Japanese Fisheries High School Student Attitudes about the Fisheries School Technical Curriculum

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Abstract: A survey of Japanese fisheries high school students' attitudes about the fisheries school technical curriculum was conducted using a questionnaire method. Significant differences were found between fisheries high school students' attitudes for each questionnaire item. Students in the Navigation course had the highest scores of self-efficacy, degree of satisfaction with educational methods, and degree of satisfaction with educational facilities among the five courses. Female students had lower scores of self-efficacy and degree of satisfaction with educational methods than males did. Significant differences were found in scores of self-efficacy, degrees of satisfaction with educational methods. Future studies will improve the survey precision and clarify reasons for differences attributable to class, sex, and grade.

Key words: Japanese fisheries high school, self-efficacy, ANOVA, multiple comparison

Introduction

Fisheries high schools in Japan were established to foster the development of fisheries technicians in 1894. Today, 46 such high schools specifically instruct students about fisheries industries and fisheries science. The schools have specialized in maritime officer training (navigation, engineering, and communication), aquaculture, and seafood processing. After 1945, because large fishing vessels became necessary for salmon-trout trawling and ocean long-line tuna fishing, maritime officer training courses including instruction in navigation, engineering, and communication became increasingly important throughout the country; fisheries high school became popular.

However, after the 1970s, demand for maritime officer training decreased gradually after high economic growth slowed, influenced by the 200 nautical mile economic zones, exhaustion of fisheries resources, and the oil crises[1].

Furthermore, general high schools aimed at preparation for university attendance became the main stream, and students attending fisheries high schools became fewer. The elimination or merging of high schools and courses in fisheries high schools were conducted throughout the country to answer the needs of the changing nation[2]. However, student attitudes about fishery schools' technical curriculum have not been adequately considered.

This paper clarifies differences of students' feelings of self-efficacy, their degree of satisfaction with education methods, facilities and equipment in the study field, and gender   that were examined in this questionnaire investigation to improve future fisheries education.

Materials and Methods

Four schools (school A, B, C and D) were selected randomly from the 46 fisheries high schools in Japan. The questionnaire survey was conducted during May 2007 (reference data).

Based on prior research[3,4], questions were classified into three categories: self-efficacy (Bi, Bii, Bvi, Bvii, Bxv, Ci, and Cii), the degree of satisfaction with education methods (Bviii, Bix, Bx, Bxi, Bxiv, and Ciii), and the degree of satisfaction with the facilities and equipment (Biii, Biv, Bv, Bxii, Bxiii, Civ, and Cv).

The first-grade students who responded were 434, second-grade students were 383, and third-grade students were 357. In all, 1,174 (260 female, 914 male) respondents described their attitudes.

Individuals of Navigation courses were 71 (71 male, 0 female), those of Engineering courses were 166 (163 male, 3 female), and those of Seafood processing courses were 260 (147 male, 113 female). Respondents of the Communication courses were 136 (110 male, 26 female), those of the Aquaculture courses were 166 (135 male, 31 female), those of the Synthesis courses were 218 (209 male, 9 female), those of Marine resources development courses were 60 (42 male, 18 female), and those of Commercial courses were 101 (40 male, 61 female).

The questionnaire items were of three categories: study field, sex, and grades. Analysis of variance (ANOVA) was conducted to

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assess these three categorized items in terms of their feelings of self-efficacy, satisfaction with education methods, and satisfaction with institutional facilities.

For significant differences, as inferred using a 5% standard, multiple comparison using LSD is conducted official approval.

The respective schools' Navigation courses (N), Engineering courses (E), Seafood processing courses (F), Communication courses (C), and Aquaculture courses (A) were investigated as analyzed fields of study.

Results

1. Understanding differences by study field

1) Study field vs. Feelings of self-efficacy

To clarify differences of feelings of self-efficacy according to the study field, ANOVA was conducted for Bi, Bii, Bvi, Bvii, Bxv, Ci, and Cii (Fig. 1-1). The ANOVA results show that the effects of the conditions were significantly different for Bi, Bvii, Bxv, and Ci: Bi, $F_{(2,783)}= 15.227$, $p<0.05$; Bvii, 1.478, $F_{(2,784)}= p<0.05$; Bxv, 11.310, $F_{(2,784)}= p<0.05$; Ci, 3.076,

$F_{(2,782)}= p<0.05$. Therefore, multiple comparison was conducted using LSD. For Bvi, a significant difference was found between each of A–C, A–E, C–F, C–N, and E–N (Mse=0.97, 5%). For Bxv, a significant difference was found between each of C–E, C–F, C–N, E–N, and F–N (Mse=0.97, 5%). For Ci, a significant difference was found between each of C–N, E–N, and F–N (Mse=0.97, 5%).

