

The application of reuse as a sustainable principle in the cloned furniture hall at the Faculty of Applied Arts

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Abstract

Studying historical furniture is one of the main aspects of studying furniture. The students in the faculty of applied arts, interior design and furniture specialization study at least four courses through the four levels in the department dealing with historical furniture. Therefore, the students need to study different aspects of historical furniture studies such as historical dimensions, materials, technological methods, aesthetic values, and the main characteristics. Accordingly, there was a need to make a study on the importance of building a cloned furniture hall in the department to help students in the educational process and to enhance their understanding of the different historical aspects of furniture. To achieve that the research team built the hall using the reused wood in the faculty to enhance reuse as a sustainable principle in conserving the environment. A survey was conducted to measure the need for the hall in the department by the students of the department through the four levels. The findings of the survey have enclosed the student's need for historically cloned furniture hall to enhance their understanding of the historical aspects of furniture. In addition to that using reused wood in the building process of the hall supports sustainability and environmental conservation.

Keywords

Reuse - sustainability –historical furniture- cloned furniture hall - Faculty of Applied Arts

1. Introduction

Mies van der Rohe once said that chairs are among the most difficult objects to design; since creating something which must be at the same time light, strong, and comfortable entails so many problems and possible solutions that “It is almost easier to build a skyscraper than a chair”[1] [2]. Perhaps that statement was a bit too extreme; yet chairs are certainly among the most complex types of furniture because, more than others, their design requires solving ergonomic, technical, and structural issues[3][4]A student who studies furniture design must study historical furniture and all its aspects of dimensions, materials, methods used in implementation, aesthetic values, and characteristics of each time. The idea of the research is to enhance to the educational process through the implementation of the cloned furniture hall that displays reproductions of historical furniture, reusing the used wood in the collage to enhance the idea of sustainability and preservation of the environment.

The problem of research:**The research problem is limited to the following question:**

- How does the presence of a permanent exhibition of historical furniture in the Department of Interior Design affect the educational process?
- How does the presence of a cloned furniture hall of historical furniture affect students' understanding of historical furniture aspects?
- How does the reuse of wood in the collage in building the exhibition affect the concept of sustainability and environmental preservation?

Hypotheses of research:**From the previous question, the researcher assumes the following:**

- The researchers assume that building the cloned furniture hall in the Interior Design Department contributes to enhancing the educational process. As well as reusing wood for building the hall supports sustainability.

The objective of research:**This study aims to:**

- Enhance the concept of sustainability and preserving the environment through the reuse of wood in the College of Applied Arts in building the cloned furniture hall.
- Building an exhibition that displays historical furniture to serve the educational process.

Importance of research:**The importance of research lies in the following points: -**

- The importance of preserving the environment and sustainability through reuse.
- The importance of studying historical furniture for students of the interior design department at the faculty of applied arts.

limits of research:

- According to the place limits: Faculty of applied arts - interior design department.
- According to time limits: in the academic year 2021-2022 in the second semester.

Methodology of research

- Practical approach through designing and implementing the cloned furniture hall.
- Descriptive and analytical approach through describing the design and implementation of the hall, and the literature review.
- Survey study through a questionnaire.

2. Literature Review

One of the previous global experiences of cloned exhibitions of furniture in the educational process is the exhibition of the Design Museum in Denmark dedicated to chairs[4]. Whereas the idea of the museum relies on studying the history of the development of furniture design and manufacture can be traced back through historical furniture models over the ages. Therefore, the permanent furniture fair in Denmark deals with modern furniture to **tell the history of industrial design through the evolution of chairs** from the mid-19th century to the

end of the 20th century[4]. Photos n. (1) & (2) show the chairs collection at the **Danish Royal Academy of Fine Arts**.



Photos n. (1) & (2) show the chairs collection at the **Danish Royal Academy of Fine Arts**[5]. A collection for educational purposes[4]. It is not a museum, so students can move, test, and examine the chairs to learn. The first photo was taken on May 3rd, 2022, by the young Egyptian Designers visiting Denmark as part of the **Bilingual furniture design project** [6]. The second photo was taken from the website exhibit.com [4].

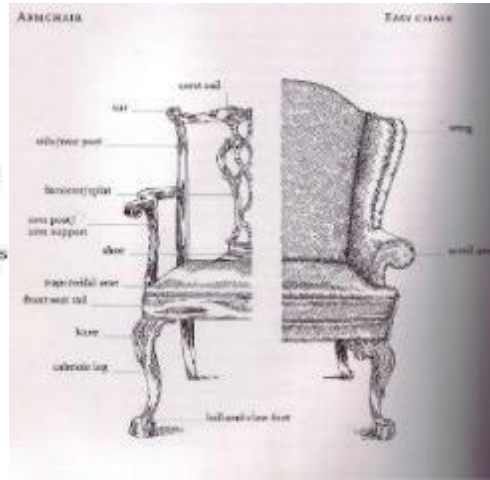
Reuse is one of the main aspects of sustainability, through which it is possible to preserve the environment by reducing the consumption of available resources and reusing waste in various manufacturing processes[7] [8] [9]. The idea of the research was to reuse the old timber at the college in building a permanent exhibition of historical furniture with the aim of serving the educational process, preserving the environment, and applying the principles of sustainability.

3. Methods and Data

The **Empirical study** included two parts. The first was about designing and implementing the showroom. The second was a questionnaire for the students of the department about the importance of having a cloned furniture hall of historical furniture in the department and its role in understanding the historical aspects of furniture in a better way and how to apply sustainability by reusing wood in the collage.

