Global Journal of human-social science: H Interdisciplinary
Volume 14 Issue 4 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-460X & Print ISSN: 0975-587X

Pulp Art Making: A Tool for Promoting Recycling through Hand Papermaking for Effective Curriculum Delivery in Art

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GJHSS-H Classification: *FOR Code: 190199*

Strictly as per the compliance and regulations of:

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I. Introduction

Educators and educational institutions are always called upon to take up and address issues when behavioural changes are needed; the waste crisis is no exception. Educators could add a fourth "R" (recycling) to the traditional three "Rs" of reading, 'riting and 'rithmetic. By practising recycling, reducing and reusing with their students, teachers will be encouraging them to develop positive behaviours of waste management. Schools also possess a unique opportunity to form the behaviours of people during the earliest stages of development through to adolescence. As the learning environment where children learn the behaviours they will adopt for their lifetimes, school is a perfect place to initiate the habit of recycling, which can help inculcate a sense of leadership and responsibility in young people. Implementing school recycling programmes can also support lessons on environmental stewardship and conservation that is taught in science and social studies. By implementing recycling programmes, schools can become a hands-on learning environment where students learn to practise the behaviours of environmental stewardship and good citizenship by reducing waste (Bullman, 2007).

It is good for communities if future leaders learn the recycling habit, which they will carry over into their homes and on into adulthood (Association of New Jersey Recyclers, 1994). A school recycling programme of waste products may not necessarily make money but it can cut down on waste and disposal costs and also instill positive behaviours associated with conserving natural resources. When educators take up recycling, the schools will end up teaching the society examples they should follow.

II. Why Recycle?

According to The Dallas Sierra Club (2008), land filling and open-space dumping of waste bring about odour concerns, air pollution, pollution of ground and surface water and indiscriminate littering. Incineration of waste materials is expensive to build and operate, they require a lot of energy, they produce air pollutants that include sulfur dioxide and nitrogen oxides, they can release metals such as cadmium, chromium, mercury, nickel and zinc in their ash, and they also generate wastewater that requires further cleanup. Landfilling of waste, incineration of waste and open-space dumping of waste, all have serious environmental challenges that can destroy the sustainability of the environment and the inhabitants in the environment (The Dallas Sierra Club, 2008).

Friends of the Earth (2008) has outlined the importance of recycling waste materials as:

a) Recycling saves raw materials

it reduces the need for raw materials such as metals, forest materials, oil, and also reduces the pressure on the environment. The level of consumption in the world has a significant impact on raw materials and the environment as a whole which is a key cause of global habitat loss. For example, demand for paper and cardboard is threatening ancient woodlands. Also virgin materials need to be refined and processed to create products, requiring the use of vast amounts of energy and the use of polluting chemicals which causes further

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destruction to habitats. For example, making one tonne of aluminium from virgin materials requires four tonnes of chemicals and eight tonnes of bauxite, which is a mineral ore; it takes 95 percent less energy to make a recycled aluminium can than a new can from virgin materials (Friends of the Earth, 2008).

b) Recycling reduces the world impact on climate change

although recycling uses energy, overall it reduces climate emissions, as recycling a material generally uses far less energy than manufacturing products from virgin materials. Recycling waste paper saves three times the energy used up in burning it. Recycling plastics also saves five times the energy created by burning it (Friends of the Earth, 2008).

c) Recycling costs less

the costs of different waste management techniques are subject to many variables which make it difficult to distinguish between them in purely economic terms. However, when comparing land filling of waste, incineration, open-space dumping and recycling, recycling has considerable economic merit. Friends of the Earth (2008) concur with The Dallas Sierra Club (2008) that recycling, instead of sending waste to landfill, avoids the payment of landfill taxes and potential breach of contract fines.

d) Recycling can generate cash

after collecting waste materials or recyclables, they are separated and sent to re-processors such as paper mills, glass works or plastic reprocessing plants where the waste is processed for use in new products. Although it costs money to collect waste materials, the materials generate income when they are recycled and sold (Friends of the Earth, 2008).

d) Recycling can Create Jobs

The process of every kind of waste recycling from collection to the sorting and reprocessing of the recyclables creates more jobs than incineration and land filling of waste. There is still a huge potential for growth in the reprocessing of waste sector, particularly with strong manufacturing industries (Friends of the Earth, 2008).

f) Recycling helps us toward sustainable living

Making people think about the impact of their consumption and production of waste can help to encourage them to make lifestyle decisions to reduce the waste they create and thereby reduce negative impacts on the environment. Recycling saves energy, reduces raw material extraction and combats climate change. The vast majority of studies have shown that recycling our rubbish is better for the environment rather than incinerating or landfilling it. Recycling creates a cyclic way of living rather than the current linear model. This cyclic way of living is essential for reducing the negative impact on the environment as a whole, and will help the world develop sustainably (Friends of the Earth, 2008).

