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Role of Teachers in Waste Management in Secondary Schools of Busoga Region Municipalities: A Cross Cutting Issue of the Competence Based Curriculum in Uganda

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Abstract: *The study investigated how teachers contribute to waste management in secondary schools in the Busoga region municipalities, a topic that intersects with Uganda's competence-based curriculum. Two major questions guided this study: What are the current waste management methods used in secondary schools? And what are the different ways of training teachers in how to utilize the waste generated in secondary schools to put them to better uses? The study employed a cross-sectional design, essentially adhering to a quantitative approach to data collection and presentation. We used questionnaires to gather responses from 169 respondents, which included 155 teachers and 14 headteachers from 14 secondary schools in the selected municipalities. Summary tables presented the data, analyzed using mean and standard deviation. The findings revealed that schools primarily implement waste management methods such as recovery recycling practices, composting, reuse approaches, and the use of waste as manure. e. Further, the study revealed that teachers are highly receptive to various training approaches related to waste management, namely the use of manure, the use of charcoal briskets, and the utilization of waste materials for doormat making, compound decoration, brick formation from water bottles, necklace beautification, and basket making. In conclusion, despite some shortcomings, teachers in the Busoga municipalities have attempted to manage waste through various methods, primarily due to the opportunity they have had to acquire the necessary skill. Therefore, we recommend increasing the level of sensitization to encourage more teaching staff members to participate in waste management practices, thereby maintaining clean and sustainable municipalities.*

Keywords: *Waste Management, Busoga Municipalities, Secondary Schools, Methods, Clean environment*

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1. Introduction

Historians associate the origin of the waste management system with urbanization, which occurred because of the 1830s industrial revolution (Turner, 2021). Urbanization led to city overcrowding and random waste disposal, which in turn gave rise to contagious diseases such as cholera and diarrhea that later became a threat to the health of urban dwellers (Satterthwaite, 2021). Educational institutions represent environmental degradation sources with a small direct influence on its quality (Wei et al., 2022). The number of students and educational staff, the technical characteristics of the site

and infrastructure (including buildings), and the institutional management all contribute to the reduction of resource consumption and externalities (Fusheini & Salia, 2021).

For a long time, import refuse trucks have centralized waste management in East African urban centers, collecting waste from sources or transfer points and delivering it to designated waste dumps (Aryampa, Maheshwari, Sabiiti, Najib, & Bukenya, 2019). The municipal solid waste management (MSWM) system in East Africa has changed from the colonial days in the 40s, 50s, and early 60s, when it was efficient because of the lower urban population and adequate resources, to the current status that displays inefficiencies (Aryampa et al., 2019).

According to the 2019 ECO schools report, Uganda introduced a National Environment Policy (NEMP) to support Environment Education (EE) at all levels of government. In 1995, parliament approved the National Environment Statute, which created the National Environment Management Authority (NEMA) as the apex body to manage Uganda's environment. The Ugandan government uses the curriculum as a driving force to focus on achieving Vision 2040, which aims to transform the country into a middle-income country. In Iganga Municipality, a temporary dumping site received 80% of the solid waste, classified as biodegradable refuse. But there was growing discontent among residents on how authorities are handling the garbage (Mawa, 2018). The accumulation of garbage in Kamuli and Bugiri Municipalities over the past three years has sparked demonstrations and stoked fears of a cholera outbreak. The garbage concern went viral across social media platforms, which called for an urgent intervention while authorities grappled with enforcement and by-laws on public and personal hygiene and sanitation management in the municipality (Opio, 2021).

In the current study, teachers in the three municipalities of Busoga, which were Kamuli, Bugiri, and Iganga, were trained by the project trainers on how to transform the solid waste in their schools into meaningful uses. For instance, the majority of secondary schools utilized waste materials such as paper and water bottles on a daily basis within their premises. However, this aligned with the innovations that the new competence-based curriculum aimed to implement. This could facilitate the preservation of the environment, an issue that cuts across all subjects taught in secondary schools, particularly the new curriculum.

1.1 Major objective

The general objective of this study was to investigate the role of teachers in waste management in secondary schools in Busoga region Municipalities: A cross-cutting issue of the competence-based curriculum in Uganda.