2) Study field vs. Satisfaction with education methods

For Bviii, Bix, Bx, Bxi, Bxiv, and Ciii, ANOVA was conducted to clarify differences in the degree of satisfaction with education methods by study field (Fig. 1-2). The ANOVA results show that the effects of the conditions were significantly different for Bx and Ciii: Bx, $F_{(2,781)}=2.620$, $p<0.05$; Ciii, $F_{(2,778)}=4.163$, $p<0.05$. Therefore, multiple comparison was conducted using LSD. For Bx, a significant difference was found between each of A–N, C–N, E–N, and F–N (Mse=0.97, 5%). For Ciii, a significant difference was found between each of A–C, A–N, C–E, C–F, E–N, and F–N (Mse=0.97, 5%).

Table.1-1 The average score of each item in each study field represents feelings of self-efficacy. N shows the number of individuals, ( ) shows the standard deviation.

	Aquaculture $N = 166$	Communication $N = 136$	Engineering $N = 166$	Seafood Processing $N = 260$	Navigation $N = 64$
Bi	2.65 (0.95)	1.97 (0.84)	2.37 (0.96)	2.24 (0.91)	2.83 (0.99)
Bii	2.39 (0.87)	2.32 (0.92)	2.35 (0.89)	2.42 (0.83)	2.34 (0.96)
Bvi	2.76 (0.78)	2.37 (0.93)	2.55 (0.87)	2.60 (0.80)	2.81 (0.83)
Bvii	2.86 (0.94)	2.89 (0.95)	2.92 (0.92)	2.90 (0.89)	3.17 (0.85)
Bxv	2.53 (1.04)	1.92 (0.98)	2.32 (1.03)	2.23 (0.96)	2.80 (1.07)
Ci	2.82 (0.87)	2.53 (0.94)	2.68 (0.99)	2.70 (0.86)	2.95 (0.93)
Cii	2.50 (0.90)	2.27 (0.96)	2.27 (0.98)	2.38 (0.87)	2.52 (0.84)

Table.1-2 The average score of each item in each study field represents degree of satisfaction with education method. N shows the number of individuals, ( ) shows the standard deviation.

	Aquaculture $N = 166$	Communication $N = 135$	Engineering $N = 165$	Seafood Processing $N = 258$	Navigation $N = 64$
Bviii	3.13 (0.80)	2.39 (0.86)	2.40 (0.85)	2.29 (0.83)	2.58 (0.83)
Bix	3.37 (0.77)	2.58 (0.80)	2.54 (0.88)	2.51 (0.75)	2.78 (0.79)
Bx	3.18 (0.78)	2.28 (0.79)	2.39 (0.80)	2.34 (0.69)	2.64 (0.80)
Bxi	3.47 (0.72)	2.60 (0.89)	2.65 (0.90)	2.69 (0.79)	2.89 (0.84)
Bxiv	2.85 (0.71)	2.08 (0.86)	2.21 (0.88)	2.16 (0.75)	2.27 (0.84)
Ciii	3.18 (0.76)	2.66 (0.92)	2.45 (0.83)	2.40 (0.74)	2.73 (0.88)

Table.1-3 The average score of each item in each study field represents degree of satisfaction with the facilities and equipment. *N* shows the number of individuals, ( ) shows the standard deviation.

