International Journal of Education and Social Development
ISSN: 3078-9931 (Print), ISSN: 3078-2287 (Online) | Vol. 2, No. 2, 2025

Research on the Design and Production Technology of Mongolian Silver Bowl

-- Take the Professional Courses of Inner Mongolia Normal University as An Example

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Abstract: The Mongolian peoples living and dining utensils have unique regional characteristics, with a history spanning over a thousand years. The dietary utensils of nomadic peoples are even more diverse in shape and pattern, rich with symbolic meanings that reflect their aspirations for a better life and emotional thoughts. Each ethnic group uses its familiar language to write and sing about its own history and culture, creating oral literature, songs, dances, ornaments, vessels, and patterns, all of which embody the wisdom of their respective ethnic groups. These elements are an integral part of the treasure house of Chinese traditional culture. This article mainly discusses the analysis of silver bowls, market research, techniques, structure, materials, and patterns in the foundational courses of arts and crafts, sharing insights based on issues encountered during the course.

Keywords: Mongolian, silver bowl, production technology (Үилд эх технологи), pattern (Хээ угалз).

1. Introduction

The Mongolian people have a wide distribution range. Nature, grasslands, deserts, forests, and lakes provide the vast expanse for nomadic tribes to thrive and multiply. Our relationship with nature is intricate and inseparable. Its not just as romantic as described in the Chale Song, where "the sky is vast and the wilderness boundless, the wind blows low over the grass to reveal cattle and sheep." For example, in Dedemas song "Beautiful Grassland, My Home," such beautiful scenery only lasts for five months of the year; most of the remaining seven months are spent living in harsh conditions—bone-chilling winds, heavy snowfall, white hair wind, disease prevention, precautions against natural disasters, herding under scorching suns, finding suitable pastures based on the annual climate, and setting up camps according to geographical conditions to avoid windblown areas. They follow the changes of nature, seeking grazing grounds, choosing winter and summer camps based on what suits the survival of their livestock. In essence, it follows the natural law of "harmony between heaven and humanity, coexistence of humans and nature," which simply means that one must be grateful for the bounty bestowed by nature. Through their industrious hands, the nomadic people live self-sufficiently on the vast land, adhering to an ecological principle where humans and nature are interdependent and mutually beneficial.

Therefore, it is not hard to understand the presence of such a large number of gold and silver ornaments created based on animal and plant images among the unearthed artifacts. From the results of studying and imitating various physical works of art from northern nomadic peoples, these metal accessories, including vessels, headdresses, earrings, bracelets, hairpins, waistbands, and horse gear, are modeled after the shapes of animals and plants found in nature. This conscious practice reflects peoples reverence and gratitude towards all things in nature. Through diligent hands and strong willpower, they have fought against the environment and followed natural laws, creating a vast array of artistic works on this boundless land. Behind these artworks lies an enduring and powerful spiritual force. Learning traditional culture is not about external forms, patterns, or symbols; tradition is the essence distilled from the spirit. On May 23,2007, the "First Special Session of the Intergovernmental Committee for the Safeguarding of the Intangible Cultural Heritage" was held in Chengdu, where the committee approved the inclusion of 90 "Masterpieces of the Oral and Intangible Heritage of Humanity" projects into the Representative List of the Intangible Cultural Heritage of Humanity. The UNESCO Intangible Cultural Heritage List (Register) is divided into three categories: one is the List of Intangible Cultural Heritage in Need of Urgent Safeguarding, and two is the Representative List of the Intangible Cultural Heritage of HumanityThe third category is the Register of Outstanding Practices, which includes plans, projects, and activities that best embody the principles and objectives of the Convention. By the end of 2018, China had a total of 40 projects listed in these three categories, making it the country with the most selected projects. The definition of intangible cultural heritage (Тодорхоилолт) in Chinas Intangible Cultural Heritage Law: UNESCO is a global organization, and its concept of intangible cultural heritage is heavily influenced by English thinking. Therefore, from our perspective, both the name and the essence of intangible cultural heritage do not conform to Chinese linguistic habits. As a result, after China joined the Convention, the newly enacted law redefined the concepts within the Convention. The Intangible Cultural Heritage Law of the Peoples Republic of China was passed on February 25,2011, and came into effect on June 1, 2011. Article 2 of the Intangible Cultural Heritage Law defines intangible cultural heritage in China as "various forms of traditional cultural expressions passed down through generations by all ethnic groups and regarded as part of their cultural heritage, as well as related objects and places." Among the "traditional crafts" in intangible cultural heritage, gold and silverware craftsmanship ranks high among the

national-level intangible cultural heritage protection projectsMao. From this, it can be seen that each region has its own local gold and silver artifacts, with the same being true for Xinjiang, Tibet, Gansu, Yunnan, and other places. In Europe, "the earliest gold artifacts date back to the Predynastic period in Egypt, where they were found in the Baidari culture. Later, gold vessels were unearthed from the tombs of King Ur in Western Asia and the ruins of Troy. Silver artifacts first appeared in the Uruk culture of Western Asia during the 4th millennium BC and in the Gerse culture of Egypt." "Materials distinguish themselves from others through their unique qualities, showcasing their individuality; craftsmanship is, in a sense, an art that expresses the personality of materials. It allows people to fully experience the natural beauty inherent in the material itself, the tactile quality, which sometimes becomes habitual, manifesting as sensitivity that combines with daily experience and association, thus becoming part of the aesthetic." In Volume 23 of "The History of the Khitan Empire," under the section on clothing regulations, it is recorded: "Foreign officials wore felt hats adorned with gold and silver decorations, tied with sashes made of yellowish-red silk wrapped around leather, decorated with gold, jade, crystal, and green stone."[1-5]

Graph 1. The traditional Mongolian silver bowl is provided by Aqitu

2. The Material Used to Make A Silver Bowl

Silver and gold artifacts are very common in the life of nomadic peoples. The dining utensils inside the yurt include silver bowls (Fig. 1), plates, tableware, Mongolian knives, and milk buckets. These are made from materials such as gold, silver, copper, iron, wood, and animal hair ropes. The craftsmanship of silver bowls involves techniques like filigree inlay, engraving, plain surface inlay, enamel, machine die stamping, and wax casting. Among these, engraved silver bowls are the most numerous, so in our silver bowl making course, we start with copying a silver bowl as an entry point. Each student first finds a silver bowl they like and copies its decorative patterns for learning. During the copying process, issues such as inaccurate proportions, structure, interweaving relationships, and layering become prominent. 1. Decorative patterns are mostly continuous motifs, with symmetry being the basic requirement. 2. The thickness of lines should be consistent; lines must not end abruptly, and they should have both a beginning and an end, with clear starting points and endpoints, characteristic of auspicious knots and scrolling patterns. 3. When students draw design sketches, they should start with 1/4 of the design, using sulfur paper to copy and replicate it, then supplement the remaining 3/4. 4. The challenge in design lies in pattern drawing, including the combination and reconfiguration of various styles, ensuring that the style aligns with the theme to form a complete pattern. 5. The design drawings determine the complexity or simplicity of the craft; if hand-drawn sketches are not done well, it will be difficult to proceedTalk about making. 6. Chiseling or filigree are made according to the design drawing 1:1. The production focuses on the symmetrical and smooth relationship of the pattern layer, clear structure, and solid and clean welding points. 7. Welding and pattern modeling are difficult for students in the production.

The wooden body of the silver bowl is made from branches and roots of birch trees, with the best material being the denser parts of the trunk. In northern regions, elm wood is also abundant, as these two types of trees have moderate density, resulting in wooden bowls that are compact, elastic, and resistant to cracking, making them sturdy and durable. There are not many large old tree roots available for making wooden bowls, so branch wood bowls are excellent. The industrious nomadic people skillfully adapted materials to create various local household items, each with its own unique design, structure, and material selection. This is the wisdom of the nomadic people derived from nature and life. A silver bowl is a must-have in the lives of nomadic people, with bowls being no more than 7 cm high and ranging from 9cm to 15cm in diameter at the rim, suitable for children up to adults. Bigger bowls or plates can be found with diameters ranging from 16cm to 50 cm, used for serving milk, fruits, beef, mutton, and other foods. These household items are treasured by the nomadic people, who use them for eating, drinking, and tea, considering them essential necessities. Compared to ceramic tableware, these wooden and precious metal utensils are more suitable for the nomadic people, as they do not break easily, which is their greatest advantage. The strength and durability of wood are its main advantages, but these woods are sensitive to water and fire; they should not be washed or soaked in water for long periods, and

