been conducted in Kenya to ascertain the relationship between task value and academic achievement in Biology. Most research has concentrated on factors that are not related to the students. Therefore, there was need to examine the relationship between task value and academic achievement in Biology.

The task value refers to the significance, usefulness of the learning materials and learning content that students attach to academic tasks (Sahneh & Zahra, 2023). Task value entails the importance, interest, and utility of the learning content. The importance of the learning task refers to the extent to which the student values the topic that is being taught in a given lesson and the significance it has on one's life. On the other hand, interest in a learning task refers to the extent to which a student enjoys the learning materials and the content being taught while utility of academic task is the association between the current task and student's future ambitions such as career choice (Dietrich et al., 2019). According to Snyder and Friedman (2021), task value is an important factor that contributes immensely to a better academic performance among students. This sentiment was further echoed in a study that revealed that task value equally motivates students towards academic achievement (Menon & Mark, 2022).

The extent to which a student develops interest in the learning task determines the extent to which they will understand learning content (Umarji et al., 2021). This suggests that students who attach more value to learning content are more likely to understand the concepts being taught compared to those with low task value. Such students will be able to answer questions asked correctly during exams. Equally, the significance of what is being taught in a lesson to the student's future goals influence level of concentration in an effort to grasp concepts (Stewart & Maisonville, 2019). The higher the level of concentration among the students, the higher the chances of grasping the concepts, which may translate to better academic results. Several studies have investigated how task value is related to academic achievement (Ncororo et al., 2022; Mete, 2021; Steinmayr et al., 2019; Oyuga et al., 2019). The studies revealed that task value is significantly related to academic achievement. However, few studies have focused on the link between task value and academic achievement in Biology subject especially in African countries. The present study filled this gap.

II. STATEMENT OF THE PROBLEM

In Kitui County, a lot of efforts have been made to improve academic achievement in Biology in secondary schools. However, the KCSE mean scores for the subject have consistently remained below average. For instance, in 2020, 2021, 2022, and 2023, Kitui County students' academic achievement in Biology was below average. During this time, the majority of the students scored grade D+ and below, with the county's average mean grade being a D plain. Concern has been expressed by the county's education stakeholders about this trend of academic achievement in the subject. If this kind of achievement continues, there would be a scarcity of trained and skilled workers in the important economic sectors like agriculture and health. This suggests that in order to reduce the deficit, the county will have to rely on staff from other counties, which will have a detrimental impact on the socioeconomic growth of both the county and the nation as a whole.

According to the study's background, academic achievement in Biology is correlated with a number of factors in the local, regional, and worldwide context. The impact of affective factors like task value on academic accomplishment in biology in Kitui County, however, has not been extensively studied. Research on the factors that lead to low academic achievement in Biology in the nation has concentrated on a number of different variables such as lack of qualified teachers, laboratory facilities, parental and school administration support, and a lack of motivation among students and teachers. College students and secondary school students made up the samples employed in the majority of these investigations, which were carried out outside of Kitui County. Few studies have attempted to look into the relationship between secondary school students' academic achievement in Biology and task value. Therefore, in order to close the gaps, the current study examined whether task value might be utilized to predict Biology academic achievement among form three students in Kitui County, Kenya.

III. OBJECTIVE OF THE STUDY

The study will seek to achieve the following objective;
- ✓ To establish the relationship between task value and academic achievement in Biology among form three students in Kitui County.

IV. REVIEW OF RELATED LITERATURE

Research evidence on task value has largely focused on general academic achievement as the outcome variable. Gan et al. (2023) conducted a study in China to determine how self-control, task value, and student motivation influence their participation and involvement in English lessons. The researchers selected two 226 students to participate in this study. The students selected were those in year two in their undergraduate study. The study established that task value had a positive and significant relationship with students' involvement and participation in English lessons. The study involved undergraduate students in China whose academic task value may be different from secondary school students in Kenya due to differences in the learning contexts and level of education. Therefore, the results may not be generalized to secondary school students in Kenya hence the need for the current study to address the locale and population gaps.