	Aquaculture	Communication	Engineering	Seafood Processing	Navigation
	N = 166	*N* = 136	*N* = 162	*N* = 259	*N* = 63
Biii	3.16 (0.65)	2.93 (0.89)	3.05 (0.89)	3.12 (0.70)	3.21 (0.63)
Biv	2.92 (0.81)	2.86 (0.89)	2.85 (0.89)	3.00 (0.77)	3.25 (0.71)
Bv	2.81 (0.67)	2.82 (0.75)	2.85 (0.75)	2.89 (0.69)	3.03 (0.67)
Bxii	2.64 (0.81)	2.55 (0.83)	2.74 (0.85)	2.58 (0.76)	2.91 (0.87)
Bxiii	2.32 (0.72)	2.39 (0.87)	2.42 (0.86)	2.41 (0.81)	2.63 (0.88)
Civ	2.53 (0.78)	2.54 (0.85)	2.52 (0.88)	2.53 (0.80)	2.70 (0.85)
Cv	2.43 (0.83)	2.54 (0.86)	2.42 (0.86)	2.50 (0.77)	2.56 (0.81)

3) Study field vs. Satisfaction with facilities and equipment

For Biii, Biv, Bv, Bxii, Bxiii, Civ, and Cv, ANOVA was conducted to clarify differences in the degree of satisfaction with facilities and equipment by study field (Fig. 1-3). The ANOVA results show that the effects of conditions were significantly different for Biii, Biv, and Bxii: Biii, $F(2,781)=2.513$, $p<0.05$; Biv, $F(2,781)=3.416$, $p<0.05$; Bxii, $F(2,782)=3.154$, $p<0.05$. Therefore, multiple comparison using LSD was conducted. For Biii, a significant difference was found between each of C–A, C–F, and C–N (Mse=0.97, 5%). For Biv, a significant difference was found between each of A–N, C–N, E–N, and F–N (Mse=0.97, 5%). For Bxii, a significant difference was found between each of A–N, C–E, C–N, E–F, and F–N (Mse=0.97, 5%).

2. Understanding differences by gender

1) Gender vs. Feelings of self-efficacy

To clarify differences of feelings of self-efficacy by sex, ANOVA was conducted for Bi, Bii, Bvi, Bvii, Bxv, Ci, and Cii

Table.2-1 The average score of gender represents feelings of self-efficacy. *N* shows the number of individuals, ( ) shows the standard deviation.

	Female		Male	
	N = 261		*N* = 915	
Bi	2.19	(0.91)	2.44	(0.98)
Bii	2.47	(0.79)	2.41	(0.87)
Bvi	2.65	(0.78)	2.64	(0.86)
Bvii	2.79	(0.84)	3.00	(0.90)
Bxv	2.05	(0.86)	2.41	(1.06)
Ci	2.73	(0.83)	2.81	(0.91)
Cii	2.53	(0.84)	2.47	(0.93)

(Fig. 2-1). The ANOVA results show that the effects of conditions were significantly different for Bi and Bvii: Bi, $F(1,1171)=13.661$, $p<0.05$; Bvii, $F(1,1171)=11.434$, $p<0.05$.

2) Gender vs. Satisfaction with education methods

To clarify differences in the degree of satisfaction with education methods by sex, ANOVA was conducted for Bviii, Bix, Bx, Bxi, Bxiv, and Ciii (Fig. 2-2). The ANOVA results show that the effects of the conditions were significantly different for Bviii: $F(1,1167)=15.849$, $p<0.05$.

Table.2-2 The average score of gender represents degree of satisfaction with education method. *N* shows the number of individuals, ( ) shows the standard deviation.

	Female		Male	
	N = 260		N = 909	
Bviii	3.01	(0.79)	2.44	(0.82)
Bix	3.26	(0.75)	2.59	(0.80)
Bx	3.03	(0.69)	2.40	(0.75)
Bxi	3.46	(0.76)	2.73	(0.82)
Bxiv	2.84	(0.72)	2.19	(0.81)
Ciii	3.20	(0.75)	2.54	(0.82)

3) Gender vs. Satisfaction with the facilities and equipment

For Biii, Biv, Bv, Bxii, Bxiii, Civ, and Cv, ANOVA was conducted to clarify differences in the degree of satisfaction with facilities and equipment by sex (Fig. 2-3). The ANOVA results show that the effects of the conditions were not significantly different.

Table.2-3 1 The average score of gender represents degree of satisfaction to the facilities and equipments. *N* shows the number of individuals, ( ) shows the standard deviation.