3.1.The designing and implementation of the showroom

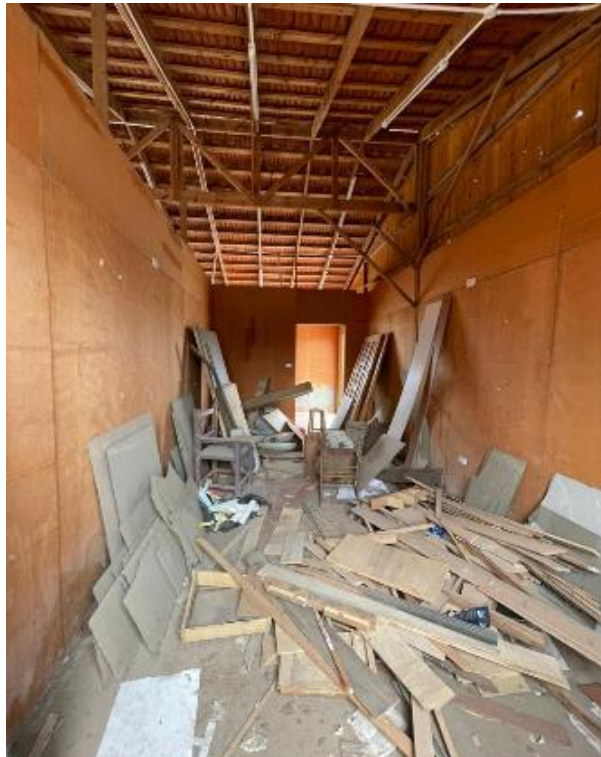
The applied project is the design and implementation of a cloned furniture hall in the department of " **interior design and furniture** " with the aim of presenting **copied models of historical furniture** pieces such as Ancient Egyptian, Islamic, European, modern, andetc. So that students can see realistic furniture pieces from different historical ages they study. The **cloned models** could be a complete piece or just a part of the historical furniture such as the back, the legs, the arm standard, and so on as shown in photos n. (3) & (4) for different parts of a modern and a classic chair. Infographics could be also used to give detailed information about historical pieces[10]. The presented furniture pieces could be implemented through other courses. But in this experiment, we focused on the design and implementation of **the interior design of the showroom** only. We reused the **used wood** from the college to activate the idea of **sustainability** as shown in photos n. (5) & (6) and by converting them into a usable product with a functional and aesthetical objective.



Photos n. (3) & (4) show different components of a modern and a classic chair that could be used in the showroom.



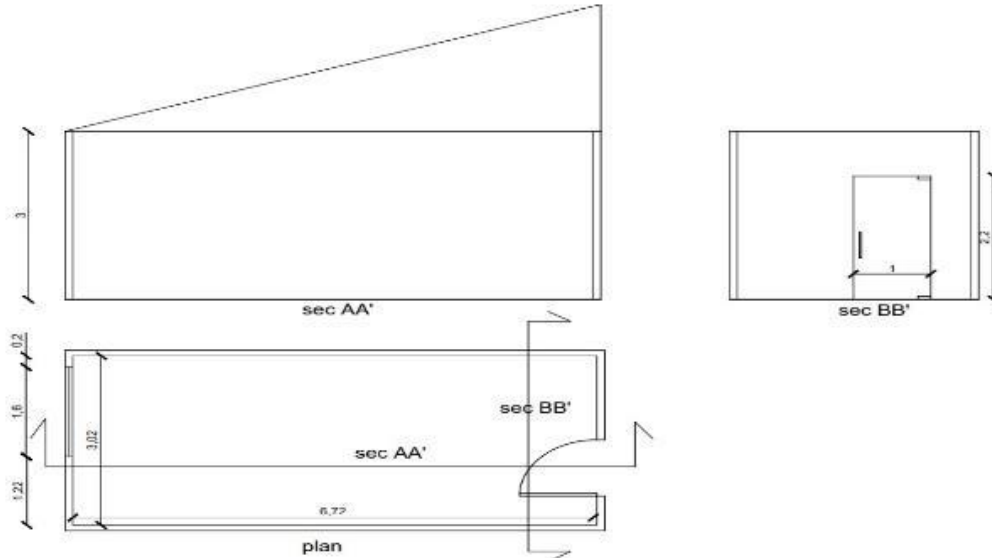
Photos n. (5) &(6) show samples of the old wood used in the implementation of the room.



Photos n. (7) & (8) show the showroom before our work where the room was a bad spot to store used wood, the photos also show some samples of the used wood which the teamwork used after that in the implementation of the hall.

The teamwork divided the performance into parts as well as the students into groups and distributed the tasks. **The division of the tasks was as follows:**

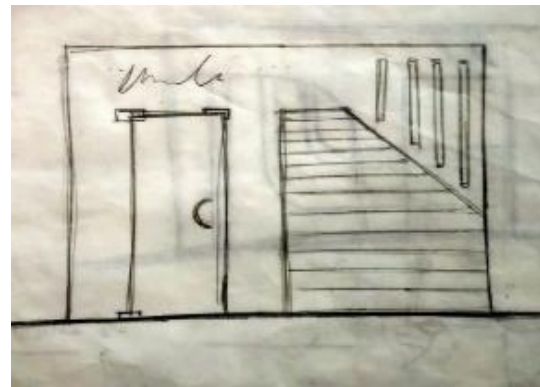
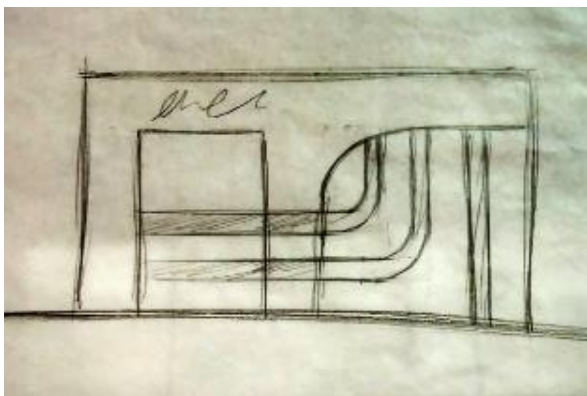
A. Identifying the room dimensions. The students under the supervision of lecturers measured the dimensions of the room then draw a plan and elevation then a side view as shown in photo n.(9).