Today the field of recycling is considered as the method that is being used to take care of waste to protect the environment (Spilka et al., 2008). Bullman (2007) stresses that reducing waste, reusing materials and products, and recycling are some of the most powerful ways individuals, households, institutions and businesses can protect their communities and the environment. Using fabric waste for hand papermaking is therefore a good option for cleaning the environment and putting resources to good use.

III. Benefits and Opportunities in Pulp Art

Essentially, the value of the pulp art process is much more important than the products that can be created; hence Smith (1995) asks teachers to guard against being too product-oriented at the outset. Papermaking projects with any number of participants can be made manageable if smaller works are made because bigger works require more pulp, more drying space, and more drying time, which can all create problems, implying that teachers must not set themselves up for something they cannot handle. One of the most exciting things about teaching hand papermaking is the many new learning experiences it often provides (Radolan, 2004) such as the opportunity to introduce some basic chemistry and environmental issues to learners (Vickerman, 1995). Pulp art also provides and also offers artistic possibilities limited only by the imagination of the pulp artist. An instructor organising a papermaking project must therefore have a general understanding of the entire process involved in the craft (Hiebert, 1998).

a) Basic Processes Involved in Hand Papermaking

According to Hiebert (1998), the following are the basic processes involved in hand papermaking:

1. First, raw material is obtained (papermaking fibre) by harvesting plant material or purchasing fibre from a papermaking supplier.
2. Once the fibre is obtained it is processed; the processing varies from fibre to fibre but most plant fibres require cooking.
3. All processed and cooked fibres are beaten into pulp, using methods such as hand beating, a blender, or beating in a Hollander beater.
4. After beating, the pulp is mixed with water in a vat.
5. A mould and deckle is then dipped in and out of the vat of pulp, allowing the pulp to settle on the screened surface of the mould as the water drains through the holes in the screen. With this the deckle is removed and the mould is tilted to let the excess water drain off.

6. The wet sheet on the mould is then transferred onto a felt or blanket. Multiple sheets of paper, one on top of the other, can be couched together each separated by a layer of felt or blanket.
7. The couched sheets are pressed to remove water from the wet sheets.
8. The pressed sheets are dried using a box fan or sunshine.

b) Organising and teaching papermaking

Papermaking can be organised and taught successfully using different techniques. Smith (1995) calls on the instructor to introduce the concept of pulp art slowly to the audience because the process of making a piece of paper involves many steps and students can only grasp so much at a time. Smith indicates that the process must always be broken down into as many steps as possible to allow the participants or students to assimilate all they are taught. The first day of paper making can focus on pulp preparation and the next day for working with the pulp. Ideally, it can take the students several practices before they can use the pulp as an art medium. In a classroom situation, all the required materials and tools must be present for a smooth operation. Depending on the number of students and the class size, the tools, materials and equipment should be arranged carefully and very well to allow space and easy movement in the room.

To Smith (1995), what works best is to have tables in the middle of the room for easy access to supplies of materials and to surround them with student work tables on which two or three vats of pulp are placed, leaving the equipment and materials on the supply tables. Chairs must be placed along the walls of the room, and if need be, to restore order in the room by directing the participants to sit on them. If the time for training is limited, instructors can complete some of the initial process before the participants arrive. For example, the instructor can prepare the different kinds of pulps to be used for the project and even make samples of what would be taught to the participants before the start of the class to save time. Because the making of paper from plants is labour intensive, Radolan (2004) recommends that instructors do most of the labour intensive and time consuming processes like fibre harvesting, preparation, and cooking before the start of the workshop.