	Female		Male	
	N = 260		*N* = 906	
Biii	3.06	(0.71)	3.14	(0.75)
Biv	2.91	(0.79)	2.97	(0.81)
Bv	2.85	(0.69)	2.90	(0.67)
Bxii	2.59	(0.75)	2.72	(0.81)
Bxiii	2.35	(0.76)	2.47	(0.82)
Civ	2.49	(0.78)	2.62	(0.81)
Cv	2.48	(0.77)	2.43	(0.79)

Discussion

Considering differences in attitudes of self-efficacy by study field, the students belonging to Navigation and Aquaculture courses preferred to choose courses by themselves. The average responses to "I was interested in fisheries vocational training prior to coming to this school (Bi)" given by Navigation and Aquaculture course students was higher than in other study fields.

The average score of "After this training I planed to work in this field for my future career (Bxv)", and "I am happy with my choice of a fisheries vocational training (Ci)" were chosen by Navigation and Aquaculture course students more than by students of other study fields.

The answers of Navigation and Aquaculture course students show a tendency toward having strong interests related to contents of the course education.

Next, considering differences in the degree of satisfaction with education methods by the course of study, the score average of "These training programs improved my problem-solving skills (Bx)" was highest by Navigation students among five study fields.

The average score of "The school administration cares about my learning (Ciii)" answered by Navigation and Communication course students was higher than those reported by students of the other three study fields.

Considering the difference in the degree of satisfaction with facilities and equipment by study field, the average score of "The overall quality of fisheries technical teaching in this school is high (Biii)" answered by Communication course is lowest compared with Navigation, Aquaculture, and Seafood processing course students.

Furthermore, regarding the item of "The overall quality of the practical experience is sufficient (Biv)", Navigation course stu-

dents gave it the highest score among students of all study fields. For "School facilities are appropriate to support my learning (Bxii)", Navigation course students responded with higher evaluations than Aquaculture, Communication and Seafood processing course students did.

As explained above, Navigation and Aquaculture course students have a sense of purpose about entering the high school, and consider working in fisheries in the future. Especially, the degree of satisfaction related to the experiment practice and the training equipment of Navigation is the highest (Biii, Biv, Bv, Bxii, Bxiii, Civ, and Cv).

The Navigation course carries out course training using training ships owned by each prefecture. Regarding those training ships, laws allow depreciation over about 9–12 years[5], and renewal of the facilities is planned earlier than in other courses. For example, building facilities used for Aquaculture course students in A high school have not been renewed for more than 40 years. Consequently, great differences might exist in feelings of satisfaction with equipment between study fields, even at the same school.

There were not so many students in Navigation course even though Navigation course existed in all schools in this survey. Perhaps only students who have a high sense of purpose select the Navigation course when they become second grade students. The imbalanced situation of the study field selection might influence the students' answers. To enhance feelings of self-efficacy and the degree of satisfaction of all students, when investigating the study field choice, the cause of the differences according to the field of study must be clarified.

Regarding difference in feelings of self-efficacy by sex, the average score of males was higher than that of females in the items of "I was interested in fisheries vocational training prior to coming to this school (Bi)", and "My practical experience provided appropriate preparation for my future career (Bvii)". These results indicate that males feel greater independence related to occupational choice.

Furthermore, the average score of job consciousness for fisheries such as the item of "I was interested in fisheries vocational training prior to coming to this school (Bi)", and "My practical experience provided appropriate preparation for my future career (Bvii)" of males are higher than those of females.

As for differences in the degree of satisfaction with educational methods by sex, the difference is not recognized in 5 of 6 items. Therefore, both are almost satisfied.

However, female satisfaction with guidance and encouragement from teachers is lower than that felt by males in items such as "I received an appropriate level of attention and encouragement (Bviii)".

Fisheries high schools have few teachers who are women. This

reason might explain those results. Detailed investigations must be done to identify the reasons why different attitudes are formed according to gender.

Continuous investigation and adequate follow-up surveys will be necessary to explain differences in these results among groups of students.

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QUESTIONNAIRE:

"**STUDY OF JAPANESE FISHERIES HIGH SCHOOL**
STUDENT PERCEPTIONS OF FISHERIES
SCHOOL TECHNICAL CURRICULUM"

SECTION A   **Profile of respondents. All information will be kept strictly confidential.** