# Value Orientations toward Agricultural Learning among Japanese Technology-Education Students

Kimihito Takeno
*Faculty of Education, Shiga University, 2-5-1 Hiratsu-cho, Outsu-shi, Shiga, Japan*

Satoshi Hoshino
*Graduate School of Global Environmental Studies,*
*Kyoto University, Kitashirakawa Oiwake-cho, Sakyo-ku, Kyoto, Japan*

Shizuka Hashimoto
*Graduate School of Global Environmental Studies,*
*Kyoto University, Kitashirakawa Oiwake-cho, Sakyo-ku, Kyoto, Japan*

**Abstract- The role of farming villages and the state of the agriculture industry are changing. Therefore, reconsidering the desirable forms of agricultural education and the content of educational programs is crucial. This research focuses on the current state of Japanese agricultural education, examining the value orientation of junior high school students toward agriculture on the basis of attribute questionnaires and open-ended questionnaires. Results showed that students' value orientation varied according to their level of interest in agriculture. The authors recommend development of educational guidance that effectively builds on students' value orientations as well as a reconsideration of educational content.**

**Keywords – Value Orientation, the Interested and Uninterested Group Students, Agricultural Learning, Japanese Technology Education**

## I. INTRODUCTION

Recently, Japan's agriculture industry has been facing a host of problems, including recent issues surrounding food, the issue of who is responsible for agriculture, and the decline of rural areas. Furthermore, as the role of farming villages and the state of the industry change, it is crucial to reconsider how agricultural education should be delivered, along with the content of educational programs.

In the United States, where relatively few citizens work in the agriculture sector, agricultural education is expected to provide students with cultural education beyond vocational training. A study by the country's National Research Council recommended the adoption of curricula that facilitate integrated agricultural education, beginning in kindergarten and continuing through senior high school. [1] However, whether such recommendations are adopted is left to the discretion of local teachers and school districts. Therefore, steps have been taken to improve teacher training for agricultural education. [2]

However, in Japan, all citizens must compulsorily study agriculture, although only at the junior high school level. In terms of specialized technical agricultural education requirements, experiential learning content is limited to the Technology section of the junior high school Industrial Arts and Homemaking curriculum (hereafter "Technology"). The Technology syllabus incorporates agricultural learning into activities that focus on the cultivation of living things. In this section of the course, students acquire various abilities on the basis of the -following learning objectives: (1) acquiring basic knowledge and skills related to nurturing living things; (2) understanding agriculture's role and effect on society and the environment; and (3) developing the ability to

appropriately evaluate and apply agriculture-related activities and skills. In addition, students can expect to experience the joy of cultivating, growing, and harvesting living things through experiential activities and to learn about occupations related to these activities. [3] This learning content was made compulsory for all junior high school students in 2008.

In agricultural education, experience-based learning is believed to play an effective role in consciousness formation among learners. Among previous research on learner consciousness in the context of agricultural education, Yamada surveyed the attitudes of students and teachers toward the educational effects of experiential learning about agriculture at the elementary school level. Yamada's results indicated that attitudes and feelings varied depending on the location and content of the experience. [4] [5] Miyata and Kiminami examined elementary and junior high school students' awareness of agriculture and identified a vocational aspiration formation process starting with "personal and family attributes," "interest in agriculture," and "interest in food." In turn, these attributes lead to "consciousness of participation in agricultural work" and then to "vocational aspiration in agriculture." Furthermore, they found that students' interest in experiencing agricultural activities diminishes rapidly as the students become older. [6] This research underscores the critical importance of gaining adequate understanding of learners' attitudes before one considers how to improve the content of agricultural education.

Moreover, it is reasonable to assume that learners' consciousness of and interest in agricultural education are defined according to how they evaluate and value agriculture. Therefore, this study aims to clarify how students' value orientations toward agricultural education are formed at the junior high school level.

