



Product design by recycling aluminum in a
creative learning process in a museum

-
in collaboration with the Aluminum Museum Holmestrand

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Foreword

When I got out of the airplane at the Gardermoen Airport at Oslo I was amazed, my thoughts quickly became filled with questions, everything around me ranging from people's behaviors to the colors of the buildings around looked different. It was my first day in Oslo, I was here to take a master degree in design. The environment was quiet I could quiet hear the conversations around but the people spoke a different language then I had come to the realization I was in a foreign land.

This fact was further confirmed during my fist few days at school, my mates had a different approach to issues, design like what I am used to was different here, it was interesting because I had never taught about this, and clearly their thinking was different.

As I went around the schools to observe my new environment one of my personal observations was the kinds of works they produced looked different from what I was used, whiles works from where I am from was mostly characterized by Ghanaian traditional symbols or the "ADINKRA" symbols I couldn't relate works here to anything indeed the culture was different, I needed time to understand how things work here, I needed to adjust my thinking and approach to understand.

The name Cultural Rucksack was fascinating to me, I was first introduced to this name during my practical placement period, the sound of the name suggested it had something to do with culture, it was also about works. My aim therefore in this project is to explore the different cultures of Ghana and Norway from a designer's perspective, I want to look at similarities in cultures that are practiced in different ways and causes this difference.

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Abstract

This research focuses on recycling and reutilizing and how artifacts can be created from aluminum waste. The project will use the Museum as case study and some research will also be conducted in Ghana to look at how the creative product making experience is executed in different ways. I will document the making of products with waste materials like aluminum waste in the creation of artifacts.

I will try to answer the research question “How can products be designed by recycling aluminum in a creative learning process in a museum?” Using interviews, observation, workshops and co creations sections.

Much research has been done on creativity in different ways, this project however will focus on designing products from aluminum. It will look at how aluminum can be used as a creative material for people, the project will exploit creativity from an aluminum museum and also factor Norwegian Cultural Rucksack program to demonstrate how creative product making experience is executed in different ways. It will also sample views and test from other people in general.

I apply diverse ways in creativity and thoughtful discoveries to develop children’s potential. The aim of this project is to demonstrate creativity and its importance, how creativity affects people attitude in general and how it can be used as a tool to developing problem solving skills in people.

I will then document results from research participants as well as my personal works in the form of concepts and solutions for the museum

Introduction: Recycling and Reutilizing

1.1 Background: Design as a creative tool in aluminum recycling

The words recycling and reutilizing of aluminium are mostly linked to industrial methods of making use of material waste. Industrial production and use of aluminium has grown very large over the past 150 years and is currently second to only iron and steel production in the metal industry (Schlesinger, 2013). Recycling as this research has shown can also include turning waste material in to craft or art, the research has demonstrated the different ways in which waste aluminium materials can be recycled using art and craft as the designer's contribution to recycling in done in a creative learning way.

Aluminium recycling has a number of key environmental and economic benefits. Compared to other high volume materials, aluminium production has one of the largest energy differences between primary and secondary production: 186 MJ/kg for primary compared to 10–20 MJ/kg for secondary (Green, 2007). With energy and cost savings in mind (Gaustad, Olivetti, & Kirchain, 2012). This research has shown the potential to contributing to solving the problem of the negative effects both economic and environment industrial metal recycling is having on our globe.

From an environmental perspective recycling aluminium in a creative way that could help reduce the amount of fossil fume, toxic melted waste and the disposition of the toxic cake all of which is produced during industrial recycling of metal. From an economic perspective energy will become more costly. It is fairly obvious that impending scarcity will discourage less essential uses of metals, especially dissipative ('one time') uses that do not permit recovery, re-use or recycling. On the other hand, the increasing complexity of both industrial materials and products has made recycling and re-use more difficult in many cases. This is a particularly acute problem in the case of complex machinery and especially electronic products (Ayres, 1997), there has been a lot on campaigns on the need for us to save our environment this research has demonstrate how everybody can be a part of this campaign in a creative learning experience way whiles also learning about their culture at the same time.

In choosing a topic that will fit this research I was stuck between recycling and reutilizing, recycling today is connected with ideological and political viewpoints, recycling is best termed down cycling in which discarded objects are broken down to raw product and manufactured again as new objects (Amick, 2015).

Reutilize or reuse on the other hand according to Wikipedia is to use or utilize something again, or for another purpose, based on this two definitions I believed recycle was best going to serve the purpose of this project because recycle is much wider in concept that reutilize.

Design is a working process with a user perspective; its development is driven by customer needs or customer recommendations. Design has become a very important tool in our everyday lives. In the book *Journal Design*, the author explains how the role of the designer is changing from someone who works behind the scenes to develop products and brands into an integral member of a company [6].

Designers work in a multitude of fields, from fashion, architecture and graphic design to web and user experience. While the specifics of actual jobs may vary by field, the work of "designers" share many essential features. However, the common impression of the typical designer can differ greatly from reality.

Thus, the perceptions people have regarding the work of designers is changing over time. It is becoming quite clear that people no longer see the designer as a person tasked with the "beautification of objects". The designer is now a problem solver who is able to work with companies, governmental agencies and organizations and society in general.

Design has a significant historical background in relation to culture, culture has no definite definition(Eliot, 2010). Amongst its many meanings, it could refer to the cumulative deposit of knowledge, experience, beliefs, values, attitudes, meanings, hierarchies, religion, notions of time, roles, spatial relations, concepts of the universe, and material objects and possessions acquired by a group of people in the course of generations through individual and group work according to Wikipedia.

Culture plays a significant role in design, in the book *Cultural Influence on the Design process* (Vivek & Luciënne, 2007) the author talks about how a designer from a particular cultural background conceptualizes a globalized educational product to be delivered across geographical boundaries through an online medium. It discusses how design of such products is influenced by the designer's pre-suppositions about how he / she visualizes the reality and conceptualizes the system, with this understanding one is clear that how people design and create is mostly influenced by their culture. Because culture plays a role in the design process it is important for designers to know to know how people get to know their culture.

In Norway, the Cultural Rucksack is one way people get to know their culture (Den kulturelle skolesekken) is a national program for art and culture provided by professionals in Norwegian schools. The program helps school pupils to become acquainted with all kinds of professional art and cultural expressions(Bjørnsen, 2012). Amongst the objectives of this program is to enable children and young people in primary and secondary school to enjoy artistic and cultural productions provided by professionals, it also aims to facilitate the pupils' access to a wide range of cultural expressions, so that they can become acquainted with and develop an understanding of culture in all its forms.

In Ghana however art and culture is replete with the traditional folklores of the country which has long been a part of its intrinsic identity. Like the other countries of Africa (Flolu, 2000),

Ghanaian people identify themselves with the works they make. Though there is a program called creative education for Ghanaian students at the primary level the main source of creativity for them is self-learning. They move in groups to search of materials to make different piece of art which are mostly inspired by previous works of older people.

To make the research complete however the research was done on three levels i.e., Theoretical, Organizational and physical. The research will further discuss the importance of creativity on a ten points level.

1.2 Project Aims and Objectives

This research is to demonstrate how creativity can be used as a tool to developing problem solving skills i.e. using creative ways to help people develop new ideas in problem solving, the research will use aluminium as the creative material. The project will demonstrate recycling in aluminium by using aluminium waste in the making of art and craft.

1.3 Research question

How can products be designed by recycling aluminum in a creative learning process in a museum?

