

Innovations

Improving the Yield of Crops in Integrated Apicultural Farming for Health Benefits and Modern Production using Cognitive Behaviour Therapy (CBT)

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Abstract: The study focused on improving the yield of crops in integrated apicultural farming for health benefits and modern production using cognitive behaviour therapy. Specifically, the study investigated the effectiveness of cognitive behaviour therapy (restructuring therapy) on students' learning outcome. The research design for this study was quasi-experimental using pretest, posttest control group. The population of this study consisted of 200 level students who were offering GST 213. Basic Skills in Agriculture in Bamidele Olumilua University of Education, Science and Technology, Ikere Ekiti, Ekiti State. The sample for this study comprised 363 students drawn from the three colleges in the University. Participation was voluntary as the respondents were not allowed to give their identities on the instrument for data collection. A research instrument, Honey Production Performance Test (HPPT) was used to collect data for the study. Ethical Clearance was sought for and collected from the Centre for Research and Development of Bamidele Olumilua University of Education, Science and Technology Ikere – Ekiti. The instrument was subjected to face and content validity. The reliability of the instrument was established through Cronbach Alpha method which yielded reliability coefficient of 0.86. The data obtained were analyzed using descriptive statistics of mean and standard deviation. Inferential statistics of analysis of covariance (ANCOVA) was used to test the hypothesis at 0.05 level of significance. The findings of the study revealed that there was significance difference in the post test mean scores of students in

the experimental group. Based on the findings of this study, it was recommended that cognitive behaviour therapy should be used to teach both theory and practicals in order to foster skills development among students in the University. Also, it was recommended that cognitive behaviour therapy should be employed to improve students' learning outcomes. There should be collaborative partnerships between agricultural researchers, practitioners, and mental health professionals to further explore the potential benefits of integrating CBT techniques into agricultural interventions and programs. The study recommended regular counselling sessions, seminars, and workshops to educate the intending apiarists (students) on modernizing bee rearing practices to adopt technology capable of improving the life of bee households, and sustain bee resources for future generation as it would increase the production of hygienic honey for both local consumption and exportation purposes.

Keywords: apiculture, integrated apicultural farming, cognitive restructuring, counseling.

Introduction

United Nations identified hunger and malnutrition as a serious obstacles to sustainable development goals thus the Goal 2 "Zero Hunger" which focused on how to end hunger, achieve food security and improved nutrition and promote sustainable agriculture. However, it seems Nigeria is not achieving much in this area due to insecurity and overdependence on white collar jobs. Joint Admissions Matriculation Board (JAMB) statistics revealed that Agriculture is least subscribed courses by candidates on yearly basis whereas courses like Medicine, Engineering and Law always have oversubscriptions (Duruji, Folarin, Olorunyomi, Duruji-Moses, 2017)

Governments' campaign for diversification to agriculture focused more on food crops and animal production whereas there are other neglected areas that can create wealth. It was observed that Nigeria's over dependence on oil economy have not paid off and now that the price of oil is reducing day by day in the world market, hence a need to enlarge wealth creation opportunities in agriculture. Globally, there is a growing consumption of honey and other bee products because of its high values in maintaining good health and in treatment of various diseases. Bee production also known as apiculture, has a critical role in maintaining biodiversity and sustains the environment, that is, the ability of natural ecosystems to maintain their biological processes and functions. Furthermore, it also provide social and economic sustainability which implies the ability to meet our own needs without compromising the needs of future generations and just and equitable use and re-use of resources respectively. Honeybee production also helps in pollinating almost 90% of what humans and plants feed on. However, it seems that rather than produce, refine and export honey, we even import pure honey (Oyerinde&Ade, 2023)