## II. APPROACH

### *A. Overview –*

In February 2014, the value orientations of junior high school students toward agriculture were measured using attribute and open-ended questionnaires. Of the 318 junior high school students in Shiga and Ishikawa prefectures who received the questionnaires, 311 valid responses (for a valid response rate of 97.7%) were received and analyzed using frequency distribution and text mining techniques. The response rate was high because the questionnaires were administered within a classroom setting.

### *B. Questionnaire content and target participants –*

Attribute questionnaires were used to identify participants' gender, school grade, favorite subject, experience of agricultural activities, and interest in agriculture. Open-ended questionnaires contained the following questions and instructions: "What knowledge, skills, and abilities do you think you can gain by learning about agriculture? How will these abilities affect your life and future? Write freely while recalling your past experiences. This questionnaire will not affect your grade, so please write lots of thoughts and ideas." The junior high school students were given 15 minutes to complete these questionnaires during a Technology class.

As shown in Table 1**,** 73 valid responses were obtained from students in the first year of junior high school and 238 were obtained from second-year students. The participating students had already experienced learning activities involving tomato and komatsuna (Japanese mustard spinach) cultivation (Photo 1).

Table -1 Breakdown of valid response

| | Boys | Girls | Total |
|---|---|---|---|
| Year1 | 37 | 36 | 73 |
| Year2 | 113 | 125 | 238 |

Photo 1. Cultivating tomatoes

### *C. Analytical method and procedure –*

The frequency distributions of interest and experience levels were examined. Furthermore, the open-ended response data were analyzed using the KH Coder [7] text mining software. Typographical errors and inconsistent notations were corrected before text mining was applied to the participants' responses. Moreover, several checks were conducted beforehand to ensure that words were appropriately extracted from the text. Before the extraction of words, student responses were assigned to two groups, an "interested" group and an "uninterested" group, on the basis of the results of the attributes questionnaire. Comparisons were then made between the words extracted for both groups.

## III. Results and discussion

### *A. Analysis of attributes –*

Figure 1 shows the frequency distribution of students' favorite subjects. The most common favorite subject was Physical Education (selected by 30% of participants). The least commonly selected subjects were Technology and Homemaking and Japanese Language, at 3% each. Therefore, few students viewed Technology—the subject that offers the opportunity to learn about agriculture through experience—as a favorite subject.

Figure 2 shows students' level of interest in experiencing agricultural activities; 16% of the participants were keenly interested and 38% were mildly interested in this experience. In other words, roughly half of the students were interested and half were not.

Students' favorite subjects and their interest in experiencing agricultural activities influence their determination of value orientations, and therefore, these attributes can be regarded as selected value orientations. According to the questionnaire responses, 54% of junior high school students were interested in experiencing agricultural activities and 3% liked the subject that enabled them to do so.

Table 2 summarizes participants' reported prior experience of agriculture activities. Although students had already experienced agricultural activities in the vegetable cultivation section of their Technology course, only 68% (212 students) indicated awareness of having experienced agricultural activities at school. Other agricultural experiences primarily consisted of helping relatives and helping with kitchen gardens.