Li et al. (2021) undertook a longitudinal study in China to examine the relationship between task values (utility value, and attainment value) and their influences on academic achievement among grade 4 Chinese elementary school students. The study sample comprised 897 students of both gender. The students' measures of achievement task values were completed in the middle of two consecutive semesters, while their academic achievement were assessed at the end of each semester. The study results revealed that attainment value was positively related to utility value, and attainment value was positively related to academic achievement. The study focused on primary school learners who are at a lower developmental stage compared to high school students. This limits the extent to which the study findings can be applicable to secondary schools in Kenya. The longitudinal design adopted also poses the challenge of sample size, time, and cost, which was addressed by adopting a concurrent embedded research design in the current study.

In another study, Michele and Schwartz (2022) investigated the role of personal values on academic achievement among fourth and fifth year secondary school students in Italy. The study adopted a cross-sectional design to investigate the influence of values and academic motivation on students' grades. The study sample comprised 234 students. The study data were collected using questionnaires and data were analyzed using descriptive and inferential means. The study results revealed that particular values influence students' academic grades by providing either intrinsic or extrinsic motivation to study. The study was conducted in Italy, a developed country with an advanced social-economic environment compared to Kenya, hence the need for the current study to compare results.

Sahin et al. (2022) examined whether subjective task value mediated the relationship between science self-efficacy beliefs and personal for science. The study population comprised about 49,867 seventh-grade students in public schools in Ankara, Turkey, while the study sample comprised 312 seventh-grade students, obtained through stratified random sampling. The study data were collected using questionnaires while data were analyzed using descriptive and inferential means. The study results revealed that subjective task value mediated the relationship between personal epistemology for science and science self-efficacy. The study treated subjective task value as a mediator variable, while the current study examined task value as a predictor variable to fill the gap.

In another study, Gaspard et al. (2020) carried a study to assess adolescent students' values and costs in three countries of China, Germany and Korea. The study sample comprised 598 students from China, 483 students from Germany, and 617 students from Korea. The research used questionnaires to assess students' self-efficacy, values, and costs in English and math and values and costs. The study results revealed stronger correlations between utility and attainment values, among Korean and Chinese students compared to German students. The study also showed positive correlations between cost and utility value among Korean and German students whereas it was not significant among Chinese students. The study focused on correlations among self-efficacy, values and costs across the three countries which differed across the countries. This is indicative that task values vary from country to country hence the need for the current study to understand the Kenyan situation.

Meyer et al. (2024) investigated how values relate to achievement among secondary school students in Germany. The study relied on secondary data drawn from the General School Certificate Study (LISA6 study), carried out in upper secondary schools in the Schleswig-Holstein federal state. The study sample comprised 3,775 upper secondary school students. The study results revealed that domain-specific task values predicted both domain-specific achievement and GPA. The study was conducted in Germany, a developed country with an advanced social-economic environment compared to Kenya, hence the need for the current study to compare results.

Juliana et al. (2023) looked into the main factors that secondary school students in Nigeria might attribute to their academic success. To assist in determining the nature of the correlations between the studied variables, the study used a correlation research design. There were 600 responders in the study's sample. A multi-stage sampling procedure was used to choose the respondents. Questionnaires were used to get information from the chosen respondents. SPSS was used for the data analysis in this investigation. It was determined that one of the main factors influencing secondary school students' academic achievement is their commitment to their studies. In addition to Kenya, the study was carried out in Nigeria, a nation with a diverse socioeconomic structure and educational system. These variations may affect academic task value of the students. The current study filled the population gap by undertaking the study among secondary school students.

Ncororo et al. (2022) investigated whether task value predicted academic success in Meru County, Kenya. Convergent parallel mixed approaches were used as the research design in this work. A multi-stage sampling process

was used by the researcher to choose 813 form three students. Surveys were employed to get information from the chosen students. Thematic analysis was used to analyze the qualitative data, and SPSS Version 25 was used for the quantitative data analysis. The study's conclusions demonstrated a strong and positive correlation between task value and academic achievement. Students' academic task values can vary based on the setting and topic of study. Because the study concentrated on Meru County students' overall academic performance, the findings might not be applicable to Biology students.in Kitui County. The current study filled this knowledge gap by focusing on the relationship between task value and academic achievement in Biology.

Oyuga et al. (2019) carried out a similar study in Kenya to look at the connection between academic achievement and task value. Students without parents were chosen from a variety of secondary schools in Kenya to participate in the study. The triangulation technique was the chosen research strategy. 300 students were chosen by the researchers to take part in this study using the saturation sampling technique. This study also included eleven principals, who were chosen using a straightforward random sample procedure. While the principals were being questioned, the students' quantitative data was gathered using questionnaires. Thematic analysis was used to examine the principals' qualitative data, while SPSS.25 (version 25) was used to analyze the quantitative data that had been gathered. The study established the existence of a relationship between task value and academic achievement but this relationship was confirmed to be weak. The study involved the orphans only and thus results cannot be generalized to apply to the general population of students. The present study addressed this population gap by giving all students taking biology equal chance of participating using simple random sampling technique.