Concept of Apiculture

Apiculture is the art of rearing, breeding and managing honeybee colonies in artificial hives for economic gains which leads to the production of valuable materials such as honey, bee wax, propolis, bee pollen, bee venom and royal jelly. As, an agricultural enterprise, beekeeping does not require land ownership or rental; it can be started with equipment and tools that can be sourced locally and in many cases skills and knowledge required for such enterprise are found within local traditions. As a business enterprise, it offers not only diverse products (honey, wax, pollen, royal jelly, propolis, venom etc.) which can be sold in local and international markets and become an important source of regular income for farm families; in addition, these products can be transformed into value-added products with minimal processing. Bee keeping also provides complementary services such as pollination (Tabinda, Murad, Sagida and Akmal, 2022); Akinlabi, 2023). Moreover, bee products improve farm families' nutrition and can provide for traditional health care remedies and apart from honey and other by-products derived from honey bee, estimates suggest that between 35% and 73% of the world's cultivated crops are pollinated by some varieties of bees indicating that most of the plant species rely on bee insects for pollination, (Akinwande, and Badejo, 2021). It suffices to note that bees are renewable resources whose stock can be replenished. However, their renewability critically depends on the quality of management they are subjected, to maintain maximum sustainable yield. Proper management of natural resources particularly flora and water resources are critical for bee sustainability as they can be a driver for sufficient food and achievement of global Sustainable Development Goals (SDGs) (Oladimeji and Abdulsalam, 2019).

Statement of the Problem

Ekiti State as one of the states in Nigeria, has a vegetation and climatic condition that is favourable to beekeeping activities. The vegetation of the study area is of both food and cash crops like maize, beans, millet, oil palm, mango, cashew, spices among others. These crops provide forage for the honeybees, however despite this fact, these natural resources are not being maximally utilized. In spite of the favourable climatic and socio-economic environment, low-cost and sufficient availability of flowering plants and manpower in this tropical region, bee production is at the low ebb. It is clear that few people that produce honey at low capacity cannot meet the needs of their immediate community not to mention the whole nation or the international market. By virtue of the motto and the policies establishing Bamidele Olumilua University of Education, Science and Technology, Ikere Ekiti, which is "learning for self – reliance", the institution through the Department of Agricultural Science & Technology is highly positioned to key in to the present government agenda of wealth creation and take the lead in apicultural services to potential bee-keepers and the

unemployed youth in the society or the community or the state at large. Presently the University runs a course called GST 213; Basic Agricultural Skills with 200 Level students. The students were divided into Cognitive Behavioural Therapy and Control group. Many of the students are apiphobia due to the traditional belief that rearing of bee is not an easy task. Many could not also go into the production or the vocation because of the sting and other distortions. The study therefore focused on how to change the negative orientation and the mindset of students towards integrated apicultural farming using cognitive behavior therapy.

Purpose of the Study

The study focused on improving the yield of crops in integrated apicultural farming for health benefits and modern production using cognitive restructuring therapy. Specifically, the study sought to:

- i. find the difference in the pre-test and posttest mean scores of students' learning outcome in experimental and control groups.
- ii. examine the difference in the mean scores of students' learning outcome in the experimental and control groups based on gender.
- iii. examine the students' attitude towards bee keeping in BOUESTI based on gender.

Research Questions

The following research questions were raised to guide this study:

- i. what is the difference between the pre-test and posttest mean scores of students' learning outcome in experimental and control groups?
- ii. what is the difference in the mean scores of students' learning outcome in the experimental and control groups based on gender?
- iii. what are the students' attitude towards bee keeping in the experimental and control group based on gender?

Research Hypotheses

The following research hypotheses were formulated and tested at 0.05 level of significance.

- i. There is no significant difference in the students' learning outcome (academic performance and attitude) in the experimental and control groups based on gender (male and female).

Counselling and Apiculture

The basic assumption of Aaron Beck (1921) on cognitive Behaviour Therapy (CBT) forms the theoretical framework for the study. The focus of cognitive therapists are concerned with the operation of metacognition which is the ability of people to reflect on their own cognitive processes, work on it and effect desired change. In life process a number of factors contribute to personality development and disturbances which may make an individual vulnerable to emotional and cognitive disturbances which when such distortions are identified and worked upon, it would bring desire change in

behaviour and such individual will feel fulfilled and actualized. Cognitive therapist believed that cognitions, emotions and behaviours interact significantly and have reciprocal cause – and – effect relationship as man is born with the potential for both rational and irrational thinking (Alkali, Alabi&Okoh, 2022).

It is therefore assumed by the researchers that some of the attitudes and factors inhibiting farmers from investing in beekeeping resides largely in their negative cognitive processes tagged "cognitive distortions". And when an individual experiences cognitive distortion the way he /she interprets events is usually negative. Research study revealed further that when cognitive distortions are reinforced it can increase anxiety, deepen depression, causes relationship difficulties which may further lead to other complications (Adamu, 2021).

Bees also play an important role in pollinating crops. About one third of all plants and plant products eaten by humans depend directly or indirectly on bees for their pollination (Ige andOlugbenga,2021).Crops pollinated by bees have been proven to produce higher yields and better quality, often at no extra cost for the farmer. Yet, many farmers consider bees and other pollinators as harmful insects. The traditional belief that beekeeping is a difficult task and the fear that bees sting had prevented many students from acquiring the skill and investing in beekeeping despite the knowledge of the economic benefits of honey. All the negative thinking and cognitive distortions that caused many students to avoid beekeeping will be identified, disputed and new feelings imputed. Cognitive behaviour therapy has these roles to play in the life of such an intending apiarist as it addresses negative beliefs and attitudes, manages stress and anxiety, enhances problem-solving skills, promotes goal setting and motivation, improves decision-making abilities, facilitates behavioral change, fosters communication and interpersonal skills, promotes sustainable practices. It is therefore believed that using cognitive restructuring as a form of cognitive behaviour therapy will help to change the negative thinking of the students and thus improve bee rearing for wealth creation. (Makinde, Kehinde- Dada, and Babatunde, 2020; Makinde&Ogunjobi, 2023).

Procedures for Counselling Intervention:

The first stage of Counselling intervention was a group counselling process where participants were allowed to discussed and respond to items listed on the questionnaire which aimed at identifying the challenges hindering commercial production of bee. The collated data revealed that poor counselling services, shortage of forage, inadequate training and manpower, poor apiculture policies, diseases affecting honey bees and poor utilization of technology were some of the challenges faced in bee production. (Makinde&Ogunjobi, 2023) The second stage of counselling intervention was the use of Cognitive restructuring therapy, a procedure which was divided into graded steps.During the therapeutic session, participants were assisted to advance through levels of fear, starting with the

least frightening exposure to the highest frightening level which is ability to withstand bee without the fear of sting especially during the harvesting stage of the honey. Teaching or training students with phobia of beekeeping using cognitive-behavioral therapy (CBT) of cognitive restructuring involves gradually exposing them to the fear-inducing stimulus (bees and beekeeping activities) in a controlled and supportive environment while simultaneously addressing their cognitive distortions and maladaptive beliefs about bees in chronological steps as follows:

Psychoeducation:

Begin by providing students with information about beekeeping, bee behavior, and the importance of bees in agriculture and ecosystems. Educate them about common misconceptions and myths surrounding bees to correct any irrational beliefs they may hold.

Assessment of Phobia Severity:

Assess the severity of the student's phobia using standardized measures or clinical interviews. Determine the specific triggers and manifestations of their fear, such as fear of bee stings, fear of swarming bees, or fear of being in close proximity to beehives.

Establishing Trust and Rapport:

Build a trusting and supportive relationship with the student to create a safe space for discussing their fears and concerns. Validate their emotions and assure them that their fears are understandable and manageable.

Gradual Exposure:

Implement systematic desensitization, a technique used in CBT, to gradually expose the student to bee-related stimuli in a hierarchical manner, starting from the least anxiety-provoking situations and gradually progressing to more challenging ones. For example:

Begin with exposure to pictures or videos of bees.

Progress to observing bees from a safe distance.

Move on to observing bees in an enclosed observation hive.

Finally, introduce hands-on activities such as wearing protective gear and approaching beehives under supervision.