The research question was choosing in line with the objective of the project, the aim of the project is amongst other reasons explore how design is influenced by culture from the perspective of the Cultural Rucksack with Ghana and Norway as model countries. A lot of research has been done on the Cultural Rucksack however not much has been done form the designer's perspective. The objectives for the research question were:

- To explore the cultures of Ghana and Norway from a design perspective.
- To explore the design from both countries perspective.
- To explore similarities in cultures practiced in different ways in relations to creativity
- To test out if the situation could have been the same in relations to geographical location and creative thinking.
- To explore the role of culture in design.i.e. in relationship to creativity and in what way does culture influence creativity.

This research is a continuation of previous works done by the researcher during the practical placement period and material testing, the objective of the practical placement project was to help pupil that visited an Aluminium Museum in Holmestrand create simple works from Aluminium. I developed on this project in the material testing project where I experimented with aluminium to help me familiarize myself more with the material as it was a metrical I hadn't known much in my previous studies, In this research I will look at.

- Creativity as a tool for knowledge acquisition and how it influences pupils' decision making.

- How creativity can be used a problem-solving tool.

1.4 Research Scope: focus and context

The wider scope of the research will be Ghana and Norway this scope will give me the opportunity to work on the research from a wider perspective which will be in the form of stages, the context for the research will at the Museum and the cultural rucksack educative program. The focus will be on Pupil and contribution from the researcher, to make the study complete the research was conducted in four stages

- Cultural
- Theoretical
- Organizational
- Physical

1.4.1 Cultural Context

I Used the cultural level for the project looked in to culture of the two countries I considered for the project at the museum and Ghana. Culture is some set of elements shared by people who have a social structure with the latter referred to as “Society”, culture he noted possess attention on the products of social life (what individuals do) where as social life as such: Individuals in their relations to others (Zimmermann, 2012).

In Ghana culture in the context of this research was in the local communities, pupil used it as part of a play system it was neither organized and had no rule. Pupil had the liberty to choose what either worked or did not work for them, it was mainly about play and trying out new things. There were no venues or organized systems for this to be done, what pupil did were mainly play toys popular among them was the aluminum Tin car called locally as the” Konko” car in Ghana (Image 1).



Image 1: play toys from Ghana

In Norway the situation was different, this situation could be accessed in the Norwegian Flagship Cultural Rucksack program. The Cultural Rucksack¹ is a national programmer for arts and culture for all students in Norwegian primary and secondary schools, in other words for all students 6–19 years old. The program has existed since 2001, and is regarded as extremely successful. There has been considerable public acclaim for the Cultural Rucksack in Norway, and actors in both the fields of arts and education have expressed great enthusiasm for the program (Christophersen, BREIVIK, Homme, & Rykkja, 2015), this system in Norway however unlike Ghana, Norway was organized, there were instructors or tutors who directed pupil on what to do or what not to do (Image 2).



Image 2: instructor Merethe Sortland second from right guides two pupils in a creative session

1.4.2 Theoretical Context

Creativity, or the generation of novel ideas, especially ones that are useful, is essential for our survival as a species. Therefore, it is not surprising that we celebrate and revere those who make creative contributions in such areas as science, technology, and commerce (Paulus, Nijstad, & Nijstad, 2003)

Creativity and innovation are becoming increasingly important for the twenty-first-century knowledge society. They contribute to the economic prosperity as well as to social and individual wellbeing and are essential factors for a more competitive and dynamic community.

Education is seen as central in fostering creative and innovative skills. Creativity is a form of knowledge creation; therefore, stimulating creativity has positive effects for learning. Thus, educational actors should have the power to unlock the creative and innovative potential of

the young. Creative learning is therefore any learning which involves understanding and new awareness, which allows the learner to go beyond notional acquisition, and focuses on thinking skills. It is based on learner empowerment and centeredness (Sultan & Al-Lail, 2015). I used the theoretical context of the research to look in to how the project was going to be implemented and its importance, I again used the context to analyze the importance of this research in terms of learning and knowledge acquisition.

Even though the cultural approach was different in relations to Ghana and Norway the aims were the same in terms of the final results which was creative learning and knowledge acquisition. The research further identified that the approaches to creativity were different, there was more individualistic approach in Norway as to the group approach as was the case in Ghana.

Creative Thinking

Creativity masters a process of making or producing, criticality a process of assessing or judging. The very definition of the word “creative” implies a critical component (e.g., “having or showing imagination and artistic or intellectual inventiveness”). When engaged in high-quality thought, the mind must simultaneously produce and assess, both generate and judge the products it fabricates (Paul & Elder, 2004). The approach to creativity by Ghanaian pupil was that of a group approach, creativity is a learning process. Doing things in group is a typical trait amongst the people of Ghana. The advantage to the group creativity is the sharing of ideas, members in the group have the chances to share ideas to overcome hurdles in the creative process. The disadvantage with group creativity is that sometimes decision making becomes a problem as members may have conflicting views and opinions, this may make decision making take a much longer time.

An individualistic approach

Unlike the situation in Ghana the approach in Norway was more of an individualistic approach, this the researcher found out was also due to the different cultures and the relatively systemic way of doing things in Norway, unlike the group creativity like was the case the disadvantage with the individualistic creativity is the person involved has no one to share ideas with which means the person involved would do everything by themselves. The advantage with this however is also that the decision making in the creative process is made much quicker as there aren't extra members in the group to bring conflicting views and opinions like in the case of the group.

Organizational Context

I used the organizational context to look in to the different places or locations in which this research was conducted, in Ghana the research was analyzed in the local environment. In Norway however the research was done in a museum, it was free creative learning where Pupil learnt how to go about making useful things on their own without any laid down processes or help in terms of its execution this situation could be equated to problem based learning.

PBL is an educational strategy where learning is driven by a problem. The problem could be a challenge or a description of a difficulty, a curious outcome, or an unexpected happening (O'Grady, Yew, Goh, & SpringerLink, 2012), problem-based approaches to learning have a long history of advocating experience-based education. Psychological research and theory suggests that by having students learn through the experience of solving problems, they can learn both content and thinking strategies. Problem-based learning (PBL) is an instructional method in which students learn through facilitated problem solving. In PBL, student learning centres on a complex problem that does not have a single correct answer. Students work in collaborative groups to identify what they need to learn in order to solve a problem. They engage in self-directed learning (SDL) and then apply their new knowledge to the problem and reflect on what they learned and the effectiveness of the strategies employed (Hmelo-Silver, 2004), with this I used the Seven steps in Problem based Learning:

- Examine and try out what you know
- Discover what you need to learn
- Develop your people skills for achieving higher performance in teams
- Improve your communications skills
- State and defend positions with evidence and sound argument
- Becoming more flexible in processing information and meeting obligations
- Practice skills that you will need after your education

Importance of problem based learning is that students who partake in project based learning for classrooms often develop a greater ability to organize and research all subjects that they are enrolled in. Since they are learning collaboratively with a small number of their peers,

Students are able to develop their communication skills and effectively listen and pass information along to the group they work so closely with – a skill that is essential as an adult in the real world

Students are evaluated on more than essays and exams. Rather, students are evaluated based on their projects and presentations. Rubrics allow teachers to evaluate the students based on the core curriculum.

Students are inspired to gain a deeper appreciation for the subject at hand, and develop an interest in diving into the subject and gaining an enhanced knowledge of the subject. Even though problem based learning is a seven-step learning process I Exemplified it at the museum down to four key steps to narrow the research and make it much easier which I used during the learning process. The researcher had to adapt a similar approach to the problem in Ghana, the researcher had to again narrow down the seven steps in Problem based learning to an approach that best worked for the problem in Ghana. The four steps were aimed at making the work easier and achieving the best results for this purpose. The four steps involved:

- Attending to the problem
- Investigation of the problem
- Development of a solution
- Presentation of a solution

Four exemplified steps to problem base learning used for research

The nature of PBL means it needs a representation of the problem that is as close as possible to the real task (Hedberg, Brown, & Arrighi, 1997). By observing and different tasks, the learner can experience an information-rich representation that can alert the learner to important physical and social contexts that are relevant to the task (Hoffman & Ritchie, 1997). This leads to greater link between the problem and the learning task.