V. METHODOLOGY

A. RESEARCH DESIGN AND TARGET POPULATION

The researcher used concurrent embedded research design to examine the relationship between task value and academic achievement in Biology. Both qualitative and quantitative data were collected, analyzed and then the results were merged to address the research issue. Questionnaires and interview schedule were used to collect data that were analyzed using descriptive statistics, inferential statistics and thematic analysis. The researcher gave more weight to quantitative data because the study aimed to test the research hypothesis. This research design was appropriate for this study because it provided more viewpoints regarding the variables under study. This helped to reduce potential biases which enhanced the reliability of the findings.

B. SAMPLING TECHNIQUES AND SAMPLE SIZE

Purposive sampling was used to select Kitui County and form three students. The different school categories namely National Schools, County schools, and Sub County secondary schools were selected using stratified sampling technique.

This allowed analysis of potential differences in cognitive control and task value in learning Biology across the different categories of school. In schools with more than one stream of students taking Biology, the researcher used simple random sampling technique to select one stream. Simple random sampling technique was also used to select students from each school. Adopting simple random sampling guaranteed that the sample size was selected without bias, improving the generalizability of the findings (Bhardwaj, 2019).

Slovin's (1960) formula was used to select the students.

$n = \frac{N}{1+N(e)^2}$ where *N* is the target population and e is the margin of error (0.05).

$n = \frac{30600}{1+30600(0.05)^2} = 394$

The sample size was increased by 19% to 470 students take care of none response as suggested

by Anokye's (2020). Proportionate sampling was used to obtain the number of students who were sampled from each school category.

C. RESEARCH INSTRUMENTS

a. TASK VALUE SCALE

The study adapted task value scale which was developed by Koksal and Yaman (2013) to collect data on task value of the students towards learning Biology. The questionnaire has 24 items that measure task value on three domains. The 24 items were loaded on three factors (importance, interest and utility). The overall Cronbach's alpha reliability coefficient was .79. Items 1-8 measured importance while items 9-16 measured interest and items 17-24 measured utility. The domains were measured using a five point Likert scale which is; 1 = not true, 2 = a little true, 3 = rather true, 4 = true and 5 = very true. The scores were summed to obtain the total score that was used in hypothesis testing. A score of 24-48 indicated low task value, 49-72 indicated moderate task value and a score of 73- 120 indicated high task value.

b. INTERVIEW SCHEDULE

Qualitative data were collected using self-developed interview schedule. This research instrument was developed in consultation with the research experts on psychological measurement of task value with regard to Biology learning. It comprised of short questions that measured task value of learning Biology.

c. ACADEMIC ACHIEVEMENT IN BIOLOGY PROFORMA

This proforma was used to collect data on the score of the student in academic achievement in Biology. The researcher filled the academic achievement proforma using student's end of the term examination 2024 scores.

d. DATA COLLECTION PROCEDURES, ANALYSIS AND PRESENTATION

Task value scale, Biology academic achievement proforma, and interview schedules were used to gather data. The researcher trained three research assistants to help in data collection. Quantitative data was collected first then followed by the qualitative data. Questionnaires were distributed by the researcher and research assistants to the sampled students. The researcher spent 20 minutes explaining the purpose of the study to the sampled form three students in each school. After they indicated that they understood it, they were given the opportunity to fill the questionnaires.

This enhanced the reliability of the responses that were provided. Filling the questionnaire took about 30 minutes. Before the questionnaires were collected, the respondents were requested to countercheck to ensure all the questions were answered. Thereafter, the students to be involved in the collection of qualitative data were randomly selected from the sample of the students involved in filling the questionnaires. The students were randomly sampled from selected schools. The students were provided with the interview schedules and their individual responses were recorded using a mobile phone.

