

Practical Tool Making and Use with Paper Box Weaving Loom

Rieko NISHIGUCHI

空き箱で作られた実践的な織り機の作成と授業への活用

西口 理恵子

概要

本学では、高等学校の家庭科および中学校の技術・家庭科の教員免許取得のための一つの科目として「家庭電気・機械」が開講されている。この授業では、菓子等の紙製の空き箱を利用した手軽な織り機の作成実習を取り入れている。さらに、学生達はその織り機を利用して糸を織るという実践的学習を行う。この織り機の授業では、機械の仕組みを理解させると同時にものづくりへの関心を高め、生活の中に取り入れて豊かな生活に繋がることを目的の一つとしている。本稿では、この授業内容とその成果について報告する。

Key words: 家庭電気・機械 Electrical & Mechanical Engineering, 家庭科教員免許 Certificate for Teaching Home Economics, 織り機 Weaving Loom, 空き箱 Paper Box, 実践的学習 Practical Learning

1. Introduction

The 15-lecture electrical & mechanical engineering (EME) series is provided for second-year students at Hiroshima Jogakuin University who are seeking certificates for teaching home economics in senior high schools and technology & home economics in junior high schools. According to the guidelines for those study courses¹⁾²⁾, as revised by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in 2008, home economics should emphasize the importance of practical and experimental learning activities (e.g. making things) and the basic knowledge and skills independent individuals need to live well. In one of those EME classes, students are normally tasked with disassembling a sewing machine to observe its structure as an example of tools for making things.

However, since it is difficult to disassemble a sewing machine completely and observe it thoroughly in the limited class time available, Kiyota³⁾ discussed the availability and applicability of weaving looms as a suitable educational tool/method for such home economics, and also reported on attractiveness of the handcrafts produced using them by junior college students. In addition, Hori and Tomioka⁴⁾⁵⁾⁶⁾ reported on the usefulness of weaving looms as tools for art education and self-expression using textiles, while Akamatsu et al.⁷⁾ and Akamatsu et al.⁸⁾ showed that weaving looms can provide effective occupational therapy that has positive effects on the comfortable life conditions of their users.

In keeping with the MEXT directive mentioned above, we have been giving lessons using simple student-made weaving looms since 2013. This paper provides an overview of our relevant lesson and reports on the educational effect provided by weaving looms.

2. Weaving Looms

The author attended a workshop⁹⁾ held by joint National Museum of Ethnology - Japan Association for International Education in Osaka on August 7, 2012 during which a wooden weaving loom (Figure 1(a)) was constructed. Such looms can be used to weave plain fabrics, which provide the basic structure of cloth. The process of fabricating a weaving loom and producing fabric are as follows:

1. Hammer nails on the top and bottom sides of a wooden board.
2. Place warp alternately on the top and bottom side nails.
3. Place a thread over the heddle and put it under the first warp.
4. Repeat Step 3 for each odd-numbered warp.
5. Place the plate on the warp of the even number sequence.
6. Spool thread onto a shuttle.
7. Lift the warp of the odd number sequence with the heddle (Figure 1(b)) and then slide the shuttle through the space between the odd and even number sequence warps using a side-to-side motion.
8. Next, lift up the even number sequence warp using the plate (Figure 1(c)) and then slide the shuttle through the space between the warps using a side-to-side motion.
9. Tighten the woven weft using a heddle or a plate.
10. Repeat 7-9.

Given that it took about two hours to make the wooden weaving loom and weave a piece of fabric, we substituted a weaving loom made of a cardboard and pushpins (Figure 2) for use in our lessons. Using a cardboard model, most students could finish their work within a 90-min lesson. However, since pushpins pierce through the cardboard too easily and tend to come loose when weaving, we improved our weaving loom design by using an empty stiff paper box (Figure 3). The pushpins are held in place with transparent tape.

3. Teaching Procedure

In the 2013 lesson, each student was directed to produce a weaving loom. However, since it appeared that some students were unskillful at such handwork, looms are now assembled by groups of three to five students. An overview of a weaving loom lesson is provided below:

1. Explain the structure of a plain weave.
2. Show students a sample weaving loom (Figure 3).
3. Explain how to make a weaving loom.
4. Explain how to weave.
5. Instruct the students to begin work.