Photos n. (9) shows the main plan, elevation, and side view of the showroom with dimensions. This photo also shows the entrance and the only window in the room. (Drawings by students)

B. Conceptualization of the interior design, formulated with several proposals.

The students made several designs for the exhibition room, some of them chose straight lines and others chose organic lines, some preferred hand drawings, and others preferred digital drawings. The work team did not set restrictions on the students in the design direction or the way of drawing to encourage them to be creative, express their opinion and work as a team, and exchange views. The students were given complete freedom to put the appropriate lines from their point of view, and then the most appropriate design was chosen after the modification process with lectures for the implementation process. Photos n. (10) show some of the students' designs. While Photo n. (11) shows some drawings for the accepted design to be implemented in the showroom.



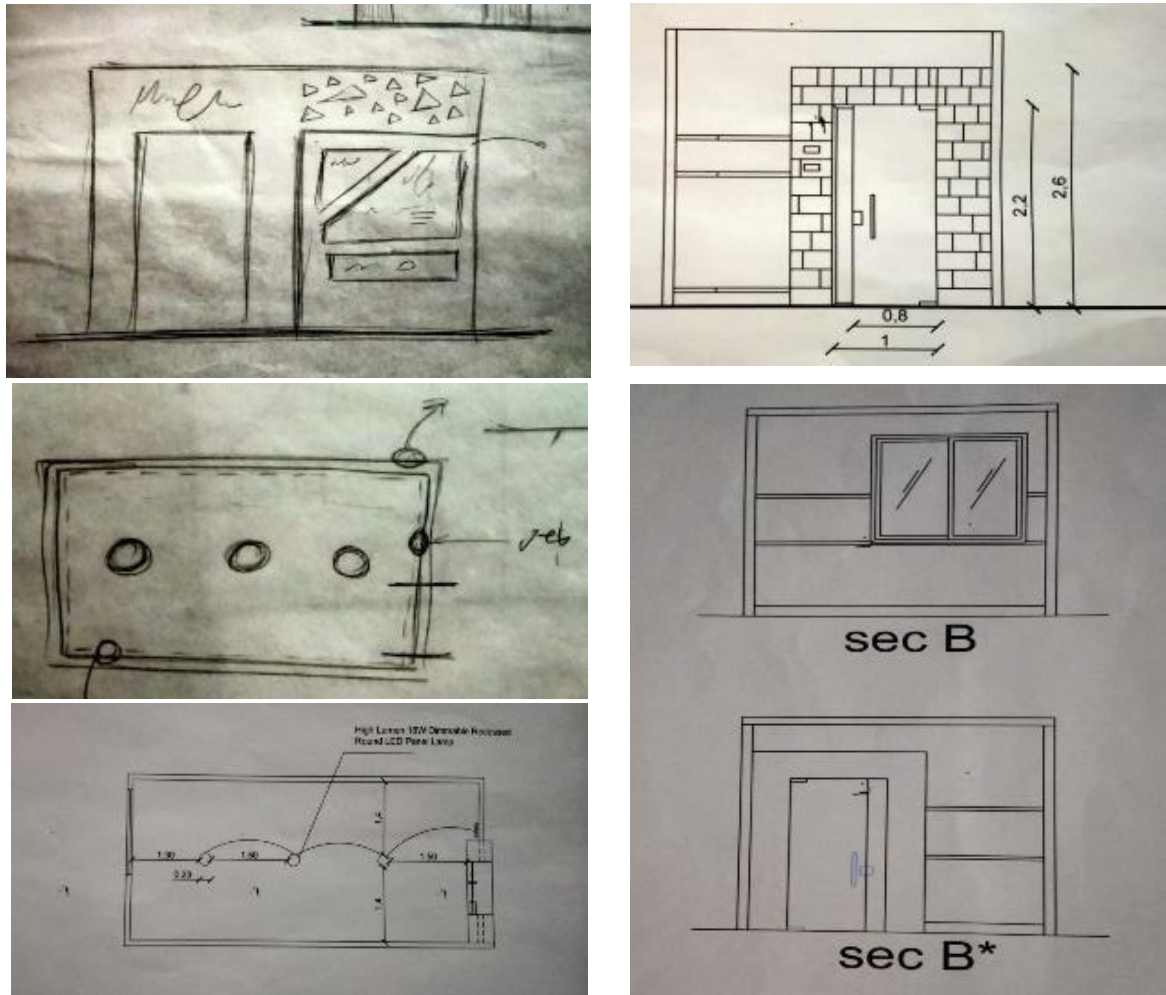


Photo n. (10) show some of the students' designs of the showroom.