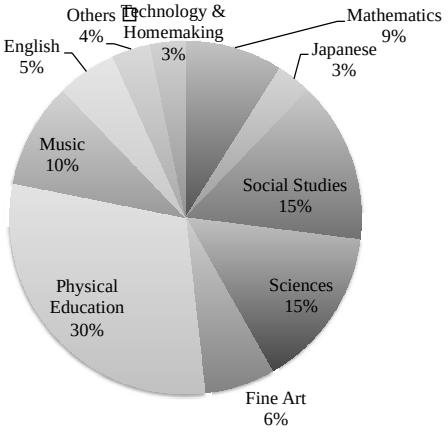


Figure 2. Participants' favorite subjects

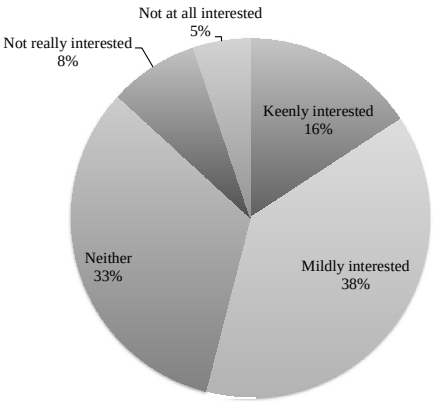


Figure 3. Participants' interest in experiencing agricultural activities

Table-2. Participants' experience of agricultural activities

| | Helping relatives | Helping with Kitchen gardens | School activities | During holiday/travel | No response |
|---|---|---|---|---|---|
| No.of responses(n) | 100 | 143 | 212 | 19 | 13 |

*B. Analysis using text mining –*

*1. Frequently occurring words*

The results of the attribute questionnaire showed that 16% of students were keenly interested in agricultural activities, 5% were not at all interested, and 8% were not really interested. To compare two groups of roughly equal size, students who were "keenly interested" were placed in the "interested" group and students who were "not at all interested" or "not really interested" were assigned to the "uninterested" group. Those who expressed mild interest, along with those who gave neutral responses, were not included in either group. Following this assignment, a comparison of the two groups was conducted using text mining.

In the word extraction process using text mining, the words "knowledge," "skills," and "abilities," which were used in the question items of the open-ended questionnaires, and the word "think," which often occurs as a general statement, were excluded from the analysis. Furthermore, "kitchen garden" and "self-sufficiency" were extracted as a single concept. Table 3 shows the numerical data extracted from the open-ended responses using KH Coder for the interested and uninterested groups. The category "total number of words extracted and used" in Table 3 refers to the number of words extracted by the KH Coder software and used in the analysis after the extraneous words identified above had been discarded.

Table 4 shows the most frequently occurring words for each group. The table includes all words that occurred six or more times. Among the interested group members, 21 words were used at least six times, including "feeling," "gratitude," "person/people," and "farmer/farming household." On the other hand, text mining of the uninterested group identified 17 words that appeared at least six times, including "gain," "useful," "money," and "techniques."

Table-3. Numerical data for the extracted words

| | Interested group | Uninterested group |
|---|---|---|
| No.of responses(n) | 49 | 41 |
| Total no. of words extracted and used | 1040 | 752 |
| Use number of words per | 21.2 | 18.3 |
| No. of sentences | 135 | 106 |
| Average no. of sentences per student | 2.8 | 2.6 |
| Number of different words | 352 | 257 |

Table-4. Frequently occurring words in each group

| Interested group | | Uninterested group | |
|---|---|---|---|
| Extracted word | No. of occurrences | Extracted word | No. of occurrences |
| Learn | 53 | Grow | 38 |
| Grow | 45 | Learn | 34 |
| Agriculture | 35 | Agriculture | 27 |
| Vegetables | 31 | Me/myself | 20 |
| Plants | 22 | Food | 20 |
| Me/myself | 20 | Important | 19 |
| Nature | 16 | Gain | 16 |
| Good | 13 | Plants | 14 |
| Feeling | 10 | Vegetables | 14 |
| Eat | 10 | Cultivation | 13 |
| Food | 10 | Eat | 13 |
| Important | 9 | Kitchen garden | 8 |
| Gratitude | 8 | Useful | 8 |
| Person/People | 8 | Money | 6 |
| Think/consider | 7 | Techniques | 6 |
| Produce | 7 | Nature | 6 |
| Kitchen garden | 6 | Good | 6 |
| Make | 6 | | |
| Increase | 6 | | |
| Farmer/farming household | 6 | | |
| Power/strength | 6 | | |

*2. Co-occurrence networks*

KH Coder can be used to provide a visual network of word patterns that occur within written material. Co-occurring words are linked by lines of varying thickness to reflect the extent of co-occurrence. Co-occurrence networks were created using the frequently occurring words for the interested and uninterested groups (see Figures 4 and 5). The co-occurrence networks were automatically generated using KH Coder's frequency setting.

