Furniture Design Method for Novice Learner

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Abstract

Through observations and trials of furniture design teaching practices from 2009 to 2022, some teaching patterns were found which allow students to learn easier to design furniture with mass-produced direction. Furniture data from various sources (especially furniture factories and export buyers) with variations in types (dining chairs, dining tables, servers, benches, stools, night stands, beds, and many others, in individual item or collections) are collected as experimental materials from year to year. Three teaching patterns concluded which allow students' easy learning are: 1) parts modification; 2) sizes modification; 3) product line extension

Keywords: Parts, Sizes, Product Line, Modification, Extension

1. Introduction

There is a wide variety of furniture manufacturing materials, such as wood-based panels, fabrics, leather, hardware, components, etc., each have too many specifications or colors of the same type. This leads to heavy design tasks and increased drawing errors. Due to the large number of parts and the large differences in process production caused by the design, furniture enterprises began to introduce the concept of generalization and standardization in the design stage [1].

Why students need a reference? From a correct reference, students learn to understand furniture sizes (ergonomics), material types and sizes, constructions, profile, furniture parts, jargons, proportion, manufacturability [2]. As there are plenty of furniture types, categories, sizes, the more references student see and practise, the richer furniture knowledge they can get. These references serve as a solid ground for them to later on design a new or better one.

2. Method

This research uses qualitative research model, where students are given tasks to design: 1) Without references, and 2) With references.

Table 1. Research Method

Design without References	Design with References
Students are free to propose any furniture design	Students are equipped with technical drawing, 3D and rendering skills
	Students are given many furniture references to choose.
	Data valid and complete from partner furniture factories
	Students are briefed to design within constraints in 4 steps
	Step 1: Make 3D model & render based on chosen reference (99.9% alike). Each folder contains a 2D CAD and a render file in .jpg.
	Step 2: Modify parts based on original 2D CAD. Students can propose as many designs as they want, around 3-5 designs.
	Step 3: Modify sizes based on original 2D CAD. Students can propose as

	many designs as they want, around 3-5 designs.
	Step 4: Extend product lines (make a collection) based on original 2D CAD. Students learn to identify design elements and design a collection based on chosen design elements.

Figure 1. Sample of Furniture References to Choose (for 21 Students)

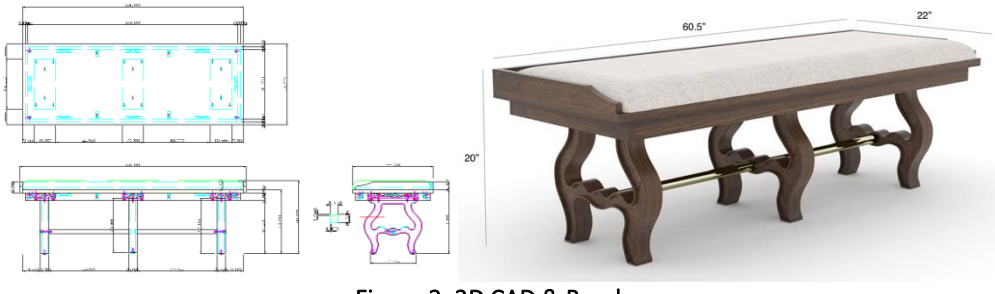

Figure 2. 2D CAD & Render

3. Findings

3.1 Parts Modification

Figure 3. Parts Modification (Backrest)

Figure 4. Parts Modification (Bench Legs)

Figure 5. Parts Modification (Cushion Seat)

3.2 Sizes Modification

Figure 6. Sizes Modification (From 1 to 2-seater)

Figure 7. Sizes Modification (From Counter Height to Bar Height)

3.3 Product Line Extension

Figure 8. Product Line Extension (From Dining Bench to Dining Table)

Figure 9. Product Line Extension (From Dining Chair to Dining Table)

4. Discussion

For step 1, each part of the 2D CAD need to be made exact and according to the original design. This exercise allows students to understand clearly all the material constructions (both exposed and hidden), material sizes, furniture sizes, clearance, hardware, ergonomics, and profile. Still in step 1, 3D render need to made 99.9% alike to allow students to understand the type of material type, glossiness level, bump, and other exact finish quality need to be presented to clients.

Regarding furniture references to choose, tables and cabinets are generally easier to redesign. Chairs and other furniture with upholstery are generally more difficult to handle, as they require longer time to make the 3D. Classic items are definitely more difficult to handle due to its intricate details. Modern items are definitely easier to redesign for its sleek and simple forms. Mastering chair design is more essential as a collection is often made starting from a chair. Research in historical designs need to be made for correct redesign proposal. Market study is needed especially for items not commonly used in Indonesia context (bar cart, counter chair, wine cabinet, and a few others).

Step 1 to step 4 is a process gradually increase in difficulty. Students are always encouraged to do step by step, and not skipping to the next step before the current step is finished. Understanding design elements is crucial for collection design (step 4 – extend product lines). Design elements can be applied monotonously for a small collection (a collection of 2 to 5 items). More design elements need to be applied for a wide range of items in a collection (a collection of 7 to 15 items across rooms, dining room, living room, bedroom, etc) to prevent monotonous results. Retailer research is also essential to check how retailers sell their collections.

Table 2. Research Findings

Design Without References	Design With References
Shocking designs	Reasonable designs
Many questions	Fewer questions
Many revisions	Fewer revisions
False from beginning to the end	Error may occur in each step, but students are easier to guide for revision
Groundless basics resulting in continuous errors	Solid ground for further design development (step 1 to 4)

5. Conclusions and Suggestions

Recommended furniture design steps for novice learners are: 1) Make 3D model & render based on CAD (99.9% alike); 2) Modify parts based on original CAD; 3) Modify sizes based on

original CAD; 4) Extend product lines (make a collection) based on original CAD. Each step should be followed accordingly, and not to skip any process.

6. Acknowledgement

This work is supported by UPH Center of Research and Community Service (P-116-S/SoD/III/2020). I would like to also thank William Chou for his expert advice and guidance through my years of teaching, and link me to all respective buyers and factories for accurate data provider.

References

[1] S. Wang, "Application of Product Life Cycle Management Method in Furniture Modular Design," *Math. Probl. Eng.*, vol. 2022, p. e7192152, Mar. 2022, doi: 10.1155/2022/7192152.

[2] S. Hartanto, "Understanding A-Z of Export-Oriented Furniture Design Process for US Clients and Vietnam Suppliers." Rochester, NY, Nov. 05, 2020. doi: 10.2139/ssrn.3807696.

Factory Data:

Chuang Yuan, Vietnam
Corporate Specialists, Sdn, Bhd., Malaysia
Great Veca (越佳)King Jade (鼎爵), Vietnam
Hang Xuyen (恒川), Vietnam
Hua Yu (華宇), Vietnam
Hup Chong Furniture, Vietnam
Hoa Thanh (合成) , Vietnam
Ming Yi (名益) , Vietnam
Ming You (名优) , Vietnam
Morishige (森茂) , Vietnam
New Elegant Co., Ltd. , Vietnam
Ngu Lam Viet (五林越) , Vietnam
Tan Nhat (新日) , Vietnam
Thanh Phu Phat, Vietnam
Sam Vuong (森旺) , Vietnam
Shun Tai (瞬态) , Vietnam
Sunflower (向阳花) , Vietnam
Tonics Furniture, Malaysia
Yu Cheng (玉成) , Vietnam