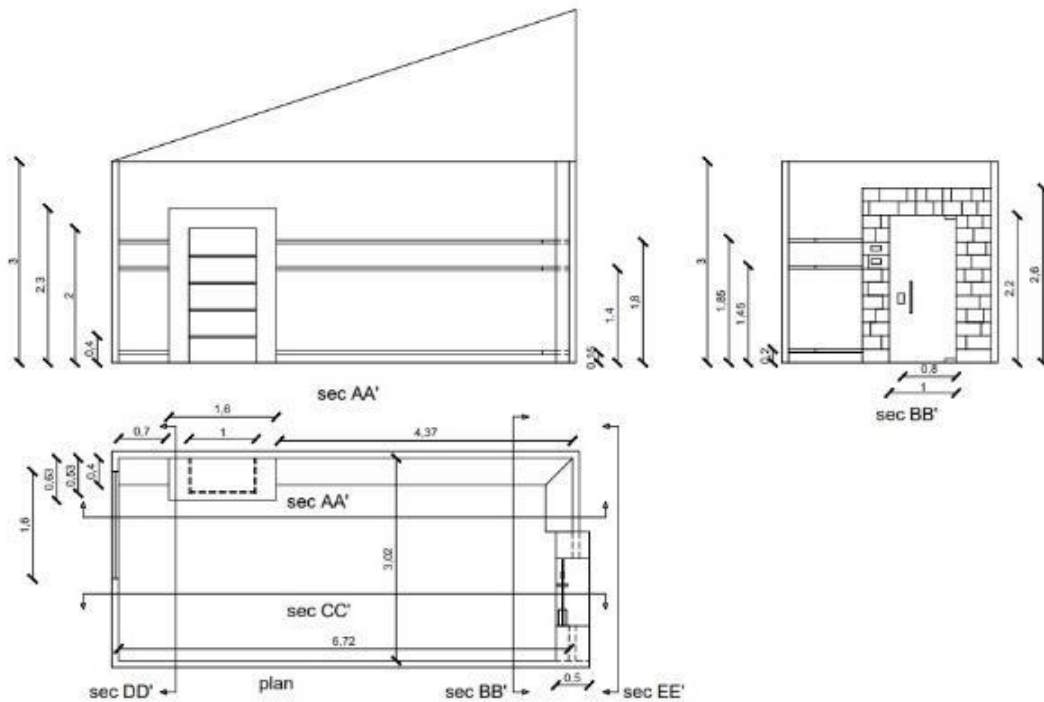


Photo n. (11) shows some drawings for the accepted design to be implemented in the showroom. (Drawings by students)

C. Drawing the executive graphics for the chosen design.

During the field studies, the students attended to measure the dimensions, study the current location, and clarify how the place transforms from the current situation to the designed one. Photos n. (12), (13) & (14) show the lecturers explaining some aspects or stages of design and implementation to the students. After choosing the optimal design suitable for implementation, the detailed executive drawings were made by the students and with the help of the lecturer.



Photos n. (12), (13) & (14) show the lecturers explaining some aspects or stages of design and implementation to the students on the site.

D. Determination of allowable budget.

The items to be worked in the showroom were identified and the cost of each item was determined such as the costs of raw materials, workers, and finishing costs, in other words, a budget was drawn up for the work.

E. The implementation process includes wood reuse, assembling, painting, and lighting installation.

After choosing the appropriate design, and the appropriate working drawings, the implementation of the hall began. First, choosing the appropriate wood and then cutting it according to the design imposed to form shelves, ceilings, storage units, and desk. Shelves have been made to carry the displayed pieces of furniture, a storage unit to store the exhibits, and a desk in the case of an employee responsible for the cataloging process for the exhibits, and students can use it also to study one of the exhibit pieces. As shown in photos n. (15), (16),(17),(18) & (19) the walls, the ceiling, the lightning, and the outdoor area before and after implementation.



Photos n. (15) show the wall AA` before and after fixing the shelves that will carry the displayed pieces of furniture, the storage unit, and the desk. The second photo was in the fixing shelves stage.



Photos n. (16) show the wall CC` before and after fixing the shelves.



Photos n. (17) show a vision of the development of the building process of the room and the initial paint process.



Photos n. (18) show the wall DD` and part of the wall AA` before and after fitting the storage unit, and the desk. The last photo was in the primary painting stage.



Photos n. (19) show the wall BB` before and after installing the wooden cladding, the initial paint stage, and after fixing the door.

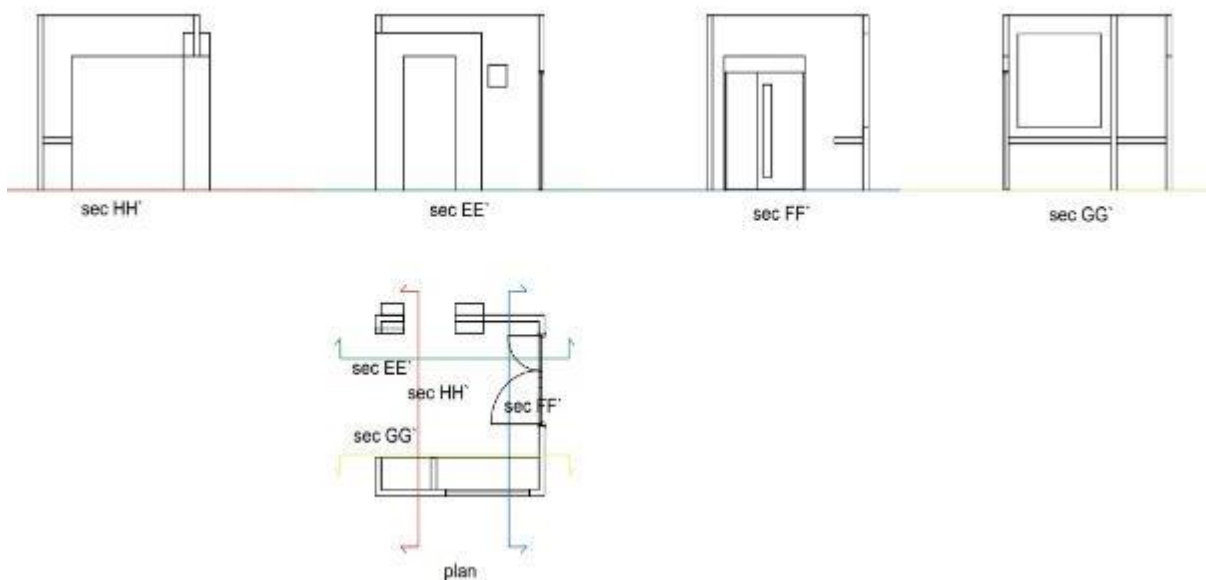


Photos n. (20) show the development of the ceiling before and after, the last one for the ceiling with lighting and initial paint.



Photos n. (21) show the development of the lightning process, the electrical supply of the wires, and the installation of the final direct and indirect lighting and their electrical switches.