Cognitive Restructuring:

Challenge and reframe the student's negative thoughts and beliefs about bees using cognitive restructuring techniques. Help them identify and replace irrational thoughts (e.g., "Bees are dangerous and will sting me") with more balanced and accurate thoughts (e.g., "Bees are important pollinators and are unlikely to sting if left undisturbed").

Relaxation Techniques:

Teach the student relaxation techniques such as deep breathing, progressive muscle relaxation, or mindfulness meditation to help them manage anxiety and physiological arousal during exposure exercises.

Positive Reinforcement and Reward System:

Provide positive reinforcement and rewards for gradual progress and successful completion of exposure tasks. Encourage the student to acknowledge their accomplishments and celebrate small victories along the way.

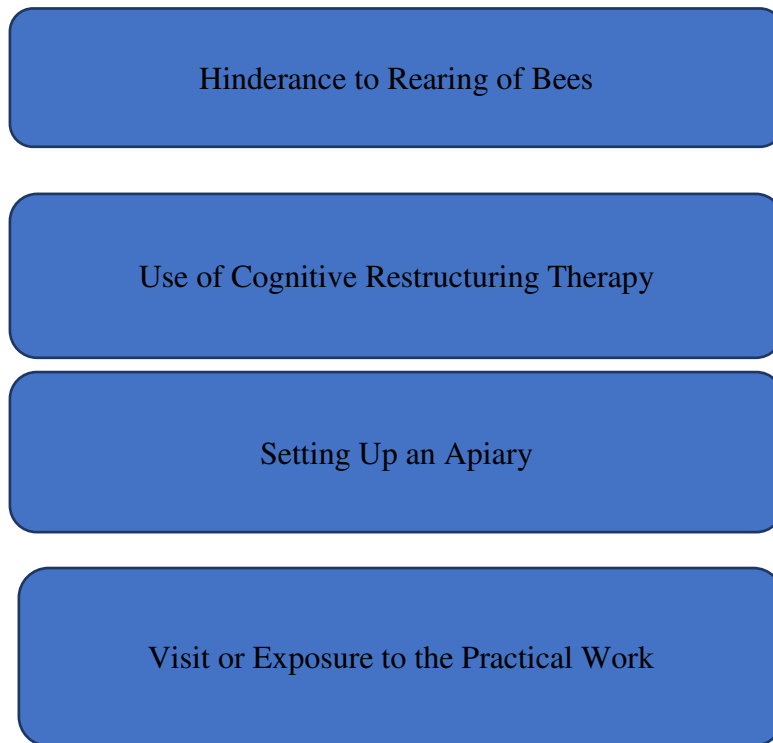
Homework Assignments:

Assign homework tasks that involve exposure to bee-related stimuli outside of the therapy session, such as watching documentaries about bees, practicing relaxation techniques when feeling anxious about bees, or keeping a journal to track their thoughts and feelings about bees.

Continued Support and Follow-Up:

Offer ongoing support and encouragement to the student as they continue to confront their fears and gradually increase their tolerance for bee-related stimuli. Conduct regular check-ins to monitor progress, address any setbacks, and adjust the treatment plan as needed.

The procedures were summarized as follows:



S/N	Behaviour	Rating
1	Level 1: Imaginary view of Bee	
2	Level 2: Watching the process of bee rearing on video	
3	Level 3: Listening to recorded sounds of buzzing bees.	
4	Level 4: Looking at bee in an enclosed box	
5	Level 5: Observing bees from a distance.	

6	Level 6: Being in the presence of bees in an enclosed observation hive.	
7	Level 7: Approaching beehives while wearing protective gear.	
8	Level 8: Handling beekeeping equipment or conducting beekeeping tasks under supervision	



Fig. 1: Sample of Top bar hive used by Makinde&Ogunjobi, (2023).



Source: Makinde & Ogunjobi, 2023.