To prepare them for a comprehensive examination, the data were cleansed after the collection process was complete. In the process of data cleaning, questionnaires that did not meet the established criteria were thrown away. Following data cleaning, data coding according to the study variables was carried out. SPSS version 25 was employed to analyze the data. This was done in order to search for missing data, test for assumptions, and get rid of any outliers. Analysis of quantitative data was conducted using both descriptive and inferential statistics. Thematic analysis was performed on qualitative data. A code book was created by the researcher to help group the response into themes. Both a deductive technique, which recognized the concerns highlighted by the sampled students in their responses, and an explicit approach, which concentrated on the objective responses to the many issues raised under the study variables, were utilized to determine the themes.

VI. RESULTS AND DISCUSSIONS

Table 1 presents the descriptive data of gender and type of school cross tabulation.

Gender and Type of School Crosstabulation

		Type of your school			Total
		National Schools	County schools	Sub County Schools	
Gender	Male	16(3.51%)	53(11.62%)	154(33.77%)	223(48.90%)
	Female	20(4.39%)	38(8.33%)	175(38.38%)	233(51.10%)
	Total	36(7.89%)	91(19.96%)	329(72.15%)	456(100.00%)

Table 1

Table 1 shows that 175(38.38%) female students were from sub county schools, 38(8.33%) were from county schools, and 20(4.39%) were from national schools making a total of 233 (48.90%). The table also shows that there were

154(33.77%) male students who were from sub county schools, 53(11.62%) were from county schools, and 16(3.51%) were from national schools making a total of 223 (48.90%) students.

The researcher also obtained the descriptive statistics of task value based on gender as presented in Table 2.

Gender	N	Min	Max	R	M	SD	Kur	Sk
Male	223	56.00	120.00	64.00	101.92	13.05	.33	-.76
Female	233	48.00	120.00	72.00	103.21	15.40	1.45	-1.24
Total	456	48.00	120.00	72.00	102.58	14.30	1.08	-1.05

Note. N=456; Min – Minimum; Max – Maximum; R-Range; SD – Standard deviation; Sk – Skewness; Kur- Kurtosis

Table 2: Descriptive Statistics of Task Value by Gender

As seen in Table 2, the female students obtained a higher mean of 103.21 (SD=15.40). They also obtained a minimum score of 48, and a maximum 120. On the other hand, male students obtained a mean of 101.92 (SD=13.05). They also obtained a minimum score of 56, and a maximum score of 120. The results show gender differences on task value.

The descriptive statistics of task value were also obtained based on sub scales by gender as presented in Table 3.

	Gender	N	R	Min	Max	M	SD	Sk	Kur
TV importance	Male	223	25.00	16.00	41.00	33.42	4.97	-.12	.25
	Female	233	25.00	16.00	44.00	33.94	5.60	-1.29	1.50
TV Interest	Male	223	20.00	20.00	40.00	33.97	4.66	-.87	.48
	Female	233	24.00	16.00	40.00	34.47	5.28	-2.26	1.35
TV Utility	Male	223	24.00	16.00	40.00	34.53	4.42	-1.17	2.08
	Female	233	24.00	16.00	40.00	34.80	5.12	-1.42	2.22

Note. N=456; TV – Task Value; Min – Minimum; Max – Maximum; R – Range, M-Mean; SD – Standard deviation; Sk – Skewness; Kur- Kurtosis

Table 3: Descriptive Statistics of Task Value Sub scales by Gender

Table 3 shows that on the sub scale of task value importance, the female students obtained a higher mean of 33.94 (SD = 5.60). Their minimum score was 16, and a maximum 44, giving a range of 25. The values of skewness coefficient was -1.29 indicating that the data was moderately skewed. The coefficient of kurtosis was 1.50 indicating that the distribution shape was platykurtic, within normal distribution. The results indicate gender differences in task value importance in favor of female students, implying that female students had higher task value importance compared to their male counterparts.

On the sub scale of task value interest, the female students again obtained a higher mean of 34.47 (SD=5.28). Their minimum score was 16, and a maximum 40, giving a range of 24. The values of skewness coefficient was -2.26 indicating that the data was highly skewed. The coefficient of kurtosis was 1.35 indicating that the distribution shape was platykurtic. The results indicate gender differences in task value interest still in favor of female students, implying that female students had higher task value interest compared to their male counterparts. On the sub scale of task value utility, the female students still obtained a higher mean of 34.80 (SD=5.12). Their minimum score was 16, and a maximum 40, giving a range of 24. The value of skewness coefficient was -1.42 indicating that the data was moderately skewed. The coefficient of kurtosis was 2.22 indicating that the distribution shape was platykurtic. The results indicate gender differences

in task value utility still in favor of female students, implying that female students had higher task value utility compared to their male counterparts.