Coordination of the outdoor area of the exhibition room was a necessity, so we made drawings for it as shown in photo n.(22). Then we made the appropriate working drawings and after that the implementation.



Photos n. (22) show some of the drawings for the outdoor area design. (Drawings by students)



Photos n. (23) show the wall EE' before, though, and after fitting the wooden cladding. The last photo was in the initial paint stage.



Photos n. (24) show a close shot of the wall EE` after fitting the glass door and the last one after the paint stage.



Photos n. (25) show the wall FF` before, though, and after implementation.



Photos n. (26) show the wall GG` before, though, and after implementation.



Photos n. (27) show wall CC` and wall AA` after the paint process.

The final stage in the implementation of the hall was hanging the cloned masterpieces of furniture with infographics illustrating their characteristics as shown in photos n. (28)to (31).



Photos n. (28) show final shots of the cloned furniture hall.



Photos n. (29) show close shots of the walls in the cloned furniture hall.



Photos n. (30) show other close shots of the walls in the cloned furniture hall.





Photos n. (31) show **close shots of the walls in the cloned furniture hall and infographics used to illustrate the main characteristics of the era they belong to.**

One of the main aims of the work is to integrate the students with the implementation stages and teach them dealings with the workers to acquire the skill of implementation and supervision of the workers. As well as their participation by themselves in some stages of the implementation as shown in photos n. (32) & (33). Many students were keen to record all the details of the work and share them with their colleagues in the lecture.



Photos n. (32) show the participation of lecturers and students themselves in some stages of the **implementation**



Photos n. (33) show students participate in the implementation process in a team spirit, and this is one of the goals of the work to provide students with the skills to work as a team alongside the educational process.

3.2. Survey study

A questionnaire was conducted for the students of the Interior Design Department at the Faculty of Applied Arts in its four levels. It was launched online to conduct their opinion and to determine the extent of the need for a showroom that displays models of historical furniture in the department. As well as to determine the extent of their knowledge of the concept of sustainability and reuse of unused wood in the collage and the role of this in preserving the environment.

3.2.1. The design of the survey questionnaire

The online survey was developed and analyzed via Google documents. There were 69 respondents in a month. Table n. (3) is an illustration of the structures of the survey's questions and the methods of answers available then the objective of the question.

Table n. (1) The structure of the survey questions, the response methods available, and the objective of the question. Source: Authors.

The survey title: A questionnaire to conduct your opinion on the need for a showroom that displays models of historical furniture pieces in the department of interior design and Furniture in the college.

	Questions	The methods of answers available to students	The objective of the question
1.	Select the level you are enrolled in.	The supplied answer is a multiple choice of the four levels in the department.	To clarify whether the survey participants come from a certain level or from the departments generally.

The number of courses dealing with historical furniture and field visits:			
2.	How many courses dealing with historical furniture did you study?	The supplied answer is a multiple choice of 5 Evaluations: (0 -1 - 2 - 3 - more than 3).	To evaluate the importance of studying historical furniture in the department courses.
3.	How many museum visits have you made under the supervision of the department so far to study historical furniture?	The supplied answer is a multiple choice of 5 Evaluations: (0 -1 - 2 - 3 - more than 3).	To evaluate the importance of studying historical furniture directly in the real field.
The role of historical furniture copies in enhancing the educational process in the department			
4.	Do you prefer to have copies of historical pieces of furniture inside the department?	The supplied answer is a multiple choice of 3 Evaluation: (Yes - No - Maybe).	To evaluate the student's need for historical furniture in the department.
5.	On a scale from 0 to 10, please specify from your point of view the impact of the presence of copied pieces of historical furniture in an exhibition in the department on teaching you the historical furniture features through the following points	The answer is a scale from 0 to 10 that determines the student's opinion on the extent to which the presence of the copied pieces of historical furniture contributes to learning historical furniture features.	To evaluate the student's need for historical furniture copies in enhancing their understanding of the historical aspects of historical furniture according to the time it belongs to in the following aspects:
	Improve understanding of the aesthetic values of the era it belongs to.		Aesthetic values.
	Support understanding of the historical dimensions of furniture of this era.		Historical dimensions.
	Exceed knowledge of the technological methods used in assembling furniture in this era.		Technological methods used in assembling furniture.
	Enhance understanding of the materials used in the implementation of the furniture.		Materials.
	Reinforce understanding of the characteristics of		The characteristics of furniture for the historical period

	furniture for the historical period it belongs to.		
	The role of sustainability and reuse in the implementation of the showroom idea.		
6.	Do you think that reusing the used wood in the college contributes to preserving the environment and achieving the principles of sustainability?	The supplied answer is a multiple choice of 3 Evaluation: (Yes – No – Maybe).	To evaluate the sustainable background of students about reuse as a principle of sustainability and environmental preservation.

4. Results

The questionnaire results analysis.

The first question in the survey asked about the level a student is enrolled in. This question showed the percentage of students' participation in the questionnaire from the four levels and from each level separately. There were 69 participants in this survey from 127 students rolled in the department. The participation rate of second-year students was 42%, while the participation of fourth-grade students was only 17% percent as shown in figure n. (1)[8].

The percentage of students' participation in the questionnaire from the four study levels

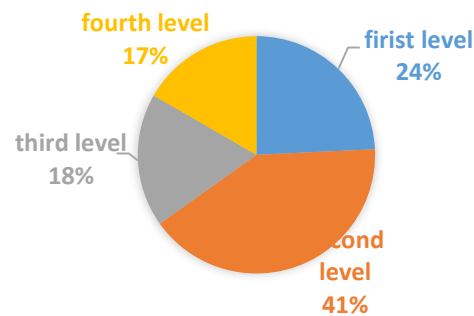


Figure n. (1) the percentage of students' participation in the questionnaire.

The number of courses dealing with historical furniture and field visits.