In the stage of investigating the problem students need a range of sources of information in order to investigate the issues raised by the problem presentation. In many cases the problem statement does not specify the information needed for a solution. Students need to be able to investigate a range of sources of information to enable them to understand the broader context in which the problem exists, to find additional information that may be needed to broaden their conceptualization of the problem so that they can begin to understand the problem requirements.

Developing solutions for problem solving the problem may include databases, spreadsheets, simulators, and other forms of software that are used as 'cognitive tools' in analysis and problem solving (Jonassen & Reeves, 1996). These 'tools' can enable learners to choose their own representation of a problem (such as selecting their own data to graph for comparison rather than accepting those of others) and promote deep reflective thinking. In this way, learning can be a challenging process that actively engages the learner (Reeves, Laffey, & Marlino, 1997).

During presentation of the solution the researcher must maintain the authenticity to the task, students should present a solution using the approach that is likely in the type of scenario presented in the problem statement (Hoffman & Ritchie, 1997). Instructional technology can be used as the tool for presentation if this is appropriate to the real situation.

I exemplify Problem based learning in a local environment in Ghana where I had to adapt a similar approach to the problem at the museum, the researcher had to again narrow down the seven steps in Problem based learning to an approach that best worked for the problem in Ghana the situation In Ghana was different to that of Norway hence the researcher adapted the four steps used in Norway for Ghana

Physical Context

The final stage of the research which was the physical was to document findings from the research. The researcher at this stage will document the findings from the Museum, Ghana and also that of the researchers own inspiration as a result of working with this project. In Ghana, the project was taking in the local environment, there wasn't any particular location (free range) while in Norway the system was rather organised, things were done within rules and systems.

1.9 Why is creative product making in a museum Important?

According to the world international council of museums a museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible

heritage of humanity and its environment for the purposes of education, study and enjoyment.

With this definition one becomes aware of the role museum plays in helping one in learning about their environment and about human heritage, we could also denote from this definition that the pieces of art and other objects created by other people that are found in museums tell different stories about human heritage and history, this brings to bare the huge role art and creativity has played in human lives from time in history. Creativity continues to play an important role in our lives in modern times so do museums, creativity in a museum I believe does amongst other reasons two important things, which are

- It motivates people to learn about their history and culture through creation.
- It helps in given meaning to creative objects i.e. tell the stories behind them.

These two reasons however cannot be the only reasons for which creativity in a museum is important, in the book *Why Isn't Creativity More Important to Educational Psychologists? Potentials, Pitfalls, and Future Directions in Creativity Research* (Plucker, Beghetto, & Dow, 2004) the author talks about how creativity is an important component of problem solving and how it increases cognitive thinking in students. Creativity in a museum continues to be important in recent times and I state ten reasons why I think this is important. These will be explored the design process and further discussed in the final part of the thesis. The ten reasons why creativity in a museum is important are:

- Diversity in thinking
- Encourages discussions amongst pupil
- Self-Training
- A good way of learning about one's environment and history
- Being Proactive in the case of students
- Building self-confidence
- Develop new problem solving methods
- Helps people develop the habit of patience
- Innovation
- Balance thinking and execution

Exemplified discussion on the importance of creativity in a museum

In diversity in thinking creative sections and workshops at a museum helps people to be more diversified in their thinking, this is because during a creative process people face challenges and these challenges or obstacles are overcome by trying different ideas. Discussions amongst pupil are encourage during creative task in a museum, it is most common that they consult one another for different ideas and ways to overcome a specific task.

Self-training as a way of Learning to be creative is a very good way of self-training for people, this is a result of learning to overcome different challenges that may arise during different

stages of a creative process in a museum. Learning about one's environment and history is achieved because museums serve as archives being there also offer one the opportunity to learn about their history and environment.

Students get much more proactive during group creative task that has specific timelines challenges students to plan and work within specific timelines, this attitude when transferred in to studies helps students to work within deadlines. Again, creativity in a museum can serve as a very good of helping people identify their strengths and limitations when it comes to idea creation therefore building their own self confidence in the process, this awareness helps one to be more aware of themselves therefore building up the level of confidence they have in themselves.

Experiences gathered from trying to replicate some of the works in the museum can serve as a very important way of helping people identify new ways of solving problems, this further develops their problem-solving skills and methods. To be able to execute a creative task at the museum successfully one needs to be very patient i.e. have a clear path or thought about where and how to start and end, this is because visits to museums are guided by timelines, one must work within these timelines. Creativity is the mother of innovation, without creative thinking there will be no innovation, creative task in museum can serve as a good way of learning to be innovative because this one has a physical model to compare their innovative idea to. This is because creative task in a museum helps to bridge the gap between what we think is possible and what is possible, sometimes we think of an idea and gets fascinated by this idea as being brilliant and awesome but when we try to execute this idea in to a physical model then we realize it is not possible, creativity in museum can help correct this way of thinking. It helps people in thinking what is practically possible.

2.0 Methods

Different research methods were employed to answer the research question, to meet the requirements of the research question the researcher employed different research methods, all pictures taking of other people in this project were done with the approval of the individuals involved and with the consent of parents of underaged persons.

The research methods employed for this research include interviews, observation, co-creation and workshops, the researcher employed the use of the qualitative research methods mostly because of its nature of gathering an in-depth understanding of the situations or the research question (Duffy, 2012). Quantitative research methods were also employed in parts to analyse the information and other responses from the research.

Semi-Structured Interviews

Semi-structured interviewing, according to Bernard (1988), is best used when you won't get more than one chance to interview someone and when you will be sending several interviewers out into the field to collect data. The semi-structured interview guide provides a clear set of instructions for interviewers and can provide reliable, comparable qualitative

Semi-structured Interviews were conducted in the museum where both pupil and technicians at the museums were interviewed, they were also employed in soliciting for information from people outside of the museum whose contributions and opinions were relevant for the purpose of this research

Observation

As an ethnographic research method, observation has a long history. The value of observation is that it permits researchers to study people in their native environment in order to understand "things" from their perspective. Observation requires the researcher to spend considerable time in the field with the possibility of adopting various roles in order to gain a more comprehensive understanding of the people being studied (Baker, 2006).

Observation was important during the research, the researcher employed observation during workshops and co-creations sessions, the researcher used this method to try to understand how pupil worked and what happens during the working process.

One of this this the researcher uncovered during observation was the different ways in which pupil worked and how they asked for help, different tools and materials amongst other things during these workshop sessions.

Workshop

The researcher used workshop sections at the museum to see what was being done or what already existed, when trying to create new ideas for an already existing situation it is important to understand the system and how it works. In the case of Norway for example because the researcher wasn't accustomed to the cultural rucksack program workshops and observations helped the researcher to understand the already existing system to as to be able to stay on track when creating new ideas.