Benefits of Modern Honey Bee Production and Processing

Bee farming, at modern levels, is loaded with many benefits. These benefits include the harvesting of products such as honey, wax, propolis, bee venom, bee bread, royal jelly and other minor items that are useful to man. These products bring in income, foreign exchange, raw materials for industries as well as medicine for ailments. In Nigeria, according to Adeshina (2019), Cramp (2020), Fakayode, Babatunde, Olowogbon&Adesuyi, (2020) and Ojeleye (2022) posited that modern honey bee production and processing offer a multitude of benefits, both to beekeepers and society as a whole. Some of the key benefits include: High-Quality Honey Production, Increased Yield and Efficiency, Diversification of Products, Pollination Services, Environmental Stewardship, Economic Contributions, Nutritional and Health Benefits, Research and Innovation:

Methodology

The study adopted quazi experimental research design of pretest, post - test and control group. The quasi-experimental design is used when true experimental design cannot be carried out because it involves human beings who are already assigned into various classes which cannot be altered. A pretest-posttest design is usually a quasi-experiment where participants are studied before and after the experimental manipulation. The schematic presentation of this design is shown below:

$$E = \begin{matrix} O_1 & X & O_2 \\ C = & O_3 & X_c O_4 \end{matrix}$$

The population of the study comprised all the 200 level students in the 45 programmes or courses of BOUESTI offering GST 213, Basic Agricultural Skills. The sample for the study comprised 363 students of BOUESTI offering GST 213 selected from the 45 courses in the University using multistage sampling procedures. At the first stage, the eight (8) schools from the three (3) Colleges were used as the University operates with Collegate system. Stage two involved the selection of five (5) departments each from the schools through simple random sampling technique. In stage three, A stratified sampling technique was used to select (25) twenty five students each from the departments, thereby making three hundred sixty three students (363) with the consideration of gender. A stratified sampling technique was used to cater for the variable of gender (male and female). That is, 181 students for experimental group and another 182 for the control group. The experimental group were taught the rudiments of bee keeping and honey production using counselling therapy (cognitive restructuring) demonstration method or practical teaching while the control group were taught the same topics without cognitive restructuring therapy .

The researchers made use of one instrument, titled; Honey Production Performance Test (HPPT). The instrument comprised parts A and B. The personal data of the respondents were not needed since the researchers didn't use their

identities. Part A is the Honey Production Performance Test (HPPT) which was drawn from the identified sub-topics of bee keeping and honey production. It comprises 20 items of multiple choice questions followed by four options lettered A-D, out of which the respondents were expected to select the best option to the questions and 5 practical questions. The HPPT was developed by the researchers for data collection which consisted of 2 units to measure the level of knowledge of the students and measure the acquisition of practical skill based on the two content areas that were covered. The items of HPPT used for pretest were reshuffled for the posttest to avoid memorization or transfer of knowledge. Part B was made up of 20 items to measure Students' Attitude towards Honey Production. This was structured on a 4- point likert type of scale; Strongly Agree (SA) = 4; Agree (A) = 3; Disagree (D) = 2; and Strongly Disagree (SD) = 1. Each respondent was made to tick the appropriate option. The responses were collated and marked for data analysis.

The questionnaire was validated by experts in the departments of agricultural science education and counselling psychology for face and content validity. The reliability of the instrument ensured through a pilot-test conducted on the instrument, selecting 10 students outside the sample of the study. The reliability coefficient of 0.86 was obtained using Cronbach Alpha method which indicate that the instrument is reliable to collect the necessary data for the study. The research questions were answered using descriptive statistics of frequency, percentages, mean, and standard deviation. Inferential statistics of analysis of covariance (ANCOVA) was used to test hypotheses at 0.05 level of significance.

Research Question 1:

What is the difference in the pre-test and post-test mean scores of students' learning outcome in experimental and control groups?

Table 1: Pre-test and Post-test mean scores of students' learning outcome in Experimental and Control Groups.

Groups	N	Pre-test		Post-test		Mean Difference
		Mean	SD	Mean	SD	
Experimental	181	63.21	18.13	72.04	11.52	8.83
Control	182	61.17	17.29	63.89	20.44	2.72

The result in Table 1 revealed that students in the experimental group and control group had performance mean score of 63.21 and 61.17 respectively for the pre-test score with respective measure of variability of 18.13 for the experimental group and 17.29 for the control group. This established the homogeneity of the test among the two groups. The mean score of students in experimental and control groups for the post test score are 72.04 and 63.89 respectively with respective measure of variability of 11.52 and 20.44. The mean difference between the performance mean scores of students in the experimental group before and after treatment is 8.83 while that of students in the control

group is 2.72. This implies that those in the experimental group had the higher mean score. Hence, the use of Cognitive Behavioural Therapy has positive effect on the learning outcome of students in Agricultural Science.