The second question asked about the number of courses dealing with historical furniture the students' study in the department. The results showed that 42% of students studied one course -dealing with historical furniture- at least. While 12% of students studied more than 3 courses as shown in figure n. (2). This confirms the importance of historical studies of furniture in the department. This confirms the necessity of the research idea, which is the presence of historical pieces of furniture in a permanent exhibition in the department to strengthen the educational process.

The number of courses dealing with historical furniture the student's study in the department

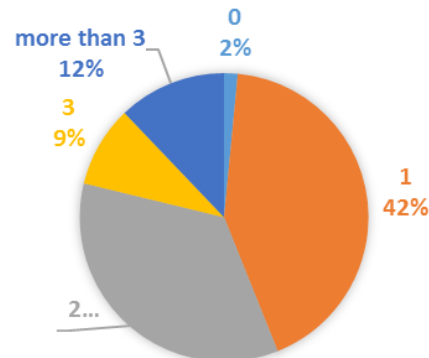


Figure n. (2) the number of courses dealing with historical furniture the student's study in the department so far.

The third question asked about the number of museum visits the students have made so far to study historical furniture. The results showed that 38% of students went on museum visits at one time at least. While 3% only went more than 3 times as shown in figure n. (3). This question was designed to evaluate the importance of studying historical furniture directly in the real field through museum visits. Perhaps the college is far from the museums, which is the reason for not repeating field visits to museums, and there may have other reasons.

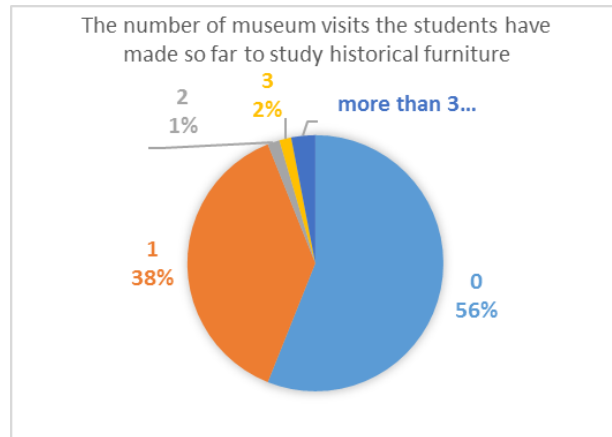


Figure n. (3) the number of museum visits the students have made so far to study historical furniture.

The role of historical furniture copies in enhancing the educational process in the department.

The fourth question asked about students' preference for having copies of historical furniture inside the department. The results showed that 62% of students prefer having copies of historical furniture inside the department. While 26% only chose maybe and 12% did not prefer that as shown in figure n. (4). This question was designed to evaluate the students' opinion of the importance of the research idea, which is the presence of historical clones of furniture that mimic reality and confirm the importance of direct interaction with the furniture they study.

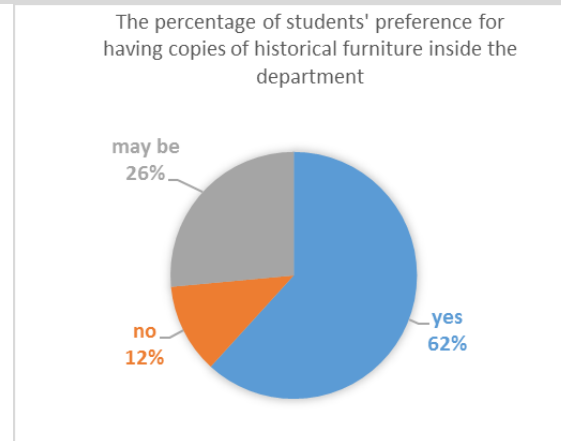


Figure n. (4) the percentage of students' preference for having copies of historical furniture inside the department.

The fifth question asked students to evaluate on a scale from 0 to 10 their opinion on the impact of the presence of copied historical furniture in a permanent exhibition in the department in teaching them the historical furniture features through many aspects, **first understanding the aesthetic values of the era it belongs to.** The results showed that 25% of students support the idea as shown in figure n. (5). This question was designed to evaluate the student's need for historical furniture copies in enhancing understanding of the historical aspects of furniture

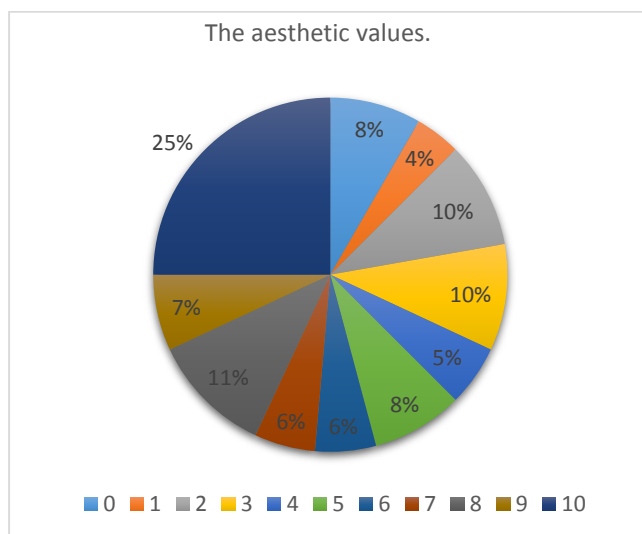


Figure n. (5) the relation between the presence of a permanent exhibition on teaching the historical furniture features especially understanding aesthetic values.

according to each time they belong through Aesthetic values.

Second, understanding the historical dimensions of the furniture in this era. The results showed that 21% of students support the idea of the presence of a cloned furniture hall in understanding the historical dimensions of furniture according to the historical period it belongs to. While only 5% do not support that as shown in figure n. (6). This question estimated the role of historically copied furniture in enhancing understanding of the historical dimensions of furniture they belong to.

Third, better knowledge of the technological methods used in assembling furniture in the era it belongs to. The results showed that 22% of students support the idea of the presence of a permanent exhibition on teaching historical furniture in understanding the technological methods of furniture for the historical period it belongs to. While only 8% do not support that as shown in figure n. (7). This question estimated the role of historical copies in enhancing understanding of technological methods used in assembling furniture according to the era it belongs to.

Fourth, a better understanding of the materials used in the implementation of the furniture. The results showed that 25% of students support the idea of the presence of a cloned furniture hall on teaching historical furniture in understanding the materials of furniture for the historical period it belongs to. While only 6% do not support that as shown in figure n. (8). This question estimated the role of historical copies in enhancing the understanding of furniture materials.

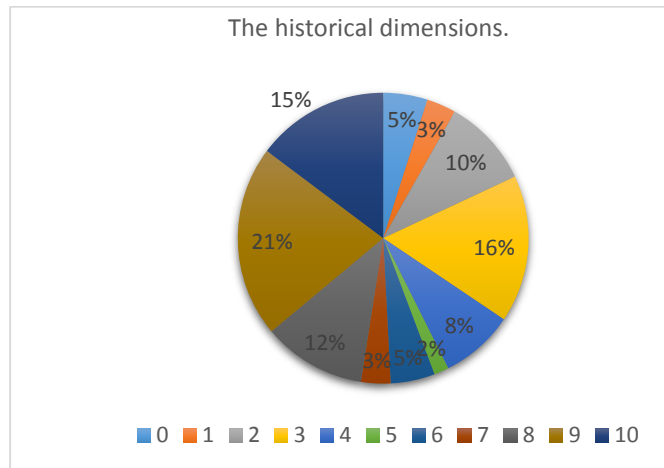


Figure n. (6) the relation between the presence of a permanent exhibition on teaching historical furniture in better knowledge of the historical dimensions.

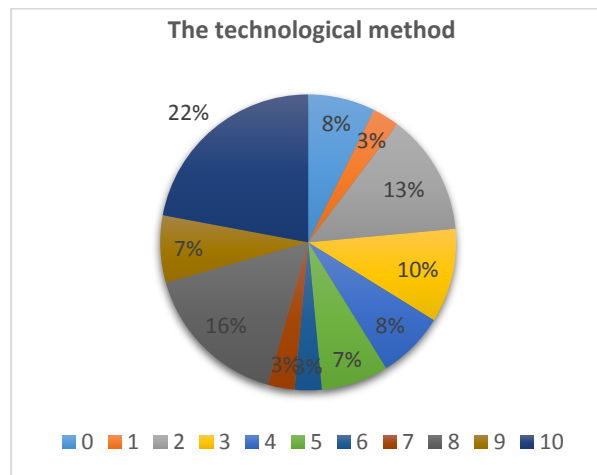


Figure n. (7) the relation between the presence of a permanent exhibition on teaching historical furniture in better knowledge of the technological method.

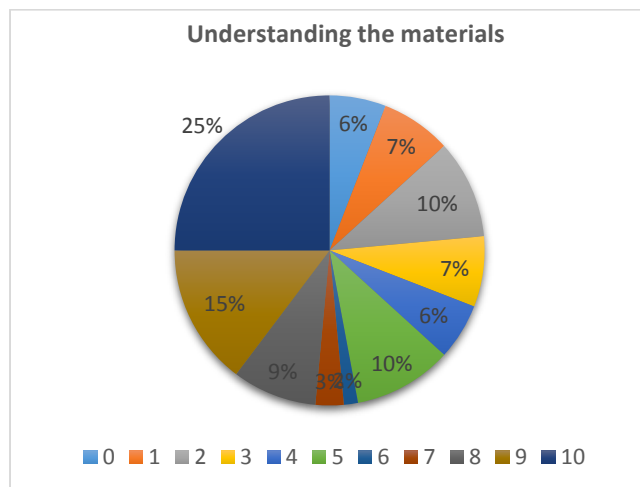


Figure n. (8) shows the relationship between the presence of a permanent exhibition in understanding the historical materials of the furniture.

Fifth, a better understanding of the characteristics of furniture for the historical period it belongs to. The results showed that 22% of students support the idea of the presence of a permanent exhibition on teaching historical furniture in understanding the characteristics of furniture for the historical period it belongs to. While only 4% do not support that as shown in figure n. (9). This question estimated the role of historical copies in enhancing understanding of the characteristics of furniture.

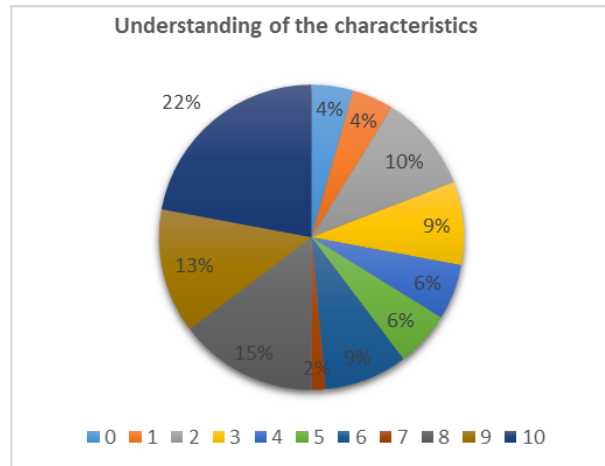


Figure n. (9) shows the relation between the presence of a permanent exhibition on teaching historical furniture in the understanding of its characteristics.

The role of sustainability and reuse in the implementation of the showroom idea.

The sixth question asked students about their opinion on reusing wood in the college and if that contributes to preserving the environment and achieving the principles of sustainability. The results showed that 82% of students support the idea of reusing wood helps in environmental conservation and supports sustainability while 13% said maybe as shown in figure n. (10). This question estimated the sustainable background of students about reuse as a principle of sustainability and environmental preservation.

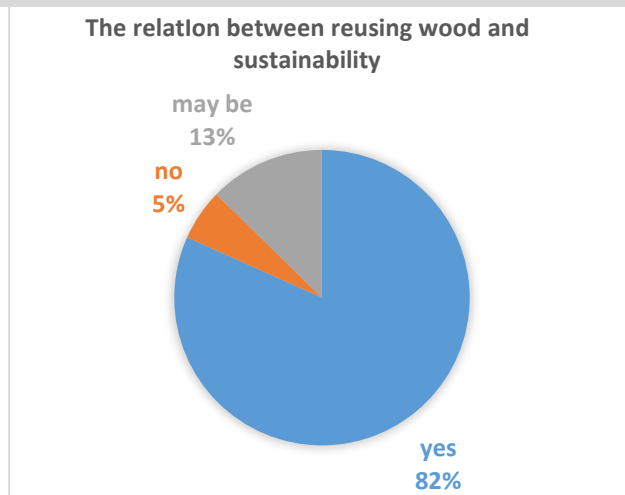


Figure n. (10) shows the relationship between reusing wood and sustainability

5. Discussion

5.1. Building a cloned furniture hall in the department of interior design that shows historical copies of furniture by reusing wood in the faculty.

To investigate the research idea which is building a cloned furniture hall in the department of interior design that shows historical copies of furniture by reusing wood in the faculty to enhance sustainability and environmental preservation **we designed a survey and published it online** to the students **to measure** their real need to the exhibition and the existence of copied historical furniture, then their awareness of sustainability and how it could be applied in the implementation of the showroom. **We found that** 62% of students prefer having clones of historical furniture inside the department as shown in Figure n. (4). In addition to that 42% of students studied one course at least -dealing with historical furniture- as shown in Figure n. (2). Furthermore, 38% of students went on museum visits for one time at least to study historical furniture as shown in figure n. (3). Furthermore, 82% of students support reusing wood in the

college in the implementation of the hall to preserve the environment and achieve the principles of sustainability as shown in figure n. (10). **These previous three results confirm the importance of the research idea which is building the cloned furniture hall in the Interior Design Department that contributes to enhancing the educational process.** As well as reusing wood for building the hall supports sustainability. The idea of the exhibition has already been implemented in the Danish Royal Academy of Fine Arts, Denmark, a comparative study of the idea of research[11]

5.2.The impact of a cloned furniture hall in the department of interior design that shows historical copies of furniture by reusing wood in the faculty on the educational process.

To investigate the expected effect of the exhibition on the educational process **we designed a survey and published it online** to the students **to measure** the impact of the presence of copied pieces of historical furniture in a permanent exhibition in the department on teaching them the historical furniture features through many aspects, **first, understanding the aesthetic values of the era it belongs to**, 25% of students evaluated that it will be helpful in understanding the **aesthetic values of the era it belongs to** in a scale from 0 to10. **Secondly, understanding the historical dimensions of furniture of this era**, 15% of students evaluated that it would clarify **the historical dimensions of furniture of this era** on a scale from 0 to10. **Thirdly, exceeding knowledge of technological methods used in assembling furniture in this era**, 22% of students evaluated that it would exceed the knowledge of the technological methods used in assembling furniture in this era. **Fourthly, to enhance their understanding of the materials used in the implementation of the furniture**, 25% of students evaluated that it would enhance their understanding of the materials used in the implementation of the furniture. **Finally, to reinforce understanding of the characteristics of furniture for the historical period**, 22% of students evaluated that it would reinforce their understanding of the characteristics of furniture for the historical period. Figure n. (11) shows the effect expected of the exhibition on the educational process through the previously mentioned four aspects from the students' point of view.

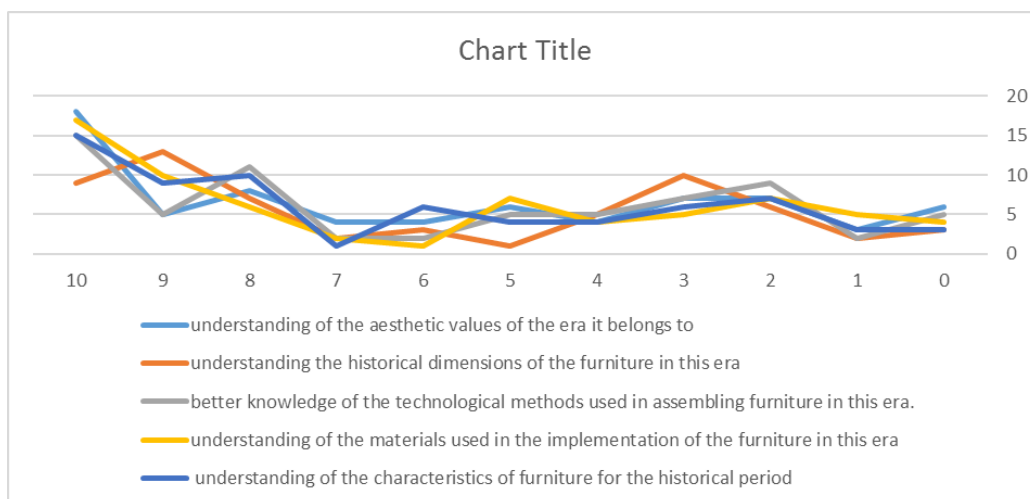


Figure n. (11) shows the impact of a cloned furniture hall in the department of interior design that shows historical copies of furniture on the educational process through different aspects.

6. Conclusion

It can be concluded that building a cloned furniture hall in the department of interior design that shows historical copies of furniture by reusing wood in the faculty would be helpful in many aspects. First, enhancing understanding of the historical part of furniture through different aspects. Secondly, making good use of the used wood in the faculty enhance sustainability and environmental preservation.

We faced some limitations during the applicant part of the paper such as the lack of cooperation sometimes of some workers and carpenters during the implementation processes, but this problem was overcome by cooperation between the work team, the students, and the faculty administration.

Acknowledgment

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