In the co-occurrence networks, the level of co-occurrence is indicated by the thickness of the line and commonly occurring words are contained within larger circles. A comparison of the two figures shows that extracted words for the interested group can be roughly divided into five clusters, whereas extracted words for the uninterested group formed three clusters. The interested group network contains a cluster consisting of words such as "farmer/farming household," "person/people," "gratitude," and "feeling." In contrast, the uninterested group network contains an undifferentiated cluster consisting of 11 words and a cluster that does not appear in the interested group network.

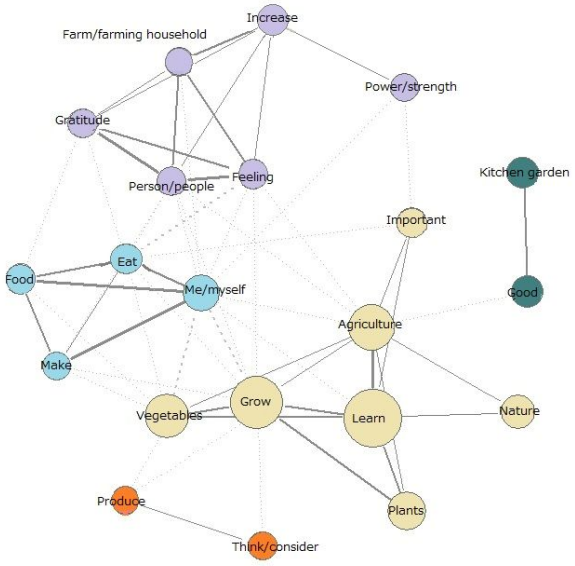


Figure 4. Co-occurrence network for the interested group

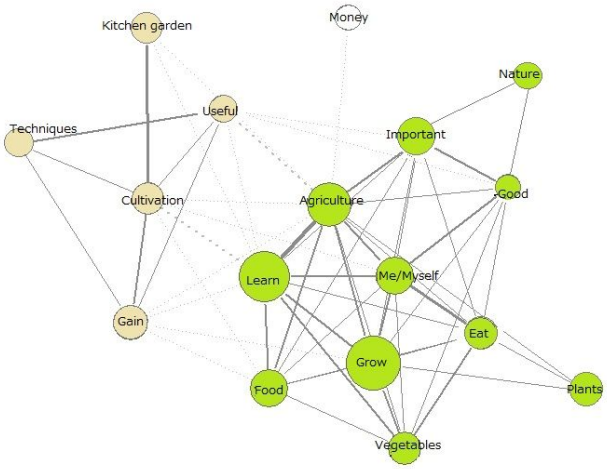


Figure 5. Co-occurrence network for the

: very strong association
: strong association
: is association

Additionally, Table 5 contains examples that illustrate the contexts in which the extracted words occurred within the open-ended responses. Examples from the interested group contain references to "contributing" to agriculture; for example, students expressed gratitude toward farmers and mentioned making contributions to farming households by learning about agriculture. These responses suggest that agricultural education raised students' awareness about their own study of agriculture, how they can contribute to support nature and farmers. In the uninterested group, examples reveal a tendency among students to view agricultural learning as something useful for securing one's own food and future. Furthermore, unlike the interested group, the uninterested group made a significant number of references to economic considerations.

Table-5. Examples of open-ended responses
(using frequently occurring words)