wooden bowls cannot be cleaned with modern kitchen detergentsTo clean, the wooden bowl would absorb dish soap, rendering it unusable afterward. To protect the wooden bowl and ensure durability, the inside was inlaid with silver. For aesthetic harmony between top and bottom, the silver bowls base was also covered with silver, adorned with various patterns and gems. The craftsmanship is exquisite, making it one of the most typical representatives of nomadic peoples dining utensils.

Graph 2. The picture shows the process of making the bowl rim

Graph 3. Interior decoration design of silver bowl

3. The Craftsmanship of The Silver Bowl

Marx: "Labor has been replaced by machines, which have returned some workers to barbarous labor and turned others into machines. Labor has produced wisdom, but it has also made workers dull and foolish." This can be clearly seen in the records of the "New Book of Tang: Officials Records," which states, "The art of fine engraving takes four years to teach; the art of chariot and musical instrument making takes three years; the art of flat and curved blades (spear) making takes two years;... etc." Among these, "fine engraving" often refers to intricate goldsmithing techniques such as engraving, carving, and filigree inlay. Through the production of silver bowls, it is not difficult to see the difficulties and key points in the craftsmanship. Below, I will explain the process of making the silver bowl in two parts. The internal production process of the silver bowl (Fig. -2):1. Conceptual design and drawing of renderings (Fig. -3) 2. Melted pure silver poured into a round mold 3. The silver block is forged or pressed by a rolling machine to form a 1mm thick silver plate 4. The cut silver plate has a diameter about 3cm larger than the bowl opening. When inlaying the silver plate inside the bowl, start at the outer edge of the bowl opening, first use a rubber hammer to bend down at a 90-degree angle along the outer edge of the bowl opening until the silver plate grips the bowl opening. Then use the rubber hammer to strike the silver plate inward, extending it from the periphery to the center. Finally, use specialized tools for making silver bowls to process around the inner wall of the silver bowl using pushing, rolling, and kneading techniques. 5. According to the shape of the inner wall of the bowl openingPush the silver plate from the top to both sides downward and press it tightly. Pay attention to the extension of the silver plate; during the processes of pushing, rolling, and kneading, try to extend the silver plate in circular motions on both sides, ensuring that the inner wall structure of the silver bowl fits seamlessly with the silver plate. During this process, remove the silver plate for annealing, and repeat the extension, pushing, and rolling processes about 10 times. Ensure that the thickness of the silver plate at the bottom of the bowl is thicker than that on the inner wall of the silver bowl. To ensure durability in future use, after installing and securing it, clean any dirt from the silver plate, then forge and extend the 90-degree reversed side according to the shape of the outer edge of the silver bowls rim, extending the silver plate back by about 2 cm, leaving a rim of about 1.5 cm, and trim off any excess silver plate material. [6] [7]

Graph 4. A breakdown of the engraving process at the bottom of the silver bowl

Graph 5. Bottom of silver bowl with wire and weaving process breakdown

The process for making the bottom of a silver bowl (Figures 4, 5):1. Conceptual design and rendering according to the production techniques, which include engraving, filigree, and weaving (Figure 4).2. Fix the silver plate on a

rubber board (Л ав). 3. Attach the designed pattern to the silver plate using a flat chisel tool to engrave the pattern onto the silver plate. 4. The thickness of the silver plate with the temporarily engraved pattern is 1.5mm. 5. Use a drum chisel to press down and lift the pattern layer by layer, then remove it from the rubber board (quenching), add glue (Л ав) to the recessed areas, and flip it back onto the rubber board. 6. Adjust the pattern layers, shape, and structure from the front, then assemble and weld the cut parts, clean them, and finally fix them to the bottom of the silver bowl.

The prices of precious metal materials change daily according to international financial trends. This situation determines the total price of silver bowls, but has little impact on artisans; it only indicates that production costs have increased. The price of handmade items does not fluctuate with the cost of materials; instead, it is determined by the difficulty of the craftsmanship. Over time, the price of handmade items has remained stable, rising only due to increased labor costs. Traditional handicrafts face challenges in inheritance, yet society cannot sever its demand for traditional crafts. Based on multiple market surveys conducted by teachers and students (Tables 1, 2), the prices provided are for reference only, following the minimum standard for production costs.

Table 1.

Handmade silver bowl price list of gold and silver jewelry market in Ulan Bator, Mongolia 1				
age	1 two silver pieces / 37.5 grams	The handmade (plain silver bowl) weighs 300 grams	Handmade (eight treasure pattern silver bowl) weight 300 grams	The handmade (silver flower bowl) weighs 300 grams
In 2020	1 two silver pieces / 110,000	1,300,000 Montagues	1,900,000 Montus	2,400,000 Montus
In 2022	1 two silver pieces / 126,000	1.5 million Montagues	2,500,000 Montus	$3 million in Montego
In 2024	1 two silver pieces / 139,000	1,700,000 Montus	2,900,000 Montus	3,600,000 Montus

Table 2.

Silver bowl price list of Mongolian in Inner Mongolia 4							
age	can / ¥	Machine-made (plain silver bowl) weighs 300 grams	Machine-made (eight treasure pattern silver bowl) weight 300 grams	Machine-made (filigree cast silver bowl) weight 300 grams	The handmade (plain silver bowl) weighs 300 grams	Handmade (eight treasure pattern silver bowl) weight 300 grams	The handmade (flower silver bowl) weighs 300 grams
2010 year	1/12¥	4200	4200	4500	54 00	7500	9000
2020 year	1/4¥	1800	1800	2100	4500	6000	7500
2022 year	1/6¥	2400	2400	2700	4500	6000	7500
2024 year	1/8¥	3000	3000	3300	4500	6000	7500

The decorative patterns on silver bowls: The designs on dining utensils include religious motifs such as the Eight Treasures, floral and scrolling patterns (Fig. -6), swastika patterns, the twelve zodiac animals, the five domestic animals, auspicious eight steeds, woven patterns, scrollwork, taotie motifs, winding and vibrant scrolling patterns, cloud patterns symbolizing smooth sailing, and continuous, prosperous meander patterns. There are also plain mirrors, pure silver bowls with a slight floral edge. Personal preferences vary, so there is great freedom in surface decoration design. Design products need to express diversity; one decorative style cannot meet the aesthetic demands of the general public.

graph 6. Mongolian silver bowl picture

Table 3. Statistics of grades and majors in Mongolian traditional silver jewelry technology (design and production of silver bowls ($\bar{x} \pm s$， Оноо）

он	Оноо
2017	80.17 ± 7.47
2018	78.32 ± 8.62
2019	83.71 ± 9.36 *#
2020	79.04 ± 10.43
202 1	83.04 ± 8.60 #

Note: Compared with the class of 2017*P <0.05; compared with 2018 grade#P<0.0 5。

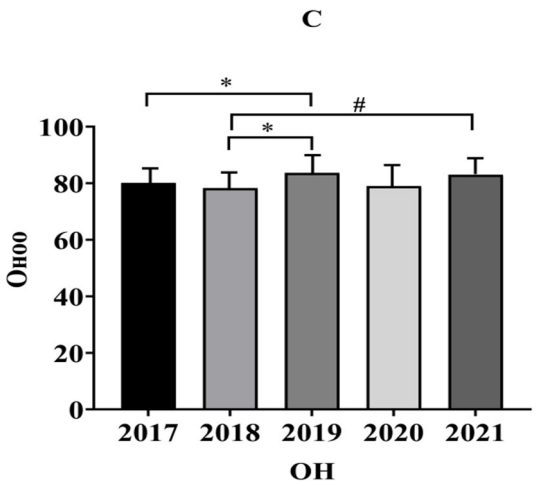

Figure 7. Comparison of grades and majors in traditional Mongolian silver jewelry technology (design and production of silver bowls)

The scores for the Mongolian traditional silver jewelry craft (silver bowl design and production) course across different grades were processed using SPSS 22.0 statistical software. The differences between groups were evaluated using one-way analysis of variance (ANOVA), and the means of two groups were compared using t-tests, with P<0.05 indicating statistically significant differences. The results show that for the Mongolian traditional silver jewelry craft (silver bowl design and production) course, there were differences in average scores among students from grades 2017,2018,2019,2020, and 2021. Among these, the scores of students from grades 2019 and 2021 both reached above 8 3 points, making them the best-performing groups with an average score of 8 3.36 points. In contrast, the scores of students from grades 2017,2018, and 2020 were less satisfactory, failing to reach 79 points.

Table 4. Table 4 Statistics of grade-by-grade professional courses on traditional Mongolian silver ornaments (design and production of silver bowls) (percentage%)

Score (Оноо)	2017 он	2018 он	2019 он	2020 он	2021 он
<60	0.00	3.57	0.00	3.57	0.00
60-69	17.02	10.71	8.33	14.29	7.69
70-79	21.28	32.14	25.00	28.57	23.08
80-89	53.19	42.86	41.67	39.2 8	50.00
≥90	8.51	10.7 2	25.00	14.29	19.23

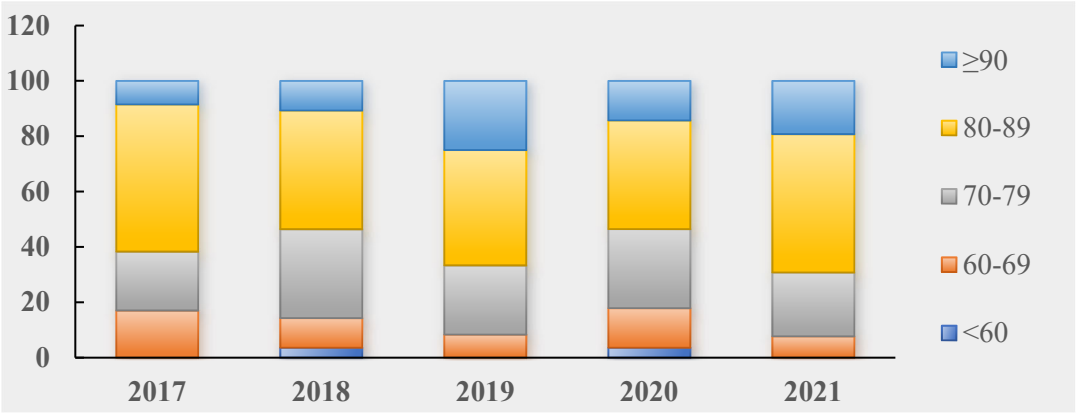

Figure 8. Table of grade-by-grade professional course scores for Mongolian traditional silver jewelry craft (silver bowl design and production) (percentage%)

After segmenting the scores, we found that for the specialized course on Mongolian traditional silver jewelry craftsmanship (silver bowl design and production), 25% of the students from the 20 19 cohort scored above 90 points compared to other cohorts, indicating that the performance of the 20 19 cohort was particularly outstanding. The percentage of students scoring between 80-8 9 points was highest among those from the 20 20 and 202 1 cohorts, averaging 45%. For the 2017 and 2018 cohorts, their scores were less favorable compared to those from the 20 19,20 20, and 202 1 cohorts, with 47% of students scores mainly concentrated in the 80-8 9 range.

Course Focus: The ability to conceptualize and draw design sketches, the overall effect of the image, the application of ethnic cultural symbols and other related elements, as well as unique innovative design capabilities. Production Challenges (1) From the demonstration of the production process, it is clear that as the size increases, both the design difficulty and the technical difficulty rise simultaneously. The silver bowl is made in two parts; for a wooden bowl with a diameter of 13 cm, the inner wall of the silver bowl requires 120 grams of silver material, while the bottom of the silver bowl uses over 150 grams of silver material. This does not include the weight of gemstones used for inlaying. As the size increases, more space is needed for design, providing students with greater room to express their creativity when drawing design sketches. This leads to another issue: on a plane with a diameter of 13 cm, when designing the rendering, the proportion of space allocated for inlaid gems and decorative areas must be considered. (2) In terms of decorative techniques, filigree and engraving can be chosen. When conceptualizing the design drawings, students need to understand the decorative effects of these two techniques. (Figure-4) illustrates the process of making the bottom of the silver bowl using engraving techniques, while the process of making it using filigree techniques has been explained in the previous discussion on technical difficulty. Therefore, the requirements for craftsmanship and the structural requirements of the design drawings are higher. The use of forging tools such as hammers, chisels, and anvil plates still requires a higher level of proficiency. Inlaying,Welding and surface treatment remain the same. (3) The number of point, line, and surface welds has increased (Fig. -5). The number of filigree wires used for silver bowl surface decoration has also increased, naturally making it more challenging. The requirements for work have become more specific and complex, as practical operation still requires teachers to demonstrate and teach students.