If the students or participants are not involved in the preparation of the pulp, the process of preparing the right consistency of pulps for creating the different kinds of works must be explained to them through a brief demonstration during the teaching session. The processes involved in papermaking are many so Smith (1995) advises teachers taking people through papermaking to have one or two volunteers or teaching assistants to help carry out the project. This allows for orderliness and also ensures that all participate fully throughout the process. In the case of teachers who do not have volunteers to help them during the training sessions, students who are able to grasp the process and finish with their works early could be asked to help and assist other students who will still be working.

c) Safety Measures

Although manipulating pulps to create art is fun for all ages, there are safety measures that instructors must consider when organising and teaching any kind of pulp art (Smith, 1995; Radolan, 2003, 2005, 2006, 2010). Vickerman (1995) insists that instructors of children in particular must always adopt the "safety first" motto because some wood and plant materials can cause allergic reactions and skin irritations to some individuals. Pulp spraying, which involves spraying pulp on three dimensional moulds to attain the form of the mould with the pulp may be harmful, especially to people with pre-existing respiratory conditions (Schutter, 1998). Pulp spraying could cause some people to cough and sneeze within seconds of entering the papermaking workshop. Soda ash and caustic soda which are added to soften fibres during cooking are highly corrosive upon skin and eye contact and inhalation. Chlorine bleach, which is added to pulp to whiten it and other colouring pigments, must be handled carefully by instructors because they can cause skin, eye and respiratory irritation (Vickerman, 1995). Protective gloves can be worn to prevent cracking effects on the hands during cooking and rinsing of fibres (Farnsworth, 1989).

The blades in mechanical beaters can trap the hands when working with or cleaning the pulp out of the beater. Instructors must especially guide their participants on the use of mechanical beaters during pulp art projects. The use of large amounts of water in papermaking workshops also presents hazards if splashed on electrical outlets or on other electrical equipment around. While Vickerman (1995) advocates preventing situations of electricity coming in contact with water when working, Hiebert (1998) cautions instructors to make sure their working area is free of all electrical hazards and that all extension cords must be kept well above the working floor and far away from water during working hours. It is important therefore that hand papermaking projects are organised in well ventilated rooms or areas; bearing in mind that beating can be done anywhere, although the pounding and blending creates noise that can disturb other people around the place (Vickerman; 1995; Hiebert, 1998).

IV. Materials and Methods

This one-day hands-on workshop involved a purposive sample of 15 art teachers drawn from 20 schools (3 in primary; 5 in Junior High, 7 in Senior High) in Kumasi. Selection was largely determined by interest and willingness to participate in the workshop that was

held in the Textiles studios of the Faculty of Art in KNUST, the research base of the authors. The workshop commenced with an introduction that outlined the concept of recycling, details of the workshop, a discussion of the paper mulberry plant, and examination of plant and fabric samples to get the teachers to become familiar with the materials to be used. Equipment assembled for the project as well as samples of previously produced papers and those on which drawings had been done were thoroughly examined by the participants. The next thing done was to take the teachers through the processing of waste fabrics and paper mulberry fibre, first by cooking cut up pieces of the mulberry plant with caustic soda to soften it so that the outer bark could be peeled off to obtain the inner fibre. After two to three hours of cooking in a pot of water, a piece of the cooked fibre was removed from the pot and tested by attempting to pull the inner fibre and outer bark apart to ascertain its softness and readiness for pulping. As Heibert (1998) indicates, if by pulling on a piece of bark it separates with a slight tug, then the bark is ready. If not, cooking is continued and the fibres checked every 30 minutes. When the test showed that the fibres were ready, the outer bark was peeled off to reveal the inner bark which was rinsed with clean water and then cut into smaller pieces.

The next stage was the sorting of the waste fabrics by type with the participants, cutting the fabrics into tiny bits with scissors and milling each type separately in 1.5 litres of water into pulp in a domestic blender with a measured quantity of the cooked mulberry fibre. The pulp was poured into a 25-litre pan filled with water, the mixture was vigorously stirred by hand to obtain an even consistency after which a mould and deckle was used to scoop some of the pulp onto the mould. The pulp on the mould was then couched on a felt placed on a flat wooden board. This process was repeated several times to obtain a pack of wet sheets that were placed in-between felts and pressed using either G-clamp or Jack press to drain the water from the wet sheets. Afterwards the pressed sheets were removed and placed on flat metal plates for drying in the sun.