The researcher ran Pearson product moment correlation test on the following null hypothesis:

H_{02}: There is no significant relationship between task value and academic achievement in Biology among form three students in Kitui County.

The results of the test are presented in Table 4.

		Biology Score
Task Value	Pearson Correlation	.60**
	Sig. (2-tailed)	.00
	N	456
Importance	Pearson Correlation	.44**
	Sig. (2-tailed)	.00
	N	456
Interest	Pearson Correlation	.66**
	Sig. (2-tailed)	.00
	N	456
Utility	Pearson Correlation	.61**
	Sig. (2-tailed)	.00
	N	456

Table 4: Correlation between Task Value and Academic Achievement in Biology

From Table 4, the results revealed existence of a strong positive and significant relationship between task value and academic achievement in Biology, $r(456) = .60$, $p < .05$. The results imply that the higher the ask value among the form three students, the higher the academic achievement in Biology and vice versa. On the subscales of task value importance, the results revealed a moderate positive and significant relationship with academic achievement in Biology, $r(456) = .44$, $p < .05$. The results indicate that the higher the task value importance among the form three students, the higher the academic achievement in Biology and vice versa.

On the sub scale of task value interest, the results revealed that that there was a strong positive and significant relationship with academic achievement in Biology, $r(456) = .66$, $p < .05$. The results indicate that the higher the task value interest among the form three students, the higher the academic achievement in Biology and vice versa. Finally, on the sub scale of task value utility, results revealed that that there was a strong positive and significant relationship with academic achievement in Biology, $r(456) = .61$, $p < .05$. The results indicate that the higher the task value utility among the form three students, the higher the academic achievement in Biology and vice versa.

The researcher carried out further analysis on the prediction of academic achievement in Biology from Cognitive Control. The results are presented in Table 5.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.70a	.49	.48	7.18
2	.70b	.49	.48	7.19

a. Predictors: (Constant), Utility, Importance, Interest
b. Predictors: (Constant), Utility, Importance, Interest, Gender

Table 5: Model Summary Prediction of Academic Achievement in Biology from Cognitive Control

The results in Table 5 can be seen that R square value for model 1 was .49 indicating that 49% of the variance in academic achievement in Biology among form three students in Kitui County, Kenya is jointly influenced by task value utility, task value importance, and task value interest. The multiple regression coefficient was .70, which indicates a strong correlation between task value utility, task value importance, and task value interest and academic achievement in Biology. Including gender, in model 2 does not alter the value of R and R square which remained .70 and .49 respectively, indicating that gender has no significant influence on the predictive power of the variables of task value utility, task value importance, and task value interest when taken together.

ANOVA test was conducted to confirm if the predictive values for academic achievement in Biology from task value were significant. The results are presented in Table 6.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22166.07	3	7388.69	143.13	.00b
	Residual	23333.93	452	51.62		
	Total	45500.00	455			
2	Regression	22172.37	4	5543.09	107.17	.00c
	Residual	23327.63	451	51.72		
	Total	45500.00	455			

a. Dependent Variable: Biology T score
b. Predictors: (Constant), Utility, Importance, Interest
c. Predictors: (Constant), Utility, Importance, Interest, Gender

Table 6: ANOVA Test for the Prediction of Academic Achievement in Biology from Task Value

The results in Table 6 reveals that task value utility, task value importance, and task value interest had a joint significant relationship with academic achievement in Biology, $F(3, 452) = 143.13$, $p < .05$. Therefore, the null hypothesis was rejected implying that task value significantly predict academic achievement in Biology. The results also reveal that when gender is included, the joint relationship among task value utility, task value importance, and task value interest with academic achievement in Biology was not altered and continued to be significant, $F(4, 451) = 107.17$, $p < .05$. This further confirms that gender has no significant influence on the predictive power of the variables of task value utility, task value importance, and task value interest when taken together.

The predictive values for task value utility, task value importance, and task value interest were computed by carrying out regression analysis. The results are shown in Table 7.