Subsequently, students were required to write a report on a weaving loom and provide remarks about a lesson.

4. Results and Discussion

In our lessons, which are aimed at teaching the structure of a weaving loom and how it works rather than creating artwork, each student in a group is required to use a different color thread and to weave five to six layers of weft (Figure 4). Because we use a color-coding method, the first objective of which is to identify which group member weaved a particular weft, the quality of their work could also be compared. This encourages them to weave their wefts carefully. Furthermore, since they take photos of each other during the weaving process, they can also observe each other's handiwork and provide advice to each other as necessary. As a result, the class tends to proceed smoothly.

As mentioned in Section 1, this EME lecture series is designed for student teachers; however, typically more than 70% of students take it for credit, rather for obtaining teaching certification (Table 1). Therefore, we have in mind conducting lessons as follows: Students are divided into groups based on whether or not they are student teachers, after which sub-groups of three to five students are formed. The student teachers are then provided advanced guidance about loom weaving and then placed in charge of the subgroups. Placing them in a leadership role then provides them with a valuable teaching opportunity.

The following are lesson remarks:

1. I learned how to make fabric and how the parts (e.g., heddle) of a weaving loom work together.
2. I came to admire the ancient wisdom of separating odd and even warp numbers.
3. It is difficult to put a thread over a heddle.
4. It is difficult to create a space between the odd and even warp numbers even when a heddle is used.
5. Weaving is fun.
6. The result is beautiful.
7. I will try to weave fabric at home using a loom made from a paper box.
8. I intend to use a weaving loom made from a paper-made box in my future high school lessons.

As pointed out by Kiyota³⁾, students in the lesson enjoyed weaving fabric and they did not experience many difficulties in making a loom and in weaving the thread. In this regard, the loom shown in Figure 3 has room for improvement. In the first version (Figure 3), a white long thread is placed on a heddle and is ducked under a weft. However, in our improved version, 40 cm-long threads (red thread in Figure 5) are placed on each slit of a heddle at 1 cm intervals, ducked under the warp (yellow thread in Figure 5), and then looped. In addition, printed guidelines and numbers are placed on each weaving loom and two colors pushpins are used in sequence to clearly explain to the students how weaving should proceed. If the above improvements decrease difficulty, we will consider it likely that student teachers will be able use such weaving looms easily in their future lessons. The author intends to provide lessons using the new version of a weaving loom and to survey the effects on student teachers.

In the present study, students slide the shuttle from side to side repeatedly. Therefore, their works are not as creative as the student artworks shown in Hori et al.^{4) 5) 6)}. Nevertheless, even though artistry was not a lesson goal, certain students felt that the colorfully arrayed fabrics created by their groups were

beautiful. It is also possible for students to weave a fabric using several colors with a theme in mind, such as Japanese autumn, in which we see red, green, and brown leaves and blue sky, even though they are simply sliding the shuttle from side-to-side. Thus, if student teachers find artistic expression in creating fabrics using various colored threads, it can be said that weaving looms stimulate interest to making things, with the result that weaving looms may help those same student teachers provide their future classes an awareness of the joy that comes with making things, as well as a chance to apply the imparted skills to actual creations, such as woven wall hangings.

5. Summary

This study focused on the following four points:

1. We conducted a simple weaving loom lesson to provide student teachers a useful subject for their future home economics class.
2. Students feel that making things is fun.
3. Students learn the weaving system easily.
4. The weaving loom used in this study needs further improvement before it will provide an effective teaching tool in home economics classes.