After drying, the sheets were removed and tested by asking the teachers to explore the potentials of the produced papers with colour pencil, pastel, poster and water colour, oil and acrylic paint. The results were similar to the original project described by Opoku-Asare and Yeboah (2013).

The participating teachers were not necessarily taught to acquire painting, drawing and book binding skills per se because as art practitioners, they needed no tuition to do what they already were familiar with. The highlight of the workshop was showing the teachers how to make miniature books out of the dried handmade papers. Plates 1 - 11 show stages of the workshop.

Procedure followed at the Workshop

Plate 1 : Introducing participants to the concept of the workshop

Plate 2 : Taking participants through preparation of mulberry plant for pulping

Plate 3 : Participants try peeling inner and outer bark of mulberry

Plate 4 : Participants being shown how to clean cooked mulberry


Plate 5 : Participants practise cleaning of paper mulberry stalks


Plate 6 : Showing participants how to make sheets


Plate 7 : Participants practising making of wet sheets


Plate 8 : Demonstrating use of G-clamp and Jack Press


Plate 9 : Demonstrating preparation of pressed sheets for drying


Plate 10 : Demonstrating forming of miniature books from dried sheets


Plate 11 : Participants testing sheets with painting and drawing mediums

V. Testing the Suitability of Papers in Book Form

Linen and Mulberry Papers: The sheets were comfortably sewn into a book [Plate 12] but the mushy nature of the sheets made writing on them feel foamy. This nature of the paper caused the writing to look blurred and faint. The soft sheets made no flipping sound when the pages were flipped.

Cotton and Mulberry Papers: The crispy nature of the thin cotton and mulberry sheets made it very easy to sew a book out of them. Writing on the sheets also felt like writing on machine made papers. The writing was very legible on the paper. The book [Plate 13] was easy to open because the sheets flipped easily and made flipping sounds as they were flipped.

Nylon and Mulberry Papers: Sewing a miniature book out of the nylon sheets was not comfortable because the fibres peeled off when holes were punched in. Them fluffy and soft nature of the sheets also made them tear apart when being sewn. Writing in the book made the fibres flake. The entire book [Plate 14] felt soft to the touch almost like soft carpet. The pages made no flipping sound upon flipping as the pages remained in position when they were flipped. The writing was not very legible on the sheets and it also appeared faint.

Polyester and Mulberry Papers: The polyester sheets were sewn into a miniature book [Plate 15] without any problems although the fibre content of the sheets flaked off when writing on them. The writing was not legible and it appeared faint on the paper. No flipping sound was heard when the sheets were flipped and the sheets did not return to their position after flipping.

Wool and Mulberry Papers: Making a miniature book out of the woollen sheets did not go very well. The soft and non-crispy nature of the sheets and the loose bonding of the fibres made the sewing thread tear through the sheets. Writing on the sheets also made the fibre content peel off. The writing was not legible on the sheets as it appeared faint and blurred. The book [Plate 16] was quite thick when felt and the pages made no flipping sound when the book was flipped.

Acetate and Mulberry Papers: The fibre content of the acetate sheets began flaking off as the book was being sewn. Writing on the sheets also made the fibre content peel off. The writing appeared faint, dull and blurred on the sheets. The entire book [Plate 17] was soft to the touch and felt very much like a soft carpet.

Linen, Cotton and Mulberry Papers: The strong nature of the combined linen and cotton sheets made sewing it into a miniature book [Plate 18] very easy. Writing on the sheets was comfortable and easy. The writing was very legible on the sheets. The flipping sound made by the sheets when they were flipped was low when compared to the cotton and mulberry fibre sheets.

a) End of Workshop

The workshop ended with the participants being asked to evaluate the workshop and also to talk about the need for recycling in general. This was done using a question based interview guide. After the discussion, the teachers were informed of follow up visits to find out what they would do with the knowledge and skills acquired through the workshop.

VI. Results and Discussion

The use of the different sheets as writing materials showed marked differences in the way each type of paper made from the combination of different fabrics and paper mulberry fibre reacted to their use in book form. Considering the suitability of these handmade papers as material for books, the study showed that the Cotton and paper mulberry, and the Linen-with-Cotton and paper mulberry worked very well because of the strong bondage of the fibres in the sheets. Linen worked partially well; although the sheets could take some writing, its foamy nature made it very uncomfortable to write well on them. The nylon, polyester, wool and acetate sheets did not work as writing pads because of the fluffy nature of the sheets. The implication is that papers derived from Cotton and mulberry fibre, and the Linen-with-Cotton and mulberry fibre can produce sheets of papers suitable for use as writing pads.