Research Question 2:

What is the difference in the mean scores of students' learning outcome in the experimental and control groups based on gender?

Table 2: Analysis of difference in the mean scores of students' learning outcome in the experimental and control groups based on gender

Gender	Techniques	Mean	SD
Male	Experimental	77.51	10.87
	Conventional	75.29	11.09
Female	Experimental	77.97	10.54
	Conventional	66.83	13.38

Table 2 revealed the mean and standard deviation of the difference in the mean scores of students' learning outcome in the experimental and control groups based on gender. For male students, it was shown that the score of those taught using Cognitive Behavioural Therapy (Experimental group) has a mean of score of (77.51) and standard deviation of (10.87). The conventional group has a mean score of (75.29) and standard deviation of (11.09). The mean scores has difference of (2.22) and difference in measure of variability (standard deviation) was (0.22). This implies that average performance of male students who were taught using Cognitive Behavioural Therapy was significantly higher than those in Control group taught using Demonstration method. Also, for female students, it was shown that the score of those taught using Cognitive Behavioural Therapy (Experimental group) has a mean of score of (77.97) and standard deviation of (10.54). The conventional group has a mean score of (66.83) and standard deviation of (13.38). The mean scores has difference of (11.14) and difference in measure of variability (standard deviation) was (2.84). This implies that average performance of female students who were taught using Cognitive Behavioural Therapy was significantly higher than those in Control group taught using Demonstration method. Hence, there was no significant difference in male and female learning outcomes when they are been taught using Cognitive Behavioural Therapy.

Research Question 3:

What are the students' attitude towards rearing of bees in the experimental and control groups based on gender?

Table 3: Analysis of difference in the mean scores of students' attitude towards agricultural science in the experimental and control groups based gender

Gender	Techniques	No (%)	Mean	SD
Male	CBT	45 (17.1)	77.51	10.87
	Conventional	23 (8.7)	69.05	13.11
Female	CBT	32 (12.2)	77.97	10.54
	Conventional	31 (11.8)	69.44	12.57

Table 3 revealed the mean and standard deviation of the difference in the mean scores of students' learning outcome in the experimental and control groups based on gender. For male students, it was shown that the score of the students taught using Cognitive Behavioural Therapy has a mean of score of (77.51) and standard deviation of (10.87), while the score of male students taught using Cognitive Behavioural Therapy has a mean of score of (69.05) and standard deviation of (13.11). The mean scores has difference of (8.46) and difference in measure of variability (standard deviation) was (2.24). This implies that average performance of male students in experimental group was significantly higher than those in conventional group when they are exposed to Cognitive Behavioural Therapy of teaching. Also, for female students, it was shown that the score of the students taught using Cognitive Behavioural Therapy has a mean of score of (77.97) and standard deviation of (10.54), while the score of female students taught using conventional method has a mean of score of (69.44) and standard deviation of (12.57). The mean scores has difference of (8.53) and difference in measure of variability (standard deviation) was (2.03). This implies that average performance of female students in experimental group was significantly higher than those in control group when they are exposed to Cognitive Behavioural Therapy of teaching. Summarily, the Table 4 revealed that significant difference existed in the average performance of students when they are been exposed to Cognitive Behavioural Therapy and conventional method of teaching with respect to their gender.

Testing of Hypotheses

Hypothesis 1

There is no significant difference in the students' learning outcome in the experimental and control groups based on gender (male and female). To test this hypothesis, performance mean scores of both male and female students were computed and compared for statistical significance using Analysis of Covariance (ANCOVA) at 0.05 level. The results are presented in Table 4 as follows;

Table 4: Analysis of Covariance (ANCOVA) summary of difference in the students’ learning outcome in the experimental and control groups based on gender.