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	3.83	2.48		1.54	.12
	Importance	-.84	.12	-.45	-6.79	.00
	Interest	1.37	.15	.69	9.09	.00
	Utility	.79	.17	.38	4.68	.00
2	(Constant)	3.50	2.66		1.32	.19
	Importance	-.84	.12	-.45	-6.79	.00
	Interest	1.37	.15	.68	9.06	.00

Utility	.80	.17	.38	4.69	.00
Gender	.24	.68	.01	.35	.73

a. Dependent Variable: Biology score

Table 7: Regression Analysis for Task Value Utility, Task Value Importance, and Task Value Interest

Table 7 indicates that task value importance had a negative and significant relationship with academic achievement in Biology, $\beta = -.84$, t (455) = -6.79, $p < .05$. This implies that by holding task value interest and task value utility constant, a unit change in task value importance leads to -.24 change in academic achievement in Biology. Secondly, task value interest had a positive and significant relationship with academic achievement in Biology, $\beta = 1.37$, t (455) = 9.09, $p < .05$. This implies that by holding task value importance, and task value utility constant, a unit change in task value interest leads to 1.37 change in academic achievement in Biology. Thirdly, task value utility had a positive and significant relationship with academic achievement in Biology, $\beta = .79$, t (455) = 4.68, $p < .05$. This implies that by holding task value importance and task interest constant, a unit change in task value utility leads to .79 change in academic achievement in Biology.

When gender is included in the model, some effects are noted as follows: The constant value changes from 3.83 to 3.50. Task value importance had a negative and significant relationship with academic achievement in Biology, $\beta = -.84$, t (455) = -6.79, $p < .05$. This implies that by holding task value interest and task value utility constant, a unit change in task value importance leads to -.24 change in academic achievement in Biology. Secondly, task value interest had a positive and significant relationship with academic achievement in Biology, $\beta = 1.37$, t (455) = 9.06, $p < .05$. This implies that by holding task value importance, and task value utility constant, a unit change in task value interest leads to 1.37 change in academic achievement in Biology. Thirdly, task value utility had a positive and significant relationship with academic achievement in Biology, $\beta = .79$, t (455) = 4.69, $p < .05$. This implies that by holding task value importance and task interest constant, a unit change in task value utility leads to .80 change in academic achievement in Biology. Finally, gender had a positive and non-significant relationship with academic achievement in Biology, $\beta = .24$, t (455) = .35, $p = .73$. This implies that gender has no significant influence on the predictive power of the variables of task value utility, task value importance, and task value interest when taken together.

The prediction equation for model 1 is as below:

$$\hat{Y} = 3.83 - 0.84X_1 + 1.37X_2 + 0.79X_3 + \acute{\varepsilon}$$

Where $\hat{Y}$ = Predicted academic achievement in Biology; X_1 = value importance, X_2 = task value interest, X_3 = task value utility, and $\acute{\varepsilon}$ = standard error.

The prediction equation for model 2 is as below:

$$\hat{Y} = 3.50 - 0.84X_1 + 1.37X_2 + 0.80X_3 + 0.24X_4 + \acute{\varepsilon}$$

Where $\hat{Y}$ = Predicted academic achievement in Biology; X_1 = task value importance, X_2 = task value interest, X_3 = task value utility, X_4 = gender, and $\acute{\varepsilon}$ = standard error.

To gauge the overall task value students had for learning Biology, two major sub domains of perceived importance and perceived utility were used for data collection. The themes were important in demonstrating how students experience the sense of relevance and significance of their learning undertakings in biology and thus their learning initiatives as well as achievements.

PERCEIVED IMPORTANCE

Perceived importance is the extent to which students regard a task as worthwhile and important in relation to their context of future. It revealed students' attitudes towards Biology importance, relevance, and their learning behaviors in the class. Students who perceive a given course as relevant will expend efforts to master it and employ functional methods.

For instance, student 1 stressed the role of Biology for passing the exams and succeeding in academic achievement. The student emphasized the importance of Biology in the student's overall academic goals, which motivated the student to seek out multiple resources. The student stated that,

"I had difficulties with understanding the concept of classification of living organisms. Since I think that understanding and passing Biology tests is crucial, I asked teachers, friends, and also I turned to the Internet. All these enlightened me on classification, as stated above. It also enabled me understand the topic better as well as to retain such information."

By regarding Biology as an important subject for advancement in academic process, the student devoted various resources to deepen understanding of the subject, leading to improved performance.