In todays rapidly developing era of technology, industry, and manufacturing, in terms of production processes: one-piece molding, assembly line operations, etc., materials are primarily non-natural synthetic resins that mimic wood bowls. Although this has reduced costs, the sales strategy of thin profit margins and high volume is still being pursued to boost profits. Factors such as process, shape, style, price, material, and cost control all influence the value of the finished product. This value encompasses use value, craft value, aesthetic value, collectible value, and heritage value. Therefore, non-handcrafted silver bowls, after a period of use, often return to the hands of skilled craftsmen who reshape and recast them, a situation that is very common according to research interviews. Beautiful, unique objects that transcend the inherent value of materials, use, and aesthetics are widely loved by the public because they provide rich emotional value to their users. From a heritage perspective, these precious metal objects carry ethnic culture and the hopes of elders for future generations, expressed through gifts, mementos, and ornaments. These objects embody multiple factors, with their value far exceeding that of the objects themselves (Унэт жуил).

To protect the meticulously crafted silver bowls, corresponding bowl boxes were made. During nomadic migrations, these bowl boxes served to safeguard the silver bowls and prevent them from being lost. For the convenience of living outdoors while hunting, each man should have one hanging at his waist (Бүс, Агшараг). These valuable items were essential for a nomadic hunting life, so artisans were specially commissioned to create custom-made bowl boxes using materials such as silver, copper, and steel. The surface of these boxes is adorned with techniques like engraving, inlaying gold and silver, and openwork carving. Their design not only enhances aesthetic appeal but also serves practical functions.

4. Conclusion

The nomadic people have created a rich traditional cultural heritage, tilling their lives with industrious hands. The use of gold and silver artifacts by nomadic peoples can be traced back over a thousand years, during which they have created a wealth of traditional cultural heritage, tilling their lives with industrious hands. Silver bowls are one of the most typical examples of precious metal handicrafts among daily utensils. According to archaeological findings, northern nomadic peoples such as the Xiongnu, Xianbei, and Khitan had already begun using gold, silver, and copper to make various metal objects, including wine vessels, bowls, plates, and cups. These objects feature intricate engraving patterns on both the inside and outside, depicting vivid images of animals, figures, and plants. The shapes and styles of these food-serving vessels are exquisite, with the appearance of silver bowls being particularly innovative. Combining two materials—wood and precious metals—the technique of inlaying wooden bowls with metal not only saves material but also creates a striking contrast in aesthetics. This style is widely used in Mongolian folk culture. In use, it adapts to local conditions, with users preferences influencing the style, craftsmanship, decorative patterns, and shape of the wooden bowls, resulting in distinctive designs. These have become the most representative living items in Mongolian handicrafts, embodying the labor of each ethnic groupInspired by the wisdom of the people, the silver bowl is designed with an elegant and dignified appearance, made from solid and substantial materials, featuring intricate craftsmanship and rich patterns, with simple yet profound meanings. Considering the perspective of living environment, geographical location, and dietary habits, drinking milk tea, eating noodles, beef and mutton, and soup, metal has strong thermal conductivity. When hot milk tea is consumed in a wooden bowl embedded with gold and silver, it helps dissipate heat, creating a barrier effect on the wooden body, preventing deformation of the wrapped wooden bowl. Holding a hot food in a silver bowl, due to the wooden core, does not feel hot to the touch. The most important issues that need to be addressed through design are simple functional and aesthetic needs. While using objects is a basic human need, ensuring their convenience requires design solutions that conform to ergonomics.

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