Source	SS	Df	MS	F	P
Corrected Model	19241.055 ^a	3	728.352	39.522	0.001
Intercept	5744.350	1	3844.350	17.576	0.001
Covariate(Pre-test)	3.744	1	3.564	19.348	0.732
Gender	1730.391	1	920.195	32.507	0.732
Group	5727.125		2738.618		
Gender X Group	3.417		1.5935		
Error	2719.006	361	14.368		
Total	197033.000	363			
Corrected Total	5644.061	362			

a. R squared = 0.309 (Adjusted R squared = 0.297)

b. Computed using alpha = 0.05

Table 4 showed significant difference in the students’ learning outcome in the experimental and control groups based on gender (male and female). It was revealed that the significant value of 32.507 was greater than 0.05 (at the 95% level of confidence) obtained for both male and female students involved in the study. This indicated that there was no significant difference between the mean scores of male and female students’ performance in both experimental group (those that were exposed to Cognitive Behavioural Therapy) and control group (those that were not exposed to Cognitive Behavioural Therapy). Hence, the null hypothesis was not rejected. This implies that there was no significant difference in the students’ learning outcome in the experimental and control groups based on gender (male and female).

Discussion of Findings

The findings on pre-test and post-test mean scores of students learning outcome in experimental and control groups showed that there was homogeneity among the groups during pre-test stage and the use of Cognitive Restructuring Therapy had a positive effect on students’ performance during the post-test stage. This is in line with the submission of Mujuniet al (2022) who sees Cognitive Restructuring Therapy as a way to enhancing learning and changing the attitude of students and as well as developing their sense of efficacy. Also, Makinde&Ogunjobi (2023) posited that the use of systematic desensitization created a different learning approach resulting in different attitude to learning levels of motivation and engagement and therefore a different attainment level. This indicated that performance of students was predicated on their ability to visualize and represent their knowledge in Cognitive Behavioural Therapy. It was further revealed in the analysis of difference on the mean scores of students learning outcome in the experimental and control groups based on gender that average performance of students in the group of students exposed to Cognitive

Behavioural Therapy was significantly higher than those in the group of students not exposed to Cognitive Behavioural Therapy. This is in line with the position of Makinde, Kehinde- Dada & Babatunde, (2020) Adamu, (2021) that cognitive restructuring can assist students to cope with the increasing demands for skills and entrepreneurs.

It was further revealed that there was no significant difference in the average performance of students exposed to Cognitive Restructuring Therapy and those in the group of students not exposed to Cognitive restructuring based on gender. The inferential analysis of the summary of difference on students learning outcome in the experimental and control group based on gender revealed that there was no significant difference between the mean scores of male and female students' performance in the experimental and control groups. This implies that there was homogeneity in the performance mean score of male and female students when they are been exposed to Cognitive Behavioural Therapy. The study however supported the findings of Aduwo et al (2019) who submitted that gender has no influence on learning outcomes and acquisition of practical oriented skills by students studying Agricultural Science in Secondary Schools.

Conclusion

From this study it could be concluded that production of honey is at the low ebb due to fear of sting and lack of knowledge of the wealth that apicultural farming tends to generate. Cognitive restructuring as a form of cognitive behaviour therapy can help to change the negative thinking of the students intending to become bee farmers and thus improve bee rearing for wealth creation. There was significant difference between the students' knowledge of bee farming based on the pretest and the post-test data analysis.

Recommendations

Following the findings of this study, these suggestions were recommended.

1. There should be integration of cognitive - restructuring techniques into training and education programs for interested students intending to engage in integrated apicultural farming to enhance their knowledge, skills, and attitudes towards sustainable farming practices.
2. There should be advocacy for policies and initiatives that support the adoption and promotion of integrated apicultural farming approaches, including incentives for students, research funding, and extension services.
3. There should be collaborative partnerships between agricultural researchers, practitioners, and mental health professionals to further explore the potential benefits of integrating CBT techniques into agricultural interventions and programs.

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