Similarly, student 2 saw an enhancement of Biology mastery as relevant to the enhancement of his understanding and performance. When the student encountered challenges with cell structure, he was motivated to engage with various learning tools, recognizing the significance of the subject. The student stated that,

"I was confused about the organization of plant as well as animal cells. What I did was logically, I wrote notes and drew diagrams as well as talking with my classmates, which helped me to understand more about the cell structure. This in turn help me to understand the topic better."

These perceptions of students, especially the importance of understanding cell structure played the vital role in motivating the student to take an active role in the learning process, and to get a better understanding of the entire topic.

Student 4 was also seen to have rated the perceived importance of Biology high when comprehending the role of enzymes in digestion. Acknowledging the importance of this concept to both their academic success and practical health applications spurred the student to seek multiple perspectives. The student stated that,

"I had some problem in defining the role of enzymes in digestion. To avoid such a problem, I listened to what the teacher and other students had to say as well as revisiting the practical examples. This really assisted me in appreciating the role of enzymes with reference to general health. They also provided better understanding of the role enzymes play which augmented my results in related tests."

Having a list of their focus areas, which encouraged their participation and enabled them to perform better due to perceiving the topic's academic and real-life importance.

PERCEIVED UTILITY

Perceived utility refers to the extent to which students think knowledge of Biology is useful to them in their present or future pursuits, either educational or occupational. Utility is a strong motivator and students who see high utility are likely to work hard and find practical use in all that they learn.

Student 5 perceived usefulness of Biology through the study of genetics and heredity. Understanding the relevance of these concepts in everyday life, enhanced the student's interest in the subject. The student indicated that,

"Genetics and heredity were challenging for me to work with." In order to develop my thinking, I participated in discussions and studied historical cases. This let me stand back and recognize the notion of genetic applicability in one's life. These different opinions kept me developing huge interest and improved my comprehension.

This response demonstrated how perception of related topics and personal feelings can enhance the students' learning and interest.

Similarly, Student 7 indicated the perceived relevance of ecological conservation, as synthesized in learning about sustainable development. Realizing the real-world impact of what the student was studying encouraged the student to carefully weigh different perspectives. The student stated that,

"There are different perceptions on ecological conservation methods that I came across. To do this I considered all the advantages and disadvantages that could be viewed from outside – sometimes this additional information made me realize that the main idea of conservation is the development of sustainable one. It also added to the improved decision-making on ecological issues."

Recognizing the relevance of the studied Biology concepts for environmental concerns encouraged the student to explore the information and use it in decision-making.

Among the examples, Student 10 described the idea of reproduction as one that might be useful in aiding in understanding species survival. By evaluating different viewpoints, the student was able to appreciate the significance of the topic, which aided comprehension. The student stated that,

"I was getting mixed feelings of the importance of reproduction. I checked various positions in the context of what has been studied in textbooks and in class as well. I was able to appreciate the role of reproduction in extant species survival which improved my understanding about the topic."

For this student, recognizing the broader utility of studying reproduction in Biology added depth to their learning and improved their grasp of the subject matter.

The qualitative data revealed two key domains of task value, being perceived importance and perceived utility, that significantly influenced how students approached learning Biology. Through perceived importance, the students were able to engage more with Biology in a way that they probably would not have done before. Making effort and seeking out various strategies such as consulting peers and teachers and other resources enabled students to realized that Biology resulting to the students investing more effort in learning it. Associating what they were learning to an application in the future or a perceived utility of the knowledge they were gaining made the subject more interesting and enabled better understanding of Biology. The study established that students with positive attitude towards Biology and the subject content had higher level of interest and more problem-solving behaviour regarding the Biology content. It is thus imperative that educators and the academic officials perceive these domains as important in promoting both the significance and the relevance of Biology thus increasing students' motivation and academic achievements.

DISCUSSION OF THE RESULTS

The second objective of this study was to establish the relationship between task value and academic achievement in Biology. The quantitative study results revealed existence of a strong positive and significant relationship between task value and academic achievement in Biology. The results imply that the higher the task value among the form three students, the higher the academic achievement in Biology and vice versa. This was also true for the task value subscales whereby of task value importance sub scale had a moderate, positive and significant relationship with academic achievement in Biology. The results indicate that the higher the task value importance among the students, the higher the academic achievement in Biology and vice versa. On task value interest subscale, results revealed that that there was a strong positive and significant relationship with academic achievement in Biology. The results indicate that the higher the task value interest among the students, the higher the academic achievement in Biology and vice versa. Similarly, on the task value utility subscale, results revealed that there was a strong positive and significant relationship with academic achievement in Biology. The results indicate that the higher the task value utility among the students, the higher the academic achievement in Biology and vice versa.