Co-Creation

Also, known as participatory design. Sanders and Steppers (2008) used the term co-creation to refer to "any act of collective creativity, i.e. creativity that is shared by two or more people", and used the term co-design in a more narrow sense to refer to the "collective creativity as it is applied across the whole span of a design process (Steen, Manschot, & De Koning, 2011)

2.1 Combination of methods

Qualitative research was used for the research in Norway I had to employ quantitative research to set good basis for the qualitative research. , quantitative research encompasses a range of methods concerned with the systematic investigation of social phenomena, using statistical or numerical data. Therefore, quantitative research involves measurement and assumes that the phenomena under study can be measured. It sets out to analyse data for trends and relationships and to verify the measurements made (Watson, 2015).

Because I was new and Norway and didn't have detailed understanding of the creative culture and Cultural Rucksack in Norway quantitative research was vital in helping the researcher to understand the situation. The researcher employed all four research methods in Norway, semi structured interviews, observation, workshops and co-creation.

Semi-Structured Interviews at the museum

I had speak to and interview the people involved with the project at the museum, interviews were conducted on instructors, pupils, parents and guidance of pupil. By this the researcher was not only seeking to gain the opinions of the pupils but all the players and also parents and guidance about the different reaction after their wards had taking part in the creative session, the interviews were grouped in to three so the researcher had different interviews for the three main players ie instructors, pupils, parents and guidance. Some of the things I was seeking to find during interviews were.

Interviews with Instructors

- What were they teaching pupil and why?
- What were some of the difficulties they were facing
- If they were satisfied with what they were doing in their personal estimation.
- If they believed others were satisfied with what they were doing.
- What do they think should be changed about their methods or approach and why?

Interviews with pupils

- If they were happy with their experience at the museum.
- What were some of the difficulties they were facing in their execution of different tasks
- If given the opportunity to make something on their own what would they have made
- If they understood the importance or the need for the creative sessions they were having at the museum

Interview with parents and guidance

- Reaction of pupil when they came home after the creative sessions
- Discussion pupil had with them after creative session and what interest they had in their creative pieces
- If pupil were demanding and wanted to take part in creative sessions.

Observation at the museum

The researcher had a task with observation, the researcher divided the task into before and after i.e. Before observation and what to do with the achieved aims after the observation.

Expectations before observation

- Check the language of the pupil (Students)
- Check the attention levels or the concentration levels of the kids, this is essential in knowing the level of interest the students have in what is going on.
- Expression, facial or other expressions like shock or excitement.
- Observation of the different individuals to document different interest at different stages of the tour.
- Observation of conversation about what is going on.
- Expression of joy or boredom.
- Are they writing down or document anything?
- Levels of curiosity, are they overjoyed and anxious to know what is next on the agenda, feel of excitement.
- Are they really interested in what is going on, asking questions or just buying time to see the tour end?
- Different groups of people and different interest, (gender, age etc.)

Plan after observation

- Gather the information
- Make a report
- make a map, feeling of expression.
- Make a report for the museum, make a suggestion as to how you think the whole thing should be done i.e., arrangement, how to raise interest levels
- Make plan a plan, what can be done and how much time do we need, gather all the
- learn about problem based learning.

Workshop at the museum

Workshop sessions were organised at the museum with the help of contact person Kjartan Fonstelien and workshop supervisor Merethe Sortland, the workshop was divided in to four parts i.e. Excursion as at an aluminium recycling factory right behind the museum, acting and role play, storytelling and creative session

Excursion as at an aluminium recycling factory, Norway is one of the world's leading producers of aluminium. During the excursion pupil were educated on how aluminium recycling is done the industrial, they were taking round different processes plants from collection of the raw material, melting to the final outcome, they were also educated on the need for recycling rather than fresh production and how recycling is helping reduce the effect mining the material is causing the rain forest.

Acting and role play, as part of helping them know more about their culture they watch old movies about Norway and the way of the life of the Norwegian people in the past after which they are encouraged to play the different roles they observe in the short clip. Amongst a role was a cashier at a bank and a worker who was coming to deposit money at the bank.

Storytelling was also part of the workshop, pupil was told stories about different artefacts at the museum, they also responded by asking relevant question which was also part of the learning process.

Creative sessions were the final part of the visit to the museum, they were required to product a piece of art form aluminium waste the museum has received from the aluminium recycling factory, this was part of educating them on the need for recycling and how it is helping in preserving the worlds natural resources.

2.3 The Cultural Rucksack context

In Norway, I based his study on the Cultural Rucksack. The Cultural Rucksack programme is part of the government's cultural policy. It is a national effort "in which the cultural and education sectors cooperate on providing school pupils throughout the country with the opportunity to become acquainted with, understand and enjoy all forms of artistic and cultural expression at the professional level."⁵³ The geography of Norway makes it difficult

to deliver the Rucksack. Transport alone accounts for a considerable proportion of the Rucksack's budget. The results of the survey would suggest that the vast majority of schools receive some visits from professional artists as part of the DKS programme during the year, with 93.3 % of schools reporting having had at least one visit. While these are very impressive figures, it must be noted that the original programme aims at 100 % coverage; there are therefore still 6.6 % of schools missing out (schools that reported receiving no visits in the past year) (Bamford, 2012).

The Cultural Rucksack is interested in learning how the Creative Partnerships program engaged schools, teachers, pupils and parents to ensure a more lasting impact, in order to shape its own long-term development. The Cultural Rucksack's scale means that it attracts significant international attention, so CCE is very pleased to have its expertise recognized in this way.

An outline program has been agreed which will create an opportunity for CCE to work with groups of 12-16-year old's in 5-6 different locations in Norway to investigate the shape of a revised program that would be more successful in attracting the interest of young people in this age range.

2.4 Methods used in the museum

As part of my work for the course MAPDPRA during the practical placement period with which the researcher worked with developing new concepts for creativity with aluminium sheets in the Aluminium Museum in Holmestrand , the researcher had the opportunity of perusing this research further during the material testing course to play and experiment more with the main material the researcher was going to use for this research.

The researcher employed different research methods in Norway, these methods amongst other things were to equip the researcher with enough knowledge on the people and the material with which the researcher going to work with, all four methods were employed for the research in Norway.

Semi – structured interviews

Semi-structured interviews were used to collect data from instructors and pupil at the museum, the arrangement process for the creative sessions at the museum was such that pupil who came in were presented models of past works and they asked to redo similar works, i wanted to find out from instructors and pupil:

- Why instructors chose the kinds of examples they used.
- What were the pros and cons of these examples?
- Whether they believed pupil were satisfied with the whole experience.
- What in their personal estimation they believed could be added to improve the experience.

I also wanted to find out from pupil (participants) of this program:

- If they were happy with the experience at the museum.
- What they thought could have been done to make the experience more fun or to make the experience suit their needs.
- If they were given the opportunity to design the program what they could have done differently.

What works or examples best suited them and what they would have wanted to be changed.

Observation

Because I wasn't very much accustomed to the cultural rucksack observation was a very important research tool for the research, through observation the researcher was able to observe and get the understanding of the entire process so as to be familiar with the process before working with it.

Amongst the things, the researcher used observation for included.

- Understand the cultural Rucksack program
- Understanding the framework used at the museum.
- Observing things like body language to understanding either acceptance or rejection from pupil

2.5 Some examples at the museum

The examples at the museum are in relation to my discussion in chapter concerning the ten points I gave as to why creativity at the museum is important, in this chapter I will digest each point in the points in relations to my observations at the museum.

Diversity in thinking

At the museum pupil were tasked to complete a snowman with material i.e. aluminium foil, plaster of paris balls, buttons, thread etc., during observation it was realized that even though the task or object to be made was the same people faced different challenges at different stages that is to say pupil did not face the same level of difficulty at same stages of the work, this observation shows people think differently.