References

- 1) 文部科学省：中学校学習指導要領 東山書房（2015） pp.98-104.
- 2) 文部科学省：高等学校学習指導要領解説家庭編（三版）開隆堂（2014） pp.2-8.
- 3) Misuzu Kiyota: A Study on Handweaving as Teaching Materials(Part 1) : Handweaving by Using Corrugated Cardboard Instead of A Loom, Reports of research, Matsuyama Shinonome Junior College 26(1995) pp. 185-191.
- 4) Sachiko Hori and Takuhiro Tomioka: Practical Research on “Weave” in an Art Education I, Annual Report of the Faculty of Education, Gifu University. Educational Research 11(2009)pp. 85-105.
- 5) Sachiko Hori and Takuhiro Tomioka: Practical Research on “Weave” in an Art Education II, Annual Report of the Faculty of Education, Gifu University. Educational Research 12(2010)pp. 71-85.
- 6) Sachiko Hori and Takuhiro Tomioka: Practical Research on “Weave” in an Art Education III, Annual Report of the Faculty of Education, Gifu University. Educational Research 13(2011)pp. 17-26.
- 7) Tomoko Akamatsu, Mariko Shima, Akira Uno and Yoshio Fujita: The weaving chenille yarn and Occupational Therapy, Journal of the Faculty of Health Science 2(2008)pp. 11-21.
- 8) Tomoko Akamatsu, Kaori Kajiwarra, Mariko Shima and Akira Uno: Introduction to occupational therapy opportunities for lifelong study using: The practice in Bukkyo University Shijyo extension center, Journal of the Faculty of Health Science 6(2012)pp. 53-63.
- 9) <http://www.minpaku.ac.jp/research/activity/news/rm/120807>