These results are consistent with Expectancy-Value Theory (EVT) by Eccles and Wigfield (2002) which states that, peoples' expectations of success and the subjective value they attach to that success motivates the choices they make. The theory explains an individual's motivation under given circumstances to undertake some tasks in order to achieve a given goal, whereby the individual's motivation is highest when faced with a challenge which the individual feels is attainable. Studies have shown that EVT can be used to explain academic performance. This include Ncororo et al. (2022) used this theory to explain the relationship between task value and academic achievement among form three students in Meru County. Similarly, Nagle (2021) also revealed a relationship between expectancy-value-cost and academic achievement.

The current study's findings are also consistent with the results of Gan et al. (2023) who found that task value had a positive and significant relationship with students' involvement and participation in English lessons in China. In a

related study, Juliana et al. (2023) found out that one of the main factors influencing secondary school students' academic achievement in Nigeria was the value they attached to their academic success, which made them committed to their studies, results which are consistent with those of the current study. In addition, the current results are consistent with the findings of Li et al. (2021) who found that attainment value was positively related to utility value, and attainment value was positively related to academic achievement among students in China. Michele (2000) also found that particular values influence students' academic grades by providing either intrinsic or extrinsic motivation to study. In another study, Gaspard et al. (2020) revealed a stronger correlations between utility and attainment values, among Korean and Chinese students compared to German students. The study also showed positive correlations between cost and utility value among Korean and German students whereas it was not significant among Chinese students. This is indicative that task values may vary as a result of country related factors. In another study, Meyer et al. (2024) revealed that domain-specific task values predicted both domain-specific achievement and GPA, results that support those of the current study.

Ncororo et al. (2022) also found a strong and positive correlation between task value and academic achievement among students in Meru, Kenya, results which are consistent with those of the current study. Still in Kenya, Oyuga et al. (2019) established the existence of a weak relationship between task value and academic achievement. The results however differed slightly with those of the current study in that the current study has established a strong positive and significant relationship between task value and academic achievement in Biology. The current study results and the reviewed studies show that task value is an important factor in students' academic achievement in Biology. It is therefore critical for educators to inculcate task values in the teaching and learning process to enhance students' academic performance in Biology.

The researcher also collected and analyzed qualitative data aimed at assessing the task value students attached to learning Biology. The analysis of results revealed that by attaching value to understanding of the different biology topics, the students were able to take steps and use different approaches and perspectives to surmount various challenges in learning biology which lead to improved scores in the subject. This supports the findings received from the quantitative data and those from other researchers such as Snyder and Friedman (2021); Michele (2000); and Meyer et al. (2024) who found that task value is an important aspect that is able to contribute immensely to a better performance amongst students. Similarly, Menon & Mark (2022) revealed that task value motivates students towards academic achievement, results which are consistent with those of the current study. The findings imply that, strengthening students' task value enhances academic achievement in Biology. This emphasizes the need to integrate task value training in the process of learning to improve students' Bilology performance.

VII. CONCLUSIONS

The second objective of this study was to establish the relationship between task value and academic achievement in Biology. The study concludes that there exists a strong, positive and significant relationship between task value and academic achievement in Biology. The results indicate that the higher the task value among the students, the higher the academic achievement in Biology and vice versa. Based on the findings from the sub scales of task value, the researcher concludes that there exists a moderate, positive and significant relationship between task value importance and academic achievement in Biology. The results indicate that the higher the task value importance among the students, the higher the academic achievement in Biology and vice versa. The study further concludes that there exists a strong positive and significant relationship between task value interest and academic achievement in Biology. The results indicate that the higher the task value interest among the students, the higher the academic achievement in Biology. Similarly, the study concludes that task value utility had a strong positive and significant relationship with academic achievement in Biology. The results indicate that the higher the task value utility among the students, the higher the academic achievement in Biology and vice versa.

VIII. RECOMMENDATIONS

✓ Students should always be guided by teachers to link Biology concepts to everyday life and potential career paths in order to enhance students' task value for better academic achievement in Biology.
✓ The government should give policy direction to curriculum developers and TSC to ensure that all teachers are trained on how to foster task value in their students to improve academic achievement in Biology. This can be done through workshops, seminars and collaborative teaching models.

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