Encourages discussions amongst people

During the workshop one common factor was the way pupil related to each other, the interpersonal relationship that was exhibited during discussions for different ideas. I believe

are necessary for a nurse to have. In my opinion it is important to have good communication skills, be caring, empathetic and open-minded and always be aiming to improve.

Self-learning

Self-learning was eminent amongst some pupil, I use some people because even though it was not everyone that exhibited this self-learning technique others utilised it and this they exhibited by trying to overcome certain challenges or obstacles by trying and failing until they were able to come out with an idea that worked (Image 3)



Image 3: Self learning exhibited by girl at the museum

A good way of learning about one's environment and history

The task for pupil at the museum was about making a piece of art in aluminium, much emphasis was the material aluminium as Norway is one of the leading producers of aluminium worldwide this was a nice opportunity to introduce people to the material, creating awareness in their minds with the connection of Norway to this material.

Being Proactive in the case of students

Identifying different levels of strength and weaknesses was also exhibited, during the workshop one key observation was that pupil consulted one another at different stages for

ideas, they complement each other's strengths and weaknesses, the result also reflected in the classroom when student are proactive during the classroom (Image 4).



Image 4: Pupil in classroom

Develop new problem solving methods

During the workshop people identified new ways of problem solving as was imminent in how for example they failed in one attempt but was successful in another attempt, this way they get to know themselves better, they know their strengths and limits i.e. what they can and cannot do.

Building self-confidence

When people know their value i.e., they know what they can and cannot do they have more confidence in themselves, they tend to appreciate their ability.

Helps people develop the habit of patience

Patients is an important element of life, handling works of art at the museum teaches people patients as some works are fragile and could be distorted if not handled with much care, the images below shows a pupil learning and executing a piece of work (Images 5,6).



Image 5: Pupil consults museum instructor



Image 6: Pupil carefully executing his work

Innovation

Innovation was discovered as a result of trying and failing, trying and attempting different things to solve a specific problem helps one become innovative.

Balance thinking and execution

Balancing thinking and execution or designing and creation is a good technique in everything, sometimes pupil think they could do something but realize during the execution stage that it is not possible, this impossibility may be due to so many different contributing factors like material, tools etc. Balancing thinking execution therefore makes people more aware of their environment and what is possible to be made with the resources at their disposal.

2.6 Reflection of Design processes in Norway

The process in Norway was in the museum, it was more of an organised way of teaching pupil about their culture and also an educational creative session, in y opinion however what I saw much dominant were two things.

- Given pupil practical knowledge of their culture.
- Teaching pupil environmental preservation and sustainable through craft.

Given pupil practical knowledge of their culture.

These were the two main things the researcher observed dominated the design process in Norway. Practical knowledge was given to pupil through role play and inclusive learning.

Role play is a very effective learning model, role play brings the learner much more to the reality the teacher or instructor is trying to explain to them, this way the student becomes part of the answer in role play. In the book ‘The effective use of role play’ (Van Ments, 1999) the writer talks about how teacher and trainer have resorted to the use of role play in explaining real life situations to students. The author talks about how role play is an effective way of transmitting information to students in way that them a much clearer and better picture of the situation.

Inclusive learning was also present with the location, even though there was the option of classroom the museum was used. A wide range of psychological, sociological, and pedagogical literature has documented that student populations are composed of individuals with distinctly different learning styles. Unfortunately, students do not explicitly select classes based on instructor teaching style; nor can the instructors be expected to change their personality types to accommodate all students. Consequently, classes that use a variety of teaching styles are more likely to increase student performance, diversity, and interest (Lage, Platt, & Treglia, 2000)

Teaching pupil environmental preservation and sustainable through craft.

From interviews to observation the researcher could denote that one of the major purposes of the creative session was also the teach pupil about sustainability and the need to preserving the environment in which we live now.

The method in which sustainability was being taught in the context of the museum could also be role play, they were briefed on how aluminium is mined and how the rain forest was gradually being destroyed because of the mining of this metal, there were also educated on how animal and nature lives are being destroyed, for this they created something in the form an animal in the rain forest to signify the need to preserve these life’s.

2.7 Some examples in Ghana

The examples in Ghana however did differ from the situation in Norway, in Norway most of the observation was done in the museum in the form of workshop, in Ghana however it was quite common in the daily lives of young pupil, unlike most advanced countries where parents buy play toys for children, the situation however in some developing countries including Ghana the situation with some pupil however is different as pupil have to make their own play toys.

This situation has led many pupil in making different play toys in their homes, backyard, neighbourhood and all the places they find themselves, what they do is that they move from one trash can to another in search of aluminium tins and other materials like plastics useful for the making of different types of play toys, I observed from the same lenses in Ghana from the perspective of the examples in Norway:

- Diversity in thinking
- Encourages discussions amongst pupil
- Self-Training
- A good way of learning about one's environment and history
- Being Proactive in the case of students
- Building self-confidence
- Develop new problem solving methods
- Helps people develop the habit of patience
- Innovation
- Balance thinking and execution

3.0 Findings

3.1 Some findings from Ghana

In Ghana Pupil replicated a car made from aluminium cans (Image 7) to be used as play toys, during the making one evidence that was clear was consultation, pupil consulted each other at different stages for solutions for example in the making of the wheels etc. likewise was the case in the museum in Norway.



Image 7: A finished car made from aluminium food containers

Interpersonal discussions were also imminent (Image 8) like the situation in Norway, having discussion whiles working. Some pupil who took the challenge to try out different ideas until they were successful with a solution, self-learning was present.



Image 8: Inter personal discussion during a creative session in Ghana.

Ghana on the other does not have much connection with aluminium like it is with Norway as the material is mined in very small quantity in the country, the learning in Ghana however was more about the craft (Image 9), for many local Ghanaian children this stage is more like a transition that one must pass through.



Image 9: A boy poses with a car made from aluminium

In Ghana complimenting one's strengths and weaknesses were exhibited by physically being involved in where one had a problem or difficulty i.e. executing the part of the work where a friend had a problem for them.

Likewise, the situation in Norway new problem solving methods were identified by failing in one attempt and trying another attempt. People realized their strengths and weaknesses during the making, when people know what they can and cannot do they know themselves well and have confidence in their abilities.

Aluminium cans used for the making of these cars are rather fragile, which means much care and patience will have to be employed in their handling, this technique teaches pupil involved in the making patience.

Different designs were executed as a result of trying out something new which is the definition of innovation. Pupil tried a different attempt or idea as a result of trying and failing with one.

3.1 Some findings at the museum

Pupil creating snow man from aluminium foil at the Vestfold museum in Holmestrand (Images 10,11,12 and 13).



Image 10: Two girls making the snow man



Image 11: A boy making the snow man.



Image 12: A boy poses for a picture with a finished snow man piece



Image 13: A closer picture of a finished snow man by a pupil.

4.0 Findings from a Creative Learning Process

Previous works and conceptual solutions for the museum

During my master degree study programme, I have also done some search in on aluminium which I believe is useful for this project, this project for me is not only relevant for the museum but also for myself as a professional teacher in Design and Craft. I have done some research in previous works in aluminium which is relevant to this project, some of the results are shown here.

4.1 Properties of Aluminium

After iron, aluminum is now the second most widely used metal in the world. The properties of aluminum include: low density and therefore low weight, high strength, superior malleability, easy machining, excellent corrosion resistance and good thermal and electrical conductivity are amongst aluminum's most important properties. Aluminum is also very easy to recycle.

Weight

One of the best-known properties of aluminum is that it is light, with a density one third that of steel, 2.700 kg/m³. The low density of aluminum accounts for it being lightweight but this does not affect its strength.

Strength

Aluminum alloys commonly have tensile strengths of between 70 and 700 MPa. The range for alloys used in extrusion is 150 – 300 MPa. Unlike most steel grades, aluminum does not become brittle at low temperatures. Instead, its strength increases. At high temperatures, aluminum's strength decreases. At temperatures, continuously above 100°C, strength is affected to the extent that the weakening must be considered.

Linear Expansion

Compared with other metals, aluminum has a relatively large coefficient of linear expansion. This has to be taken into account in some designs.

Machining

Aluminum is easily worked using most machining methods – milling, drilling, cutting, punching, bending, etc. Furthermore, the energy input during machining is low.

Formability

Aluminum's superior malleability is essential for extrusion. With the metal either hot or cold, this property is also exploited in the rolling of strips and foils, as well as in bending and other forming operations.

Conductivity

Aluminum is an excellent conductor of heat and electricity. An aluminum conductor weighs approximately half as much as a copper conductor having the same conductivity.

Joining: Features facilitating easy jointing are often incorporated into profile design. Fusion welding, Friction Stir Welding, bonding and taping are also used for joining.

Reflectivity: Another of the properties of aluminum is that it is a good reflector of both visible light and radiated heat.

Corrosion Resistance

Aluminum reacts with the oxygen in the air to form an extremely thin layer of oxide. Though it is only some hundredths of a (my)m thick (1 (my)m is one thousandth of a millimeter), this layer is dense and provides excellent corrosion protection. The layer is self-repairing if damaged.

Anodizing increases the thickness of the oxide layer and thus improves the strength of the natural corrosion protection. Where aluminum is used outdoors, thicknesses of between 15 and 25 μm (depending on wear and risk of corrosion) are common. Aluminum is extremely durable in neutral and slightly acid environments. In environments characterized by high acidity or high basicity, corrosion is rapid.

Further details are given in Corrosion Resistance.

Physical properties table

Color	Silvery-white with a bluish tint
Hardness	The pure metal is soft, but it becomes strong and hard when alloyed
Ductility	It can be beaten into extremely thin sheets
Malleability	Capable of being shaped or bent
Conductivity	Good electrical and heat conductors
Corrosion	Resists corrosion by the formation of a self-protecting oxide coating

Chemical properties table

Chemical Formula	Al
Occurrence	Occurs only as a compound, principally in bauxite
Oxidation	In moist air, it combines slowly with oxygen to form aluminium oxide
Reactivity with acids	Reacts with many hot acids
Reactivity with water	Reacts quickly with hot water
Reactivity with alkalis	It reacts with Alkalis such as Sodium hydroxide and limewater
Compounds	A mixture of aluminium, oxygen and other elements produces Bauxite Bauxite is an aluminium ore and is the main source of aluminium

Alloys	When combined with elements such as copper, silicon, or magnesium it forms alloys of great strength
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With this knowledge in mind the next phase of my work was to head to workshop and start working with material to explore these properties and see what could come out of it.

I started my test not knowing exactly what my outcome for this work was going to be, the plan was to explore as much as I could and implement some of the results from the test in to making models or making meaning out of them in the form of making works.

4.2 Conceptual solutions for the museum

Because the research was done for a museum I developed conceptual solution for the museum, these conceptual solutions the researcher categorized in to three levels of difficulty Easy, Medium and complex were specifically designed to meet the needs of different ages of people who came to the museum to take part in the creative learning exercises the project concepts were developed for people from the age five to eighteen years and above.

4.3 Concept one: the “Magnet Feather” and the “Coiled Worm Butterfly”

Product concept for the museum with an easy level of difficulty. Both concepts are concepts that are easy to make so they can be ideal for pupil between ages 5 to 8 years, both works are refrigerator stickers and I stacked only to materials available at the museum. The result of this was the magnet feather (Image 14) Butterfly, produced from an aluminium can opener, magnet for to stick to metal, pipe cleaner for decoration and glue as biding agent (Image 15). This idea came from an interview with some of the pupils who told me they wanted to make a product they could put on their refrigerator.



Image 14: Magnet Feather

Coiled worm butterfly, produced from an aluminium can opener, magnet for to stick to metal, pipe cleaner for decoration and glue as biding agent.



Image 15: *Coiled worm Butterfly*

4.4 Concept two: “The Ant of Holmestrand” and “Foil Spidie”

Both works are product concept for the museum with an easy level of difficulty, both works in this sub chapter are produced from aluminium foil, again I used only materials available at the museum to execute these two pieces of craft, aluminium foil, aluminium wire and glue aluminium foil was shaped systematically to form the shape of the ant before wires were cut and secure with glue to complete both works. The results were “The ant of Holmestrand” (Image 16) and the “foil Spidie” (image 17).



Image 16: *The Ant of Holmestrand*



Image 17: Foil Spidie

4.5 Concept Three: “The Metallic Flower”, “Glass in Metal Candle Container” and “Elephant of Culture”

Product concept for the museum with a medium level of difficulty, this product can be ideal for pupil between the age 11 to 14 year, the age group for this product meant I had to create products with a slightly higher level of difficulty to make the creative process both challenging and interesting for. I stuck to materials available at the museum with a new addition in the case of glass in metal candle container, the new material I added was the glass which is also a processed food material, made from cut and coiled soda can the results was The Metallic Flower (Image 18), Made from processed for glass container and aluminium soda container the results was The Glass in metal Candle (Image 19) Made from aluminium soda container cut and shaped in to the shape of an elephant the results was The Elephant of Culture (Image 20)



Image 18: *The Metallic Flower*

Made from aluminium can, empty glass of tomato puree, plastic crystal decorative and aluminium wire.



Image 19: Glass in Metal Candle Container

Aluminium can and glue, execution involved cutting and moulding the aluminium can in to shape and joining the pieces together with glue.



Image 20: *Elephant of Culture*

4.6 Concept Four “Fire Bangle” and “Textured Surface Bangle”

Bangle was designed by me, it was made from the application of heat treatment of aluminium, before the metal was bent in to shape of a Bangle as shown in (Image 21), there was made a previous work but I believe would be relevant for the purpose of the museum as it was made in aluminium. In (Image 22) I used a nail and carefully textured a design on the surface of the material before bending it in to a bangle.



Image 21: Fire Bangle



Image 22: *Textured Surface Bangle*

4.7 Concept Five “Avocado skin Jewellery” pendant and earring.

Aluminium coloured jewellery with a complex level of difficulty, product for the museum, materials used were, aluminium sheet, aluminium wire and beads, cut the sheet in to the desire shape, beat the surface with hammer to create the textured effect, add colour (paint) for decoration then add the wire and beads for functionality and aesthetics as shown in (Images 23 and 24).



Image 23: Avocado Skin Earing

Jewellery (pendant)

This product was inspired by the skin of avocado Product concept for the museum, the researcher employed the same process like that of the earring the materials used were also the same with the main difference being function to create variety..

