Ecological View of Design in Education

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Abstract — Recently, innovative product development, has become important, it involves full life-cycle of products and an effort to minimize the natural and social, adverse effects of growing and accumulating waste materials.
Only responsible and environmentally conscious designers can respond, in an innovative way, to social problems and environmental challenges of the 21st century. For companies, eco-conscious product development has a strategic importance, to be able to meet the requirements that were set against them by unjust lawmakers, but also by commercial and private consumers and all of the market participants.
Through the training of young industrial designers and product engineering students, we put particular emphasis on raising the eco-conscious awareness and practical experimentation Processing of different areas of light industrial wastes sets new tasks for the product designers. Our research focuses on mapping and creative reuses of the large amounts of unused waste, unnecessary objects, old household items etc.
Obtaining the theoretical background of this growing sustainable design philosophy fourth year students get a practical reuse project. They can use all the hand techniques and high tech technologies studied so far.
Targeted solutions of project-oriented tasks are realized in new furnishings, fashion products and packaging which are promoted in exhibitions and fashion shows.
This is a creative process, which is a real design problem. All the experiences obtained through these reconstructions generate new ideas for future projects of the students.

Keywords: *Reuse, product design, reconstruction.*

1. INTRODUCTION

1.1. Importance of the research work

One of the tasks of an eco-conscious strategy is to encourage designers to minimize the waste that is created in the industry. Industrial waste is produced by industrial activity which includes any material that is rendered useless during a manufacturing process such as factories, industries, mills, and mining operations.
Observing the life cycle of products one can found a number of economic and environmental development opportunities, including manufacturing and use stages as well as end-of-lifecycle waste recovery. The new thinking can also result cutting the costs, improve efficiency and increase competitiveness.
Eco-design means the introduction of the environmentally conscious way of thinking during the design and manufacturing processes. Eco-design aims to reduce the environmental impact of products throughout their entire life cycle.
It is a new responsible approach of the current design with new attitude and new philosophy. Eco-product design is a complex concept the criteria of which are:

1. The importance of protecting and balancing the environment
2. The knowledge and use of novel materials and technologies
3. Reinterpretation of craft traditions.
4. Taking into account real market needs and processes
5. Reduce the "ecological footprint". (less water, chemicals, energy use)
6. Innovation and creativity

Reduce, reuse and recycle, are the three essential components of the environmentally responsible, designer's behavior, but we can add “repair” from the point of view of the consumer.
How can we meet the requirements? There are four ways:

- Slow design
- Design for long-life and short-life applications
- Zero waste cutting
- Design with enhanced aesthetic value

So through a one semester project work students learn to identify themselves with ecological, social and community consciousness.
They do research work on new and innovative ways to achieve more sustainability. They collect new designs from contemporary designers, from all over the world, as well as, the work of Hungarian companies.

Photos 1-2-3: Hungarian samples: Zip necklace from Gerdushi Design and reusable plastic bags from Medence Design

This research highlights the accumulated sources worth dealing with. After collecting information, they create innovative solutions even for industrial manufacturing.
Educational Institutions need to prepare students for these kinds of conceptual ways of thinking, integrated with solid engineering knowledge.

2. METHOD OF THE PROCESS

Knowing the theoretical background of the sustainable design philosophy fourth year students get a practical reuse project. The starting points can be all kinds of accumulated unused waste, unnecessary objects, old household items etc. They can make material-, form- and style combinations and can use all the hand techniques and high tech technologies currently studied.
We examine and analyze:

- Structure, form and material of the chosen pieces
- Ways for deconstruction and reconstruction
- The function of the new structure
- The variability of the forms and materials
- The possibility of their surface manipulations
- Style effects

There are plenty of purchasing sources around the country and even in our homes.
We consider all the opportunities for further development and choose a few ways to start with. They collect their inspirations, all kind of similar shape solutions and color suggestions on mood boards.

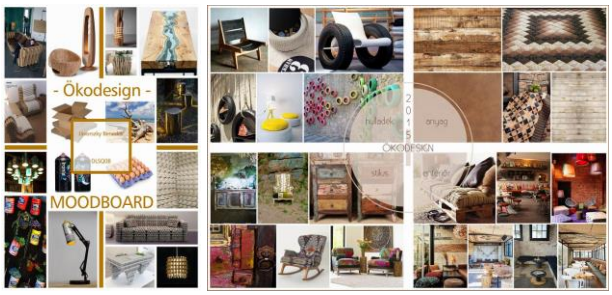

Figure 1: Inspiring moodboards (Benedek Jávorszky and Alexandra Baraksó)

2.1. Industrial wastes

During all types of production certain sizes of waste are generated, either of wood, or metal, fiberglass, leather, paper or textile. Students frequently use leather, wire and wood pieces to invent unusual demonstrating models and as many variations from their pieces gathered as they can.