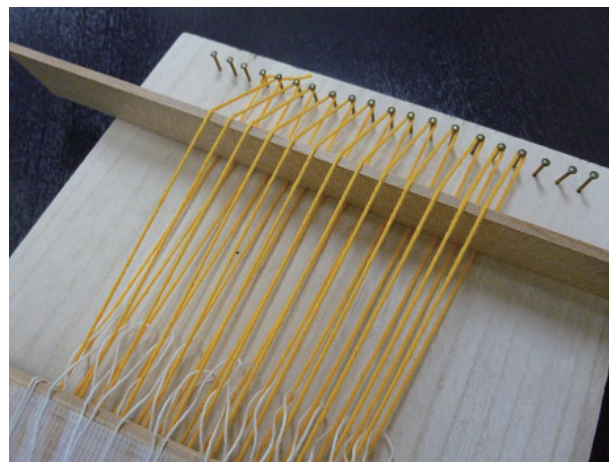
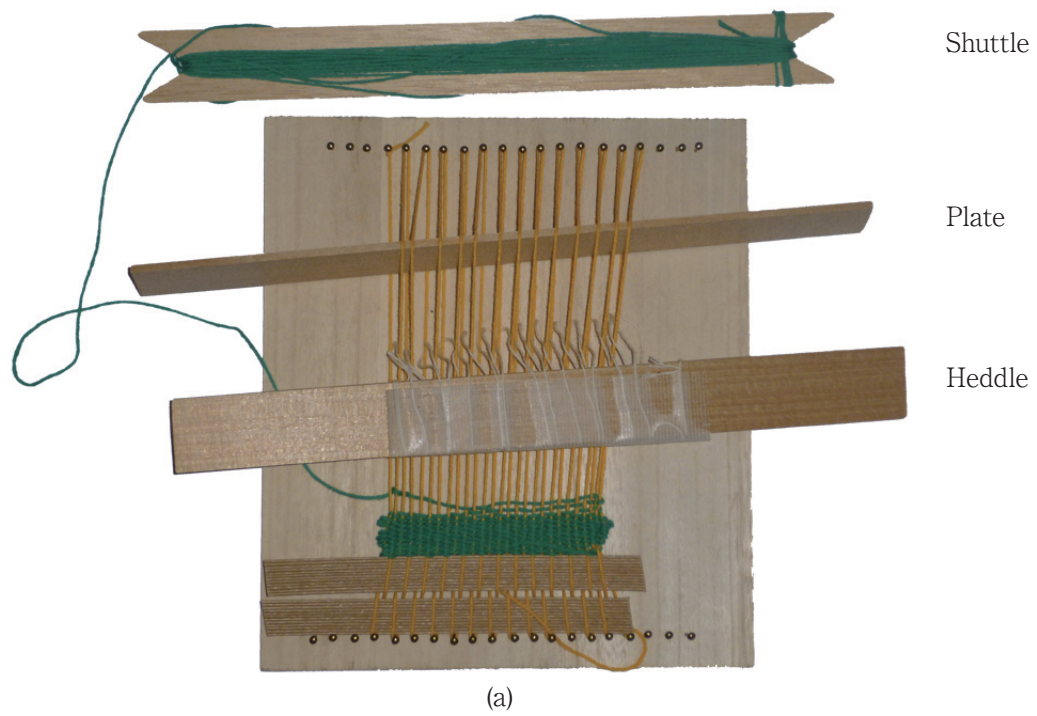
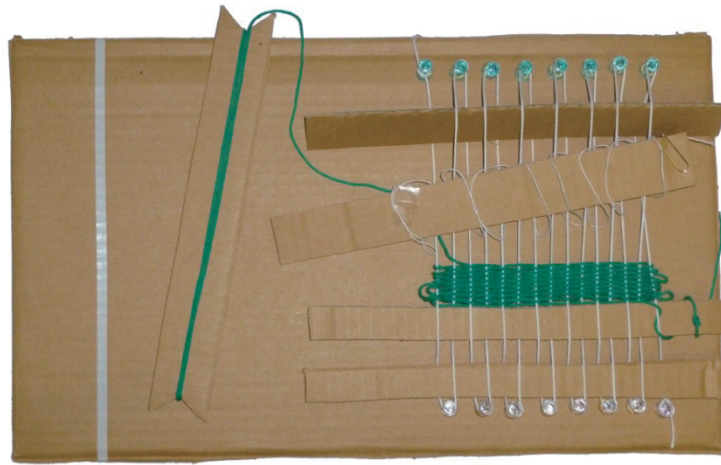
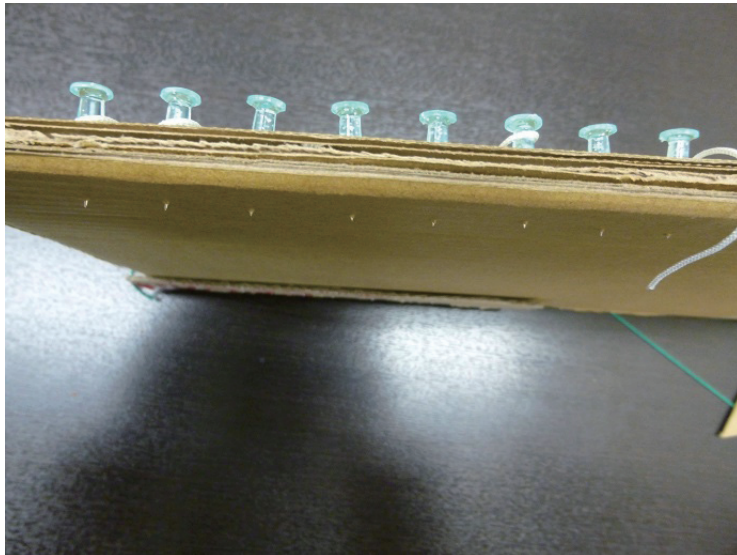


Figure 1. Wooden weaving loom made by the author in a workshop⁹⁾. (a) Top view. Green thread is spooled on a shuttle. (b) White thread is placed on the heddle. (c) The even number sequence yellow warps are lifted by the plate to make space for the shuttle.



(a)



(b)

Figure 2. Weaving loom. (a) Student loom made of cardboard and pushpins in 2014. (b) Pushpins piercing completely through the cardboard.