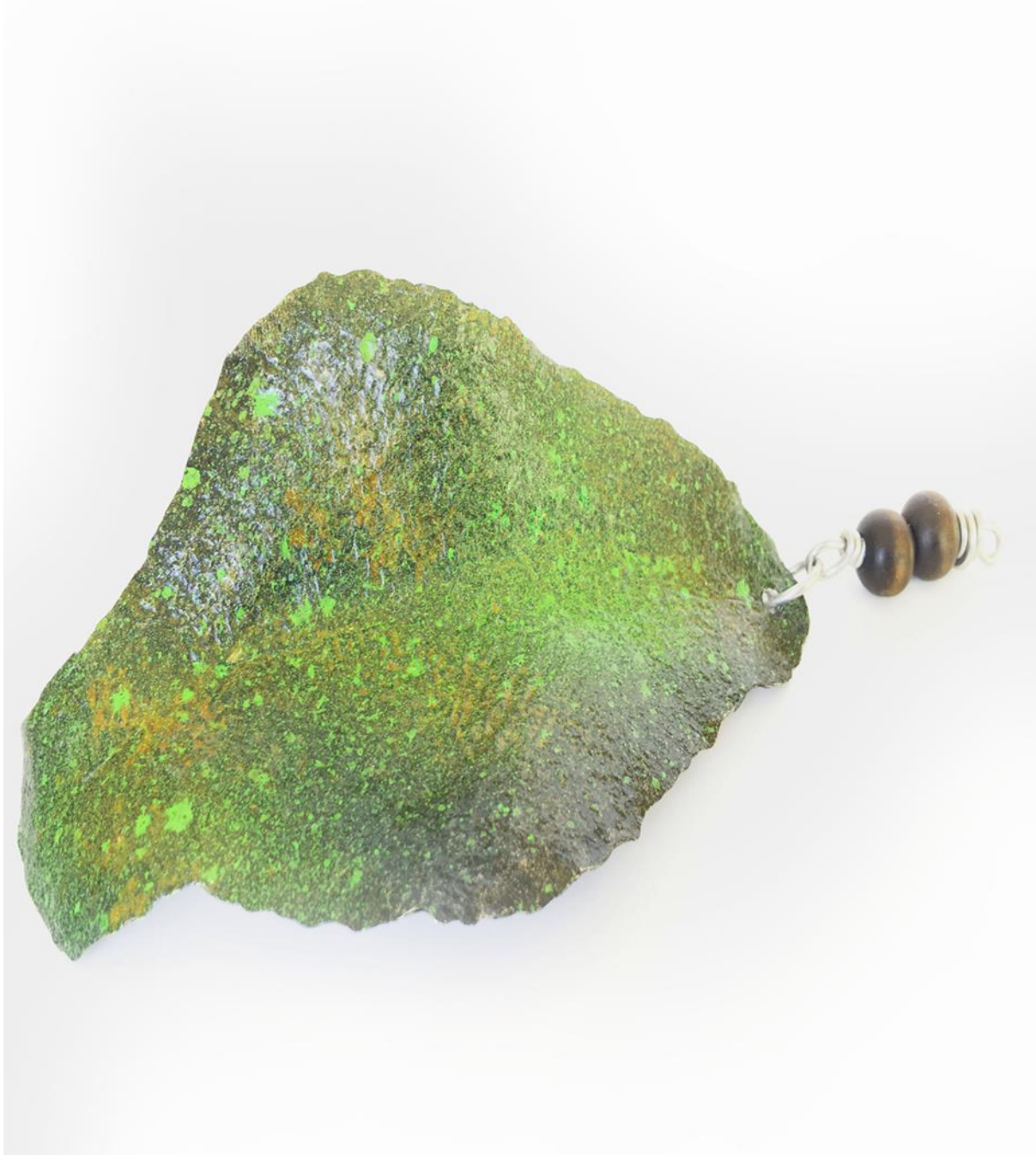


Image 24: *Avocado Skin Pendant*

4.8 Concept Six: Concepts for commercial production “Aluminium Jewellery”

Product concept is both for the museum but the researcher also sees these creative pieces as having the potential for commercial product in aluminum jewellery. Again the materials used were aluminium

sheet, aluminium wire and beads. Making this involved cutting the sheet material to the desired shape before texturing the surface with a clean round nose hammer and finally adding the wire and beads for aesthetics and functionality as shown in (Images 25,26,27,28 and 29).



Image 25: *The Spinning Earing*

Product inspired by leaf the product was executed with aluminum sheet, aluminum wire and wooden beads product can be executed by people eighteen years and over at the museum and also has the potential for industrial production in aluminum jewellery



Image 26: The Leaf Earing

Pierced out of thick aluminum sheet and decorated at the surface with blows from a roundnose hammer. Can be produced by adults at the museum and commercial production



Image 27: Pendant "Perfect Imperfections" Cracks in love

The researcher calls this product Eternity, the product was made with a thick aluminium sheet pierced and surface decoration for aesthetics. The product can be made by people eighteen years and over at the museum and has great ability for commercial production



Image 28: Earnings “The Spiral” Never ending hope

Cut out from thick aluminium sheet and treated at the surface with heat, again has the potential for adults at the museum and commercial production.



Image 29: pendant “The flower back Turtle”, represents Love for nature

4.9 Exclusive works

Works in this sub chapter were produced from the researcher intuitions and taught (design from within) in (Image 30,31 and 32)



Image 30: *The fruit tray*

Experiment with aluminium and ceramic glaze



Image 31: Pendant

Experiment 2 with ceramic and glaze



Image 32: Pendant

Presentation at Sandefjord by Vestfold Museum

During my work with the museum I have also participated in presentation that was organised by Vestfold Museum at sandefjord with a “Museum exhibition as a medium” there were about Thirty present and amongst those who presented on the day included myself, Kjartan Fonsteli, Aina Aske, Lise Emilie Talleraas, Anne Smith Vindenes and some other presenters , getting the opportunity to be part of this presentation was very good for my professional carrier as a designer since that’s what happens in the working world. I presented my work and got some feedback from the people present which also helped me shape my work further since some of the people involved had good experience with working the Cultural Rucksack I got feedback from some of the professionals in the field.

5.0 Discussion

5.1 Four stages of study

Cultural: I looked in to context of culture in both Norway and Ghana with two constant factors people and systems, the difference however was in the organization of the systems, there was a more organized system there were set rules with relation to venue and time in Norway as against a free-range system in Ghana. In Norway, creative sessions were organized in Museum with instructors to guide pupil, there were materials available for the creative sessions and pupil also had the opportunity to go on a tour in an aluminum recycling factory to learn about recycling and sustainability. The situation with relation to culture in Ghana was however different, in Ghana the system of culture with relation to creativity was that of a free-range system. There were no set rules or time, available materials or instructors, there was rather the group creativity where pupil played supervisory role for one another the pupil had the extra responsibility of finding venue and material, they complimented each other's strengths and weaknesses by serving as support guides in difficulty. There were no venues as in case of Norway so pupil chose their own venues which ranged from under trees to compound of houses.

Theoretical: Creative thinking was a constant in theory however the difference was the mode of the creative thinking session, the theoretical stage in my analysis was influenced by culture as traits of culture could be felt in the theory at the museum and in Ghana. At the museum, it was more of an individualistic approach, Pupil went about making their toys individually and called on the instructor when they were faced with difficulty at different stages. In Ghana, it was the group approach ones again as pupil had joint creative sessions and called on one another as support systems.

Organizational: I was again looking at support systems and structures, in Norway for example there was the Cultural Rucksack organization, this meant their system was organized and had support to put it in check and to also periodically update or modernize the mode to suit current creative and learning systems. Looking at the situation from a perspective of sustainability this system was much more sustainable. In Ghana, however there wasn't this constant, I could equate what was happening in Ghana to the problem based learning system where pupil adjusted themselves to suit the problem to find a suitable solution for it.

Physical: I considered the physical in terms of structure or venue, In Norway the physical was at the museum as to the local community or free range in Ghana, In Norway pupil could also learn about their cultures as they took part in creative sessions. There wasn't an available place or venue in Ghana therefore pupil had to choose their own venue and occasionally had story telling session with some older people in the community.