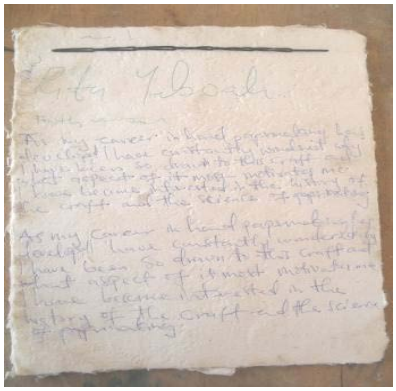

Plate 12 : Linen and Mulberry Book

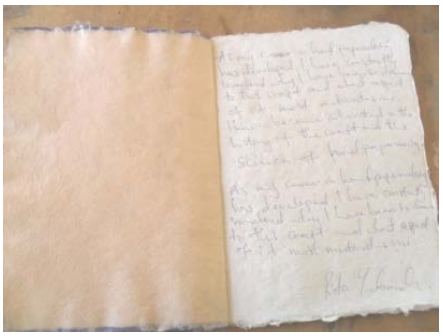

Plate 13 : Cotton and Mulberry Book

Plate 14 : Nylon and Mulberry Book

Plate 15 : Polyester and Mulberry Book

Plate 16 : Wool and Mulberry Papers

Plate 17 : Acetate and Mulberry Book

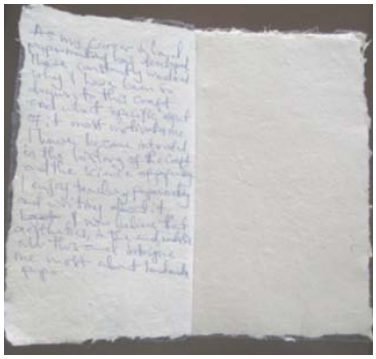

Plate 18 : Linen, Cotton and Mulberry Book

VII. Evaluation of Workshop

The enthusiasm, positive attitude and views expressed by the teacher-participants during the workshop suggested that recycling waste into useful products is a worthwhile activity that needs to be encouraged at all levels of Ghanaian education. The participants said this will help individuals in the country to be more creative and innovative to know how to handle waste and develop the love for manual work in students. They were very passionate on how waste of different kinds is taking over our environment without anything being done about it. A participant mentioned that "if nothing useful is done about the waste that we generate every day, it will cause problems for the environment and for the individuals who live in the environment". This showed that the effects of waste on the environment and our communities were primary concerns of the participants. Another participant also voiced out that "if individuals in the country continue to be ignorant about proper waste management, a day will come that waste will take over the environment". This suggests that the workshop was a positive effort in saving the environment.

The attitudes of the participants however, differed as to the possibility of implementing recycling programmes in Ghanaian schools. Some were of the opinion that it depends on the education and curriculum developers and planners in the country. Others thought that waiting for education and curriculum planners to incorporate recycling in the Creative Arts, Basic Design and Technology (BDT) and Visual Arts syllabi before teaching recycling in Ghanaian schools would not work. Another participant said "recycling activities and programmes can be treated as extracurricular activities or teachers and students can form clubs where such activities can be handled". One participant drew attention to the fact that papermaking is one of the topics mentioned in the Junior High School Basic Design and Technology (BDT) syllabus but teachers do not teach it. This revelation led to an argument on whether recycling is important to artists only for which reason recycling has been captured under the visual art component of the Basic Design and Technology syllabus followed in Junior High Schools. The participants strongly objected to the idea of recycling being identified with only Visual Art, saying recycling can be incorporated into science, social studies, mathematics, and all subjects taught in Ghanaian schools as this will be beneficial to students.