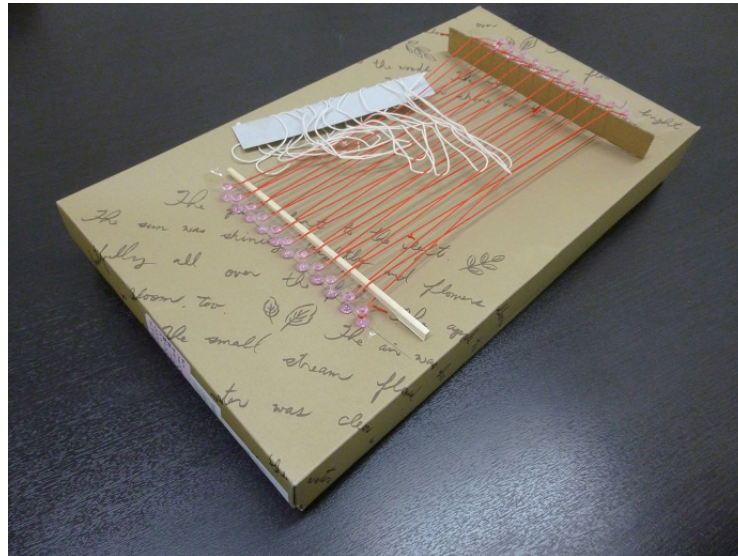


Figure 3. Weaving loom made from an empty paper box as a sample to show students from 2015 to 2016. Since the pushpins are fixed in place with transparent tape and the box is sufficiently high, students can weave easily.

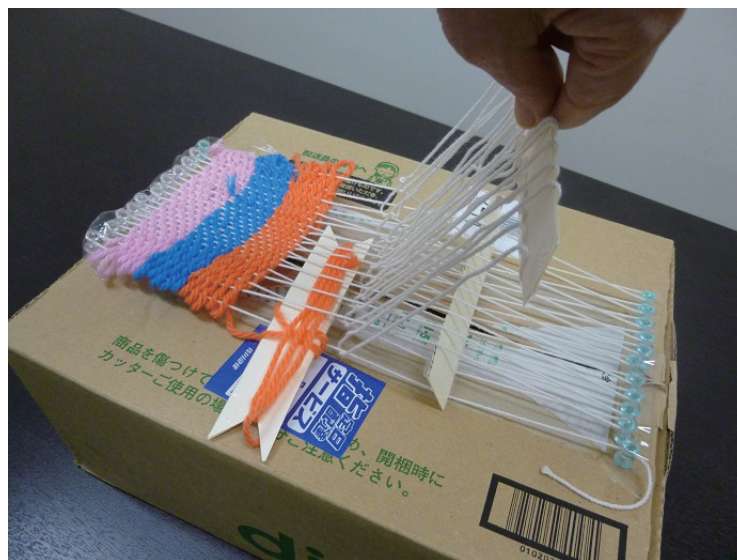
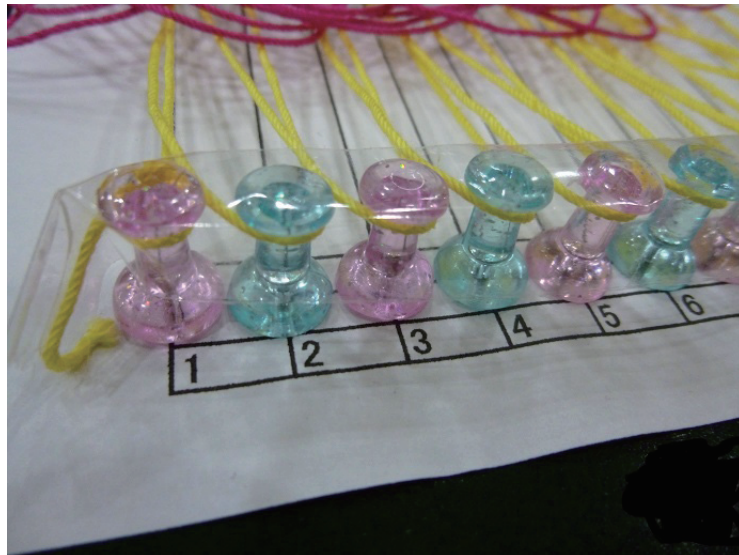


Figure 4. Group work in 2016. The three different colors indicate that three students wove the piece.



(a)



(b)

Figure 5. Improved version of a weaving loom for use in 2017. (a) Overall view. Each of the 11 red threads is looped. (b) Two different colored pushpins are placed alternately on the numbered guidelines.

Table 1. Breakdown of students in an electrical & mechanical engineering class.

Categoris	Number	%
Student teachers in a home economics course	6	25
Student teachers in a Japanese course	1	4
Other students	17	71
Total	24	100