5.2 saving the environment (the designers contribution)

Recycling through craft can be one of the solutions to reducing the effects the high usage of energy and natural resources is doing to our environment, the designer plays a very special role in this by making the campaign interesting as people get creative experience, learn about their culture while saving the environment at the same time. Controlling pollution from the designers perspective, fumes other metal waste has shown to be harmful to plants and aquatic life the book (Förstner & Wittmann, 2012) talks about how plants can absorb the harmful gasses and other metal waste which reduces the quality of the plant. In some cases, poisonous elements from these wastes are deposited in the plants which could be harmful to humans and other creatures like animals which feeds on plants.

Harmful chemicals and other gasses from metal recycling plants close to rivers and other water bodies could also be deposited in to these water bodies causing harm and death to living creatures living in these environments. One way the designer can contribute to reducing pollution is in the making of craft with material waste, recycle with craft is one solution that can reduce the harmful effects industrial recycling has on our environment.

5.5 Knowledge acquisition (the designer's perspective)

Through creative works and sessions knowledge is acquired, creative individuals are often labelled eccentric, they are committed, a dedicated, and passionate. They embrace change, use stress productively, and according to Vance, "do eve- to excess.

The creative person keeps the child in him alive. He is always curious, always adventurous, always asking why. Because creative people seek new and unusual experiences and need freedom to explore ideas on their own, they may exhibit more independence, and be more flexible and assertive than most people. They are open-minded and able to work hard for long periods (Moss & Webster, 1985) . In Learning about ones' culture from the designer perspective, creative product making in a museum can be a way in which people learn about their culture by learning about their past, museums are places where ancient artefacts and other important past information are kept. By participating in creative sessions at the museums and asking relevant questions about art and other things at the museum information is transferred in the form of answers.

6.0 Conclusion

To make sure I meet the requirements of evaluation for this project, I have acted independently with regard to project planning, work process, use of methods and use of supervisors and other resource persons during the project, to demonstrate this

I had chosen my own research team and research question, my supervisor has been a guide for me, the supervisor has been a source of check to assist me in staying true to the course of the project. I have chosen the museum as a suitable place to conduct this research and had two resource persons Kjartan Fonsteli and Merethe Sortland. I adopted four research methods in executing this project: Interviews (Hannabuss, 1996), Observation (Baker, 2006), Workshop (Cohen & Crabtree, 2006) and Co creation (Paulus et al., 2003)

To clarify and discuss a research problem using relevant research methods I developed a research question "How can products be designed by recycling aluminium in a creative learning process in a museum", I have identified four research methods i.e. interviews, observation, workshops and co creation to answer the research question. In arguing towards personal evaluation criteria to a specific problem I made sure the research had adequately answered the research question and the research was in line with the research theme. I have justified and defended all decisions made during the master's project adequately and competently to do this I have justified all decisions made during the research by supporting with references and theory from different authorities.

To demonstrate variety of conceptual solutions I have developed solutions to the research question in the form of concepts for the museum, aluminum was the material I used for the research as the theme of the research suggest, to demonstrate that I have skillfully manipulated the material for a purpose, I have created different kinds of works with the material using different techniques like heating, glue application, bending, punching, cutting etc. I have also done some research on the physical and chemical properties of the material to have a good knowledge and understanding of the material I was working with

I have systematically tested and experimentally chosen appropriate materials and working techniques, this can be seen in the concept solutions, these solutions ranged from easy to complex and these relations were based on the technique like heat, gluing, bending etc. and the level of toughness of the aluminum used, like think sheets etc. with different levels of cutting and manipulating difficulty. I have related my design process to professional research ethics and sustainable value creation as I did the work for a museum to solve a specific problem, I had identified a problem at the museum and used this project as a solution for problem, this also gives the project as the project can be related to museum because it's a solution to a problem with creativity at the museum.

6.1 Products can be designed by recycling aluminium in a creative learning process in a museum

The research questions were chosen in line with the objective of the project, the aim of the project is amongst other reasons explore how design is influenced by culture from the perspective of the Cultural Rucksack with the museum and some examples from Ghana as models. This document was to demonstrate how creativity can be used as a tool to developing problem solving skills i.e. using creative ways to help people develop new ideas in problem solving, I have used aluminium as the creative material. to answer my research question, I have conducted the research in four stages i.e. Cultural, Theoretical, Organisational and Physical, I have used these theories to understand what influences creativity from a cultural perspective, how people approach creativity from a theoretical perspective, support systems and sustainability from an organizational perspective and where or the venue creative sessions take place from a physical perspective.

I have used interviews, observations, workshops and co-creation session to understand the how creativity at the museum works and other to understand the research question and answer it accordingly. This way I documented what was already done at the museum and some works that were being done in Ghana, I have also discussed how creativity in a museum is important by exemplifying and discussing creativity using important points I developed because of working with the project. Finally to answer the research question I have documented works that were done in the Museum by pupil and I have also developed new works in the form of concepts using different levels of difficulty ranging from easy to complex, as a jewelry designer this research has also motivated me to develop jewelry concepts that can be used on a commercial level to make the process of recycling aluminum in a creative way in a museum an enjoyable experience for people young and old and the professional jeweler.

6.2 Creativity is a problem-solving and knowledge acquisition tool.

The research has answered the question of creativity being a problem-solving tool by discussing exemplifying and discussing creativity using important points that influences pupil in different ways. As a way of helping people diversify their thinking Creative sections and workshops at a museum helps people to be more diversified in their thinking, this is because during a creative process people face challenges and these challenges or obstacles are overcome by trying different ideas creative sessions give pupil practical knowledge of how things work and overcoming these challenges gives them experience, people learn more from experience so. To encourage discussions amongst people: when people are given a creative task in a museum it is most common that they consult one another for different ideas and ways to overcome a specific task. The experience gotten from this process does not only become useful for people during creative session but in other things like academics and life for example, it helps in the case of pupil in developing the habit of asking the teacher questions when they do not understand something in class

Self-learning: Learning to be creative is a very good way of self-learning for people, this is a result of learning to overcome different challenges that may arise during different stages of a creative process in a museum. Self-learning is very important for example in the case of

students self-learning is one way people use to learn and understand the materials they are given by teacher and academic books they may pick up from the library for example. As a good way of learning about one's environment and history: Because museums serve as archives being there also offer one the opportunity to learn about their history and environment. To be proactive in the case of students: Group creative task that has a specific timelines challenges student to plan and work within specific timelines, this attitude when transferred in to studies helps students to work within deadlines.

Building self-confidence: Creativity in a museum can serve as a very good of helping people identify their strengths and limitations when it comes to idea creation, this awareness helps one to be more aware of themselves therefore building up the level of confidence they have in themselves.

Develop new problem solving methods: Experiences gathered from trying to replicate some of the works in the museum can serve as a very important way of helping people identify new ways of solving problems. As a way of helping people develop the habit of patience: To be able to execute a creative task at the museum successfully one needs to be very patient i.e. have a clear path or thought about where and how to start and end, this is because visits to museums are guided by timelines, one must work within these timelines.

Innovation: Creativity is the mother of innovation, without creative thinking there will be no innovation, creative task in museum can serve as a good way of learning to be innovative because this one has a physical model to compare their innovative idea to. In balance thinking and execution, Creative task in a museum helps to bridge the gap between what we think is possible and what is possible, sometimes we think of an idea and gets fascinated by this idea as being brilliant and awesome but when we try to execute this idea in to a physical model then we realize it is not possible, creativity in museum can help correct this way of thinking. It helps people in thinking what is practically possible. Balancing thinking and execution is a very important learning step as it is a way that helps people in coming to terms with reality and doing things that are in line with their strengths.

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