1.2 The study was guided by the following research question

1. What are the methods of waste management currently used in secondary schools of Busoga region Municipalities?
2. What are the different ways of training teachers in how to utilize the wastes generated in secondary schools to put them to better uses?

2. Literature Review

This section presents a review of related literature on the methods of waste management and different ways of training teachers in how to utilize the waste generated in secondary schools to put them to better uses.

2.1 Methods of Waste Management in Communities

Waste Reduction. It seemed that the easiest and most effective way to manage solid waste was to reduce the amount of waste to be disposed of. This was a strategy that seemed simple in concept but showed promise (Azevedo et al., 2020). However, the amount of waste produced, even in developed countries, was often a function of culture and affluence. For instance, a "throwaway culture" emerged in developed countries due to the affordability of consumer goods, leading to a surge in individual packaging, which in turn led to a significant rise in MSW as the cost of production decreased. The focus on mass production and the creation of inexpensive consumer goods has led to the compromise of product quality and durability for the purpose of achieving the lowest market price, thereby increasing the likelihood of individuals discarding and replacing items rather than repairing or maintaining them (Lissah et al., 2021).

Integrated Approach. An integrated approach to waste management also considered community-specific issues and needs to formulate an integrated and appropriate set of solutions unique to each context. As with any issue in developing nations, solutions that work for some countries or areas were inappropriate for others (Concari et al., 2020). Specific environmental conditions dictate the appropriateness of various technologies, and the level of industrialization and technical knowledge presented in various countries and cities would constrain solutions (Braun et al., 2021). Studies on MSW issues, however, repeatedly discussed certain approaches as being at least adaptable to many developing nation scenarios. U.S.E.P.A. (Nouri & Taqavi, 2020).

Recycling. As Knickmeyer, (2019). indicates, one of the approaches to waste management was by separating or sorting waste generated and eventually using it for other forms of production. Households almost universally separate waste materials, preventing the discarding of the most valuable and reusable materials. Following in-home retention of valuable material, waste pickers currently remove most valuable materials either before garbage enters the waste stream or route, especially in the lower and middle-income areas of many municipalities. In these instances, there is little need for additional encouragement of recycling. Even in the more affluent areas of developing cities, it is common to find itinerant "buyers" of waste materials like cardboard and glass (Knickmeyer, 2019).

Composting. Today, composting is a low-technology approach to waste management. Many developing nations' wastes would theoretically be ideal for reduction through composting, as it has a much higher organic material composition than industrialized countries. For example, generally, in developing countries, the average city's municipal waste stream is over 50% organic material. Studies in Bandung, Indonesia, and Colombo, Sri Lanka, have revealed that residential waste is composed of 78% and 81% compostable material, and market waste is 89% and 90% compostable, respectively (Sharma & Garg, 2017). However, composting has not been overwhelmingly successful and widespread in practice throughout the developing world. Although well documented in China and other areas of eastern Asia, composting projects have a spotty record throughout Africa, Latin America, and elsewhere, with the largest number of failed facilities worldwide (Ghozatfar et al., 2023).

There have been many advantages to composting. First and foremost, it would reduce, in some cases significantly, the amount of waste requiring ultimate disposal, extending the life of landfills. Correct execution yields a useful product that households and farms can use to boost soil nutrient levels and boost organic matter, thereby enhancing soil stability. Markets can sell the product if its quality is high enough. The process by which composting decomposes organic waste is preferable to landfill processes in terms of environmental considerations. In a landfill, bacteria break down organics aerobically in the absence of oxygen, resulting in the release of methane gas. However, when properly composted, an aerobic process decomposes the organic matter, producing no methane by-product (Beesigamukama et al., 2020).

Dumping. The dumping of solid waste in landfills has been probably the oldest and definitely the most prevalent form of ultimate garbage disposal. Many "landfills" were nothing more than open, sometimes controlled, dumps. The level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no leach ate management, no consideration of landfill gas management, and few, if any, operational measures such as registration of users, control of the number of "ttipping fronts," or compaction of waste (Abdel-Shafy & Mansour, 2018).