When asked if participants had practical recycling programmes already operating in their schools, only one mentioned that their school was involved in a collaborative programme that focuses on waste recycling with another overseas school. The other 14 participants had no practical experience in recycling as a school activity; they also could not explain why this was the situation in their schools. None of the participants also knew of recycling programmes in any other school a that operates a practical recycling programme for its students. This is indicative of espoused theory (syllabus requirement) that does not translate into classroom practice, suggesting the appropriateness of the workshop for effective delivery of the art curriculum and the possibility of the workshop generating the interest and capacity for the workshop participants to initiate recycling programmes in their schools.

With regards to participants who already had ideas on waste recycling and were practising their ideas before participating in the workshop, only one participant shared the fact that he recycles waste

papers to produce sculpture works and had been teaching this to his students. With regards to the attitudes of Ghanaians to recycling, the interview revealed a variety of answers. A section of the participants shared the view that they do not see recycling as a natural behaviour of the people of Ghana. Instead, Ghanaians always want new and already made products because of laziness and lack of education. They added that this attitude is evident in the poor maintenance culture practised in the country, with regards to regular periodic servicing of personal or state property to prolong their lifespan. Other participants argued that recycling has not been evident among the people of Ghana but now some individuals are becoming more conscious of recycling as a result of environmental awareness. Examples were given on how some individuals were producing useful items such as shopping bags and furniture out of waste plastic bags and bottles.

The most important example cited by the participants was the KNUST Communication Design student who used plastic bottles to manufacture living room furniture which were exhibited at the 2010 Trade and Technology Fair held in the KNUST museum. The participants articulated passionately that educating individual Ghanaians on the need, importance and benefits of recycling can help individuals in the country to appreciate the usefulness of recycling. When asked to share their views and experiences on the workshop, one teacher said "At first, when I heard of papermaking, I thought of the use of machines but now I know that useful papers can also be made manually through a very smooth process with local materials". Other participants described the papermaking process as an interesting process which they enjoyed.

Throughout the workshop, participants articulated that they had learnt a new activity which they did not know of. Some participants also promised to initiate recycling programmes in their schools with the knowledge and skills they had acquired from the workshop, what they had witnessed, learned and produced. The teacher who mentioned that his school was collaborating with a school in the USA to reduce waste through recycling recommended the workshop as an opportunity for him to learn more about recycling. A number of the participants articulated that there were student clubs in their schools which would offer them opportunity to introduce the knowledge they had acquired to their students via the clubs. Some concerns were however, raised by the participants about how they could create awareness about what they had experienced at the workshop among other teachers who were not present at the workshop. Some suggested that the teachers' resources centre in Kumasi could be the means by which both education officials and other teachers could be alerted to opportunities in recycling through the papermaking so that all art teachers could benefit from it. The truth is that the officer in charge of the resource centre who could provide the teachers with this service was invited for the workshop but did not show up or send a representative.

The interview with the workshop participants revealed that introducing the Ghanaian student to practical recycling activities and programmes is an important venture that must be encouraged. The participants also said recycling activities can benefit students in all schools irrespective of the subject they are studying. Hence, recycling should not be regarded as exclusive to the Visual Arts and technical skills oriented programmes. Part of the lessons learned from the participants was that it is through education on waste recycling that the need for recycling waste can be instilled into the citizens of the country. The impression deduced from the workshop is that the art teachers who do not include recycling or paper making in their schemes of work and lessons lack the requisite knowledge and expertise for that purpose. The experiences the participants shared at the evaluation stage of the workshop indicated that the workshop activities had enabled them to gain new knowledge and skills that they could transfer to their students. They viewed the project as a very useful and important venture necessary for recycling and reusing waste materials to benefit individuals and the nation as a whole. What needs to be done, they reiterated, is education which could conveniently begin from the schools.

It will take much education for waste recycling to become part of Ghanaians; this type of education can start from our schools. Teachers and all in charge of education in the country have a role to play in educating and instilling the recycling attitude in the Ghanaian. It can be deduced from the group interview organised at the workshop that education can help make the individual Ghanaian to become aware of the need for waste recycling. Also it was discovered that papermaking is in the Junior High School syllabus as part of BDT but most schools ignore it. The workshop has revealed that this might be due to lack of expertise on the part of the teachers who are in charge of the subject in the schools. It is now possible for teachers who took part in the workshop organised by the researchers and students who have experienced hand papermaking in their schools to embrace the recycling exercise positively to make learning fun while also gaining new skills and knowledge at the same time.