Photos 4: Waste types: leather, wood, electric wire

The main question is what function will served by the reconstructed model, from any kind of waste? The quality of the materials and the given sizes specify the form and the function. As the students learn a lot of craft techniques and industrial technologies, as well they can choose their favorite type matching the best to the type of the waste.

Study of the construction and technological solutions are essential for starting this project.

Photo 5: Bowls with basketry technique from electric wire by Kamilla Bihary

Photo 6: Patchwork from leather waste covering a seat made from two tires by Alexandra Baraksó

Photo 7: Chair from wood-waste by Zsófia Bagi

2.2. Electronic waste

Nowadays 20-50 million tons of E-waste are generated annually, of which, only 12.5% are utilized and this waste contain high levels of valuable, re-recoverable rare earth-metal elements (REE).
A student used a HDD (hard drive) as a desk clock, for example. It was a 40GB faulty hard disk, which he transformed for a new function, as a clock, thus prolonging its life. These small metallic elements evoke a classical, futuristic way of seeing the world of mechanical watches.

Figure 2: Reuse of E-wastes: desk clock by Dániel Végh

2.3. Unused and accumulated

People love collecting things and accumulate them in their homes and offices. The new generations are not emotionally attached to these household items, photos or games etc. so they just marvel at the old things and use them easily in another way. The most interesting ones are the chairs, space dividers, tables and all kinds of lamps, but objects with smaller sizes can have good functions, as well.

The first step of the process is to deconstruct the object and survey it, from the points of view, mentioned above. The way of up-to-date reconstructions, needs well-structured ideas.

Photos 8-9-10: A bar-chair from bicycle by Lőrinc Lipták.
Glued and painted toy-parts as a table lamp.
Vinyl records as a multi-leveled lamp and clock by Gerda Nagy

2.4. Reuse and traditions

Reuse is a good opportunity to rediscover the traditions of a Society and, this way of design, enjoys great popularity. To integrate the national tradition elements into the current design streams shows a fresh way to connect the new generations with the unforgettable values of the past.

Photos 11-12-13: A nightstand from an old basin stand by Lilla Molnár.
Redesign of an old dining table by Eszter Németh. A practical kitchen stool with resin by Marietta Jobbágy

3. IMPLEMENTATION

This type of experimental work helps to strengthen the ability of assembling materials in a proper way while creating a new style. The project is based on innovative connection of different materials and shapes, meanwhile aiming to use the most suitable solutions. Mixing the different kinds of materials like the rigid and soft, resin/metal and wood, glass and leather, paper and textile etc. can cause problems in realizing the prototypes.

Creating a new form, from waste materials or reconstructing an object can be produced mainly by using two or three different materials. Textile or leather patchwork from similar materials, but different sizes mean an easier method of solution.

As new discoveries in material-science appear students would like to experience them in their works. Thus they focused on concrete and resin and three-layered sound insulating felt, as well.

Combinations and arrangements of these materials and form possibilities, integrate all of the knowledge students have acquired.

Students combine high- and low-tech processes and use recycled materials to create expressive objects, this shows their engagement concerning their responsible attitude for green design and development in a specific approach in design methods.

Figure 3: Experimenting with a new composite:chopped walnut shell in resin

The needed infrastructure for implementation are well equipped labs with: textile and leather sewing machine, laser cutter, 3D software, special machines for processing all kind of materials, handicraft tools etc.

The final documentations and posters contain all the steps of the design process from the inspirations, drawings or

photos of starting pieces, technological drawings, as well as sketches, and photos of the final products.

Figures 4-5: Two posters showing the results of design works (Gerda Nagy, Adrienn Rozsnyó)

4. CONCLUSIONS

Processing the waste originated from the different sections of light industry, poses new challenges to Product Designers. We educate our industrial product design engineer students with a particular emphasis on eco-conscious awareness and practical experimentation. The main focus of our research is the mapping of large amounts of unused waste and providing the creative possibilities for further utilization.

The end-products present the intended creativity, as well as, the conscious thought process of the student. The prototypes, of students, demonstrate that the subject of these "Material Reuse Studies" are really thought provoking and lead to challenging solutions, with the help of the method used.

All the experiences obtained through these creative deconstructions and reconstructions, generate new ideas for the students future projects. As the prototypes are unique, we regularly present them to the public, partly in the Hall of our University and also during prestigious events, like Design Week Budapest or EDUCATION International Education Expo.

Photos 14-15: Two public exhibitions

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