Incineration. Another option for waste management was incineration. One should not view incineration as a 'disposal' option, as it still requires the disposal of some ash, likely in a landfill, and the dispersal of some ash and constituent chemicals into the atmosphere. It should instead be considered more in terms of its waste-reduction potential, which can be 80–95% in terms of waste volume (Kanhar et al., 2020). This appears to be an extremely attractive option, with occasional exceptions; incineration has been an inappropriate technology for most low-income countries like Uganda. Above all, the high financial start-up and operational capital required to implement incineration facilities is a major barrier to successful adoption in developing countries (Zhang et al., 2020).

2.2 Ways of training teachers in how to utilize the wastes generated in schools

Elena et al., (2016)'s research assessing waste production in schools highlights the contribution of school children and school staff to the total amount of waste generated in a region, as well as any poor practices of recycling (the so-called separate collection of waste) in schools by the students, which could be improved through educational activities. According to Sukma et al. (2020), educating teachers regarding the importance of environmental issues is essential, since instilling the right behavior in school children is also beneficial to the behavior of their families. The way waste management is carried out in different schools in Trento (northern Italy) is as analyzed: a primary school, a secondary school, and three high schools were taken as cases of study. The possible influence of the age of the students and of the various activities carried out within the schools on the different behaviors in separating waste to also evaluate.

Iwasaki (2022) established that management of waste did not only depend on the size of the institutes and on the number of occupants, but, especially, on the type of activities carried out in addition to the ordinary classes and on the habits of both pupils and staff. In the light of the results obtained, some corrective measures were proposed to schools, aimed at increasing the awareness of the importance of the right behavior in waste management by students and the application of good practices of recycling.

In line with Magrini et al. (2021) study, assessing how the waste produced within schools is managed is crucial. The people who work and/or study in schools produce waste, and the amount of waste generated may be significantly higher than the total amount of waste

produced at home, especially in small towns. The organization of SC thus has a very important role. In addition, instilling the right behavior in a child at school often has a positive impact on the attitude of their families and their community towards waste disposal. In spite of achieving a level of excellence, the waste management system in the PAT still needs to be improved. Improvements can also be attained by involving the younger generations, so as to nurture conscientious citizens that respect the environment, making them aware of the importance of correctly contributing to environmentally sustainable waste management. In addition, young people spend most of their time in schools and, thus, their contribution to the overall waste generation is not negligible. Improvements in a waste management system can be achieved through sharing the principles of prevention, accountability, cooperation and transparency, as well as compliance with the criteria of effectiveness, efficiency, economy, transparency, technical and economic feasibility, and the principle according to which the "polluter pays.

3. Methodology

This section presents the research design, target population, the sources of information, the sample size and sampling strategies, methods of data collection and data collecting instruments, quality control, data management and ethical considerations.

3.1 Research Design

This study employed quantitative approaches using a cross-sectional research design which offered an opportunity for the researcher to verify the views of the respondents towards certain variables and drawing conclusions using triangulated data.

3.2 Population of the Study

The target population for this study comprised of; *Public secondary schools* which differ by selected district with Kamuli = 33 secondary schools out of which 10 are public4 in the municipality (KAWA Uganda, 2021); Bugiri District with 32 secondary schools out of which 12 are government and 4 in the municipality; and Iganga District has 35 secondary schools out of which 12 are public of which of 6 them were in the municipality. Altogether, the study comprised **14**secondary schools in the three municipalities.

Teachers. The number of teachers differs by school. However, on average, a public secondary school comprises 18 teachers with a total of 252 teachers in the 14 secondary schools in the three municipalities.

Head-teachers. The number of headteachers is automatically correspondent to the number of secondary schools. Therefore, if the total number of public secondary schools in the three municipalities was 14, there were 14 head teachers distributed as six (6) in Iganga Municipality, four (4) in Kamuli Municipality and four (4) in Bugiri Municipality.

Therefore, the target population was3920 students+252 teachers + 14 headteachers = 4186 people.