VIII. Feedback from the Teacher Participants

The teacher participant from one Junior High School taught the students how to combine waste paper and paper mulberry in hand papermaking to produce useful sheets. According to the teacher participant, the

students responded positively to the exercise and were very excited about the whole process. Every student present showed an interest in the exercise and wanted to partake in the process. The students were very amazed about how loose fibres in water were able to form sheets of papers. In general, the teacher participant described the class as lively and very interesting. Plates 19 - 22 illustrate stages of the follow up school projects.

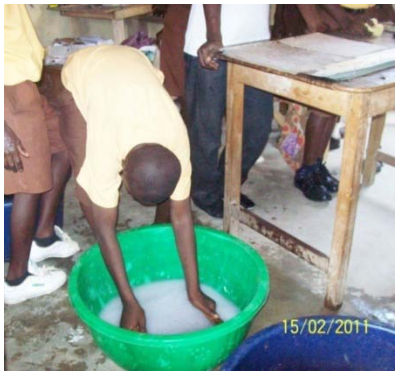

Plate 19 : Weweso JHS students making their papers

Plate 20 : Weweso JHS students drawing on their papers

At the Boadi Primary School, the teacher participant taught her students how to use waste polyester and linen fabrics with paper mulberry to make handmade papers. Information obtained from the teacher participant indicated that some of the students told her that the process was interesting and fun and it was their first time of learning to make their own papers. Some said that they had seen how to make papers manually and so they would try the process at home. Others also said they had learnt how to use waste fabrics to make papers so when they see dressmakers going to throw away their waste, they would collect them and try their hands on what they had learnt. Others also said they were happy to know how to make their own papers and that they liked the process.

The headteacher of the school and teachers from other classes were also amazed about how waste fabrics could be used to make sheets and said, it was their first time of witnessing such a process. According to the teacher participant the student who took part in the exercise had fun and every student present was keen to have a feel of the sheet forming process. Overall it was a worthwhile exercise for the students. Plates 22 - 23 illustrate the Boadi School project.


Plate 21 : Pupils of Boadi JHS making papers

Plate 22 : Display of artworks on handmade sheets in Boadi Primary School

At the Bomso Junior High School, the students were introduced to hand papermaking using acetate and cotton waste fabrics with paper mulberry fibre. According to the teacher participant, the students present were eager to take their turn in making the sheets and every student made sure his or her sheet came out well. Students who took their turn first in making their sheets helped their fellow students who were yet to make their sheets. The teacher participant also said that some students confessed they never knew that paper could be made easily. In all, the participation of the students was very encouraging. Teachers in the school also took turns to pass by to witness the exercise. Plate 23 illustrates the Bomso School project.

Plate 23 : Bomso JHS students making papers

At the KNUST Junior High School the teacher participant exposed the rest of the teachers in his department to what he was introduced to at the workshop. From there, Form Two students in the school were taught how to recycle waste cotton and linen fabrics with paper mulberry into useful handmade papers. The teacher participant commented that the students actively participated in the process and every student present made sure he or she made a paper of his or her own. The students were very excited about the whole process and some took home already prepared pulps, with the intention of trying their hands on the papermaking process at home. In general, the papermaking process was a good exercise the students encountered. Plates 24 and 25 illustrate this school project.

Plate 24 : KNUST JHS students making

Plate 25 : KNUST JHS students making Appreciation of their Art works on Handmade Papers

IX. Conclusion

The attitudes that were exhibited by these students in the four schools who had the opportunity to go through the papermaking experience using waste materials give an indication that if the recycling concept is encouraged in Ghanaian schools it would be embraced positively by students and they would learn lots of interesting ideas from it. If students are introduced to such recycling activities, they would be having fun and at the same time learn important things. If recycling activities are encouraged in Ghanaian schools with students overseeing them, not only will they benefit from the programme in terms of knowledge but also would acquire or improve their leadership skills. For waste recycling to become part of Ghanaians it will take education; this type of education can start from our schools. Teachers and all stakeholders in the education enterprise in Ghana have a role to play in educating and instilling the recycling attitude in the Ghanaian. If sustained, pulp art and hand papermaking could inculcate the habit of recycling among the teachers and students of the participating schools and positively impact on environmental and waste management issues in Ghana, which could also spark off the teachers of other subjects and thereby get them involved to expand the recycling project.

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