| ID | Interested group |
|---|---|
| 146 | By growing agricultural products, we can learn how to grow something ourselves, and this will help us to live without any difficulties in the future. At some point in the future, our knowledge of agriculture will be useful in various ways. If we don't know about it, we wouldn't be able to do anything and it would affect our lives. We can also understand many things about nature by learning about agriculture. So I think it's a good thing. |
| 276 | I feel very grateful when I think the reason we are able to eat rice every day is that people involved in agriculture put their hearts into making rice. There are also places where agriculture has become problematic because of natural damage. This affects our future; thus, I think we need to consider and implement measures that help to reduce this damage, even if only a little. I've never tended a rice field properly in my daily life, and although I do tend the kitchen garden, I think it is good to have opportunities to experience things like this. |
| 304 | Knowing more about vegetables → Useful when cooking food. Learning to cherish food → Food won't get left over. Building strength → You can carry more things. Becoming self-sufficient → Useful during a disaster. Understanding if something is safe when you eat it → You won't get food poisoning. Start to feel grateful for farmers → The number of people who help farm households increases. The number of farmers increases. |
| ID | Uninterested group |
| 68 | You learn how to grow plants. You can grow plants at home. You can eat the plants you grow. You don't have to use much money. Agricultural work also provides exercise. |
| 71 | By learning about agriculture, you learn what kind of cultivation techniques you should use and how to tend a rice field. You also learn about the tools and techniques used in agricultural work. These are useful for agricultural work when we grow up and useful when tending kitchen gardens. |
| 117 | By learning about agriculture, you can learn how to make vegetables and plants grow tall. Then you can use that knowledge if the price of vegetables goes up by not buying them and eating the ones you've grown yourself. |

## IV.CONCLUSIONS

This study focused on the junior high school level and aimed to clarify the current configuration of value orientations toward agricultural education. The value orientations of 311 junior high school students toward agriculture were surveyed using attribute and open-ended questionnaires, and responses were analyzed using frequency distribution and text mining techniques. The results can be summarized as follows.

The frequency distribution of participants' interests and experiences showed that the perception of Technology—a subject in which students can experience agricultural activities—as a favorite subject was low and that approximately half of the students were interested in experiencing agricultural activities. In view of these findings, those involved in technology and agricultural education must seek to accommodate the attitudes of learners and assist them in developing an increased awareness of related issues.

In the text mining analysis, participants were assigned to interested (49 students) and uninterested (41 students) groups and open-ended responses were examined. Thus, it was possible to visualize how learners expressed their value orientations by analyzing the written responses of each group using co-occurrence networks.

The above findings should provide a useful reference point for examining learning content and educational programs related to agricultural education in the future. To encourage more balanced value orientations in the interested group, it may also be possible to prepare learning content that enables students to experience various and more specialized agricultural activities.

On the other hand, encouraging students not already interested in agriculture to recognize that the content of experiential agricultural activities can be immediately useful to them could be effective. Furthermore, when

considering what kind of experiences and learning content to adopt, teachers must confirm learners' attitudes over a shorter period of time to ensure that they do not form unfavorable value orientations.

## REFERENCES


[1] National Research Council [NRC]. (1988). *Understanding Agriculture: New Directions for Education.* Washington, DC: National Academies Press.

[2] Anderson, S. M., Velez, J. J., & Thompson, G. W. (2014). An Analysis of K-12 Teachers' Conceptions of Agriculture Prior to and During Engagement in an Agricultural Literacy Program. *Journal of Agricultural Education*, 55(3), 132-146, 2014.

[3] Ministry of Education, Culture, Sports, Science and Technology (2008). *Course of Study for Junior High Schools: Industrial Arts and Homemaking.* Tokyo: Kyoiku Tosho. p. 28.

[4] Yamada, I. (2008). The Effects of Agricultural Experience on the Emotion and Interest of Children: A Comparative Study of Three Urban Primary Schools. *Journal of Rural Problems*, 44 (2), pp. 326-336.

[5] Yamada, I. (2008). Positive Analysis of the Educational Effects of Agricultural Experience. *Agriculture and Horticulture*, 83 (1), pp. 73-78.

[6] Miyata, T., & Kiminami, A. (2003). Analysis of Factors Affecting Attitudes toward Agriculture among Primary School and Junior High School Students: Based on a Questionnaire Survey Conducted in Iawai, Ibaraki Prefecture. [Remark 16] *Proceedings of the Annual Conference of the Agricultural Economics Society of Japan*, pp. 49-54.

[7] Higuchi, K. (2004). Quantitative Analysis of Textual Data: Differentiation and Coordination of Two Approaches. *Sociological Theory and Methods*, 19 (1), pp. 101-115.