3.3 Sample Size and Sampling

The Busoga region municipalities included Kamuli, Iganga and Bugiri municipalities. Calculations to reach the most appropriate sample size was arrived at using the formula by Yamane (1967); n = $\frac{N}{1+N(e)^2}$ where n was the sample size to be determined, N is the mother population which is 1525, 1 was representative of likely omissions, and stood for acceptable error which was normally taken to be 5% or 0.05.

Sample for teachers = $\frac{252}{1+252\,(0.05)^2}$ = $\frac{252}{1+252\times0.0025}$ = $\frac{252}{1+0.63}$ = $\frac{252}{1.63}$ = 154.6 ∽155

Sample for head teachers = 14

3.4 Sampling Techniques

Public secondary schools. Schools in the three municipalities of Bugiri, Iganga and Kamuli were*clustered* into private and public. Public secondary schools were then considered appropriate for the study. Observations indicate that compared to private secondary schools, public secondary schools have systems that were more transparent because records were available any time, and the government appointed qualified teachers on permanent contracts. Furthermore, it was mandatory for government programs and policies to be implemented in public rather than private secondary schools.

Teachers. The lists of secondary school teachers were obtained per school, and male teachers identified by name form female teachers. Stratified sampling technique was used to categorize the study population based on responsibility, that is to say; students, teachers and head teachers. This was done to avoid obtaining biased results on grounds of respondent responsibility or gender.

Further, the *simple random sampling* technique was used to select respondents basing on category by gender and by responsibility. In this case, selection of each item is by chance. Using this principle, the researcher printed 50 questionnaires and used the list of names for teachers who were at school at the time then chose the ones to participate considering the gender question.

Head teachers. In this study, the researcher's judgment was that since these have overriding information about the teaching practice and administration in their respective public secondary schools and considering that no other authority could

provide information that was equally relevant, head teachers were directly included in the study.

3.5 Research Instruments

Research instruments were tools that researchers used to collect data from the respondents. Combinations of instruments were considered appropriate to for use based on their different strengths, as none of these methods that was fit to be used exclusively to collect sufficient data. The following instruments were used; interview guide with structured questions, a semi structured close ended questionnaire.

3.5.1 Questionnaires

The Self-Administered Questionnaires were measured on a five-point Likert scale, with scores ranging from Strongly agree (SA)=5, Agree(A)=4, Neutral (N)=3, Disagree (D) =2, and strongly disagree (SD)=1. The close ended and open-ended questions were designed in a uniform format so that the collected data could easily be analyzed with the help of SPSS. The advantage of the questionnaire was that it had to be administered to teachers who were literate and professional. These questionnaires were used to collect both qualitative and quantitative data.

3.5.2 Validity of the Research Instruments

Validity refers to the degree to which an instrument measures what it was supposed to measure and consequently permits appropriate interpretation of scores. To ensure content validity the researchers constructed data collection instruments with adequate number of items and made sure that each item or question on the scale had a link with the objectives of the study. Also, in ensuring validity of instruments the researchers involved more senior colleagues in the department of education for proper guidance after which the researchers pre-tested the instruments. During interviews, the researcher used simple language and clear instructions to the respondents. Questions were phrased to ensure consistency in responses of the participants. The respondents who participated in the study were informed and knowledgeable about the study and this enabled us to ensure validity and reliability of findings.

3.5.3 Reliability of the Research Instruments

The reliability statistics were established using the SPSS whereby the Cronbach's alpha coefficients for the multi item constructs were established and presented in Table 1:

Table 1: Reliability Statistics

Variable	No. of items	Cronbach's Alpha
Nature of Solid Wastes	09	0.703
Methods of Solid waste management	08	0.824
Training of teachers on Waste Management	10	0.679
Improvement of waste management Strategies	10	0.645

According to Table 1, all constructs had their Cronbach alpha values above 0.5 for example nature of solid wastes (0.703), methods of solid waste management (0.824), training of teachers on waste management and (0.679) and improvement of waste management strategies (0.7645). This suggests that the questionnaire was highly reliable.

The reliability of the qualitative items on the interview guide were incrementally established by making clarifications during the interview process and tightening the rigor with focus on study variables using relevant probing questions where necessary.

3.5.4 Data processing

After gathering the data from the field, the researchers organized and compiled the data based on the research objectives. The data was then entered into statistical analyzing software called Social scientific package for social scientists (SPSS). The data was then analyzed and discussed by the research team in respect to the findings and objectives of the study.

3.5.5 Data analysis

Data analysis was handled as a process of evaluating data using analytical and logical reasons to examine each component of the data provided. In other words, data analysis was done as a process of inspecting, cleaning, transforming and modeling data with the goal of discovering useful information, suggesting conclusions and support decision making.

Quantitative data

Statistical procedures were employed in quantitative data analysis. Data from questionnaires were subjected to the statistical package for social scientists (SPSS) for editing and analysis. This helped to determine the degree to which the study variables are related to each other; concerning the role of teachers in waste management in Busoga municipalities. Data was presented in form of descriptive statistics such as frequency distribution tables.

Qualitative data

Qualitative/descriptive statistics arising from SPSS manipulations of data from questionnaires was presented in frequency counts, mean mark and standard deviation.

5.6 Ethical Considerations

The researcher exercised ethical conduct during and after the study by remaining confidential to protect the identity of respondents and in keeping private information private.
The researcher will also ensure never to physically or psychologically harm the respondents in acquiring information or after acquiring the information.

4. Results and Discussion

This section presents the data analyses including the quantitative data analysis and the quantitative data analysis. The data analysis is organized in respect to the objectives of the study and meaningfully to answer the research objectives.

4.1 Methods of waste management used in secondary schools

This study sought to establish the methods of waste management used in public secondary schools in Busoga regions municipalities using quantitative data. The respondents rated the eight items and Amal (2016) scale was used to interpret results as follows: 1.00-1.80 - strongly *disagree*, 1.81-2.60 -*Disagree*, 2.61-3.40 denotes *Neutral*, 3.41- 4.20 stands for *Agree*, and 4.21-5.00 for *Strongly Agree*:

Table 2: Methods of waste management used in secondary schools

No.	Method	Mean	Std. devn	Interpretation
1.	The school uses dumping to manage wastes.	4.62	0.70	Strongly agreeable
2.	The school uses incineration to manage wastes	3.21	1.72	Neutral results
3.	The school uses sanitary land fill to manage wastes	2.62	1.87	Neutral results
4.	The school uses recovery recycling to manage wastes	3.50	1.54	Agreeable results
5.	The school uses Compositing to manage wastes	4.03	1.11	Agreeable results
6.	The school uses pyrolysis to manage wastes	1.74	1.42	Strongly disagreeable
7.	The school uses re-use to manage wastes	4.31	0.80	Strongly agreeable
8.	The school uses manure to manage waste.	4.52	0.70	Strongly agreeable

The scores for methods of waste management in municipalities varied by mean and standard deviation scores. Respondents registered strong agreement with the dumping method of waste management. We interpret the mean score of 4.62 and the standard deviation of 0.70 as highly agreeable results. By implication, the dumping method is one of the most preferred waste management options among the residents in these municipalities. The high mean score suggests that the majority of respondents strongly support this method, while the low standard deviation indicates that there is minimal variation in opinions. The level of engineering, planning, and administration involved. Open dumps are characterized by the lack of engineering measures, no leach ate management, no consideration of landfill gas management, and few, if any, operational measures such as registration of users, or compaction of waste (Abdel-Shafy & Mansour, 2018). The dumping of solid waste in landfills has been probably the oldest and definitely the most prevalent form of ultimate garbage disposal. Many “landfills” were nothing more than open, sometimes controlled, dumps.

Additionally, the idea that schools in the Busoga subregion use incineration to manage waste received neutral responses. The mean score of 3.21 and the standard deviation of 1.72 contribute to the interpretation of neutral results. This implies that there is no strong consensus among respondents regarding the effectiveness of incineration as a waste management method in schools in the Busoga subregion. The study also registered neutral responses to the idea that schools in municipalities of the Busoga subregion use sanitary land fill to manage waste. The mean score of 2.62 and the standard deviation of 1.87 contribute to the interpretation of neutral results. This implies that there is no strong opinion either in favor or against the use of sanitary landfills in schools in the Busoga subregion. It should instead be considered more in terms of its waste-reduction potential, which can be 80–95% in terms of waste volume (Kanhar et al., 2020). This appears to be an extremely attractive option, with occasional exceptions; incineration has been an inappropriate technology for most low-income countries like Uganda.

Furthermore, the study's results, which support the idea that schools in municipalities of the Busoga subregion use recovery recycling to manage waste, were agreeable. The study's mean of 3.50 and standard deviation of 1.54 contribute to the interpretation of agreeable results. This implies that schools in the Busoga subregion are making a positive impact on waste management through the implementation of recovery recycling practices. The study's results recognize and support these efforts, which is encouraging. As Knickmeyer, (2019) indicates, one of the approaches to waste management was by separating

or sorting waste generated and eventually using it for other forms of production. Households almost universally separate waste materials, preventing the discarding of the most valuable and reusable materials. Following in-home retention of valuable material, waste pickers currently remove most valuable materials either before garbage enters the waste stream or route, especially in the lower and middle-income areas of many municipalities.

Furthermore, the study registered agreeable results regarding the idea that schools in municipalities of the Busoga subregion use composting to manage waste. The average score of 4.03 and the standard deviation of 1.11 contribute to the interpretation of positive results. This implies that schools in the Busoga subregion are effectively implementing composting practices to manage their waste in a sustainable manner. The high average score suggests that schools are actively participating in waste management initiatives, which is a positive indication of environmental consciousness in the region. Studies in Bandung, Indonesia, and Colombo, Sri Lanka, have revealed that residential waste is composed of 78% and 81% compostable material, and market waste is 89% and 90% compostable, respectively (Sharma & Garg, 2017). However, composting has not been overwhelmingly successful and widespread in practice throughout the developing world.

Additionally, the study's results strongly disagreed with the idea that schools in municipalities of the Busoga subregion use pyrolysis to manage waste. The mean of 1.74 and the standard deviation of 1.42 contribute to the interpretation of strongly disagreeable results. This implies that schools in the Busoga subregion are likely not utilizing pyrolysis as a waste management method at all. The study's findings, which support the idea that schools in the Busoga subregion use the reuse approach to manage waste, were highly agreeable. The mean score of 4.31 and standard deviation of 0.80 help interpret strongly agreeable results. In these instances, there is little need for additional encouragement of recycling. Even in the more affluent areas of developing cities, it is common to find itinerant "buyers" of waste materials like cardboard and glass (Knickmeyer, 2019). This implies that schools in the Busoga subregion are effectively implementing sustainable waste management practices by prioritizing the reuse of materials. The high mean score indicates that the majority of participants strongly support this approach, while the low standard deviation suggests that there is a high level of consensus among respondents.

Additionally, the study's findings, which support the idea that schools in the Busoga subregion use waste as manure to manage waste, were overwhelmingly positive. This is due to the study's mean score of 4.52 and standard deviation of 0.70, both of which contribute to the interpretation of strongly agreeable results. This implies that schools in the Busoga subregion are effectively utilizing waste as manure to manage their waste, showing a high level of environmental awareness and sustainability practices. The positive feedback from the study suggests that this method is not only feasible but also widely accepted and implemented among schools in the area.

4.2 Ways of Training teachers on waste management

This study sought to establish the types of training on solid waste management the teachers had received in public secondary schools in Busoga regions municipalities using quantitative data. The respondents rated the nine items and Amal (2016) scale was used to interpret results as follows: 1.00-1.80 - strongly *disagree*, 1.81-2.60 -*Disagree*, 2.61-3.40 denotes *Neutral*, 3.41- 4.20 stands for *Agree*, and 4.21-5.00 for *Strongly Agree*:

Table 3: Ways of Training teachers on waste management

No.	Statement about ways	Mean	Std. devn	Interpretation
1.	Teachers in our school received manure use training	4.50	0.10	Strongly agreeable
2.	Teachers in our school received charcoal briskets training	4.40	0.09	Strongly agreeable
3.	Teachers in our school received door mat training	4.80	0.40	Strongly agreeable
4.	Teachers in our school received compound decoration training	4.80	0.37	Strongly agreeable
5.	Teachers in our school received brick formation from water bottles training	4.90	0.24	Strongly agreeable
6.	Teachers in our school received necklace beautification training	4.90	0.30	Strongly agreeable
7.	Teachers in our school received basket making training	4.70	0.47	Strongly agreeable
8.	Teachers in our school received bottle irrigation training	4.90	0.30	Strongly agreeable
9.	Teachers in our school received training on bead making from paper waste	4.90	0.35	Strongly agreeable
10.	Teachers in our school received paper bag formation	4.60	0.49	Strongly agreeable

The findings revealed that all the training approaches were highly accepted by teachers in secondary schools in the municipalities of the Busoga subregion. The notion that teachers receive manure use training (M = 4.50; SD = 0.10); training on charcoal briskets (M = 4.40; SD = 0.09); and training on use of wastes for door mat making (M = 4.80; SD = 0.40), were each accepted with strongly agreeable results. This means that teachers in these secondary schools in the Busoga subregion are not only open to new training approaches, but they also highly value and appreciate them. The feedback provided by the teachers indicates a willingness to learn and implement innovative techniques in their classrooms. Elena et al., (2016)'s research assessing waste production in schools highlights the contribution of school children and school staff to the total amount of waste generated in a region, as well as any poor practices of recycling (the so-called separate collection of waste) in schools by the students, which could be improved through educational activities.

Other ways of training teachers on waste management, such as compound decoration training (M = 4.80; SD = 0.37); brick formation from water bottles training (M = 4.90; SD = 0.24); necklace beautification training (M = 4.90; SD = 0.30); and basket making training (M = 4.70; SD = 0.47), each was registered with agreeable results. By implication, these alternative training methods have been shown to be effective in improving teachers' knowledge and skills in waste management. The high mean scores and low standard deviations indicate that participants found these training courses to be valuable and informative. Iwasaki (2022) established that management of waste did not only depend on the size of the institutes and on the number of occupants, but, especially, on the type of activities carried out in addition to the ordinary classes and on the habits of both pupils and staff.

Further, training of teachers in waste management in as far as bottle irrigation training (M = 4.90; SD = 0.30); training on bead making from paper waste (M = 4.90; SD = 0.35); and training in paper bag formation (M = 4.60; SD = 0.49) were registered with strongly agreeable results also. This implies that teachers are not only receptive to learning about waste management techniques; they are also highly skilled in implementing these practices in their classrooms. The high mean scores indicate that teachers find these training sessions valuable and are likely to incorporate them into their lesson plans. In line with Magrini et al. (2021) study, assessing how the waste produced within schools is managed is crucial. The people who work and/or study in schools produce waste, and the amount of waste generated may be significantly higher than the total amount of waste produced at home, especially in small towns.

5. Conclusion and Recommendations

5.1 Conclusion

The study on waste management methods in municipalities revealed varying levels of agreement among respondents. Respondents strongly supported the dumping method, responded neutrally to incineration and sanitary landfills, and viewed recovery recycling practices and composting favorably, all of which have a positive impact on waste management. Schools overwhelmingly embraced the reuse approach and the use of waste as manure, demonstrating a strong commitment to environmental sustainability. However, there was strong disagreement regarding the use of pyrolysis.

In conclusion, teachers in secondary schools within the Busoga subregion are highly receptive to various training approaches related to waste management. This specifically relates to training on the use of manure, the use of charcoal briskets, and the utilization of waste materials for tasks such as door mat making, compound decoration, brick formation from water bottles, necklace beautification, and basket making. Furthermore, training sessions on bottle irrigation, bead making from paper waste, and paper bag formation received similar positive feedback, indicating that teachers are not only eager to learn but also capable of applying these practices in their classrooms.

5.2 Recommendations

The following recommendations are suggested based on findings and discussions in respect to the three hypotheses.

1. The stakeholders of the secondary schools in Busoga region's Municipalities should put more emphasis on adopting more methods of solid waste management as a strategy to manage the different types of solid wastes generated from their schools.
2. The stakeholders of the secondary schools in Busoga region's Municipalities should put more emphasis to train all the teachers on how to manage the different types of solid wastes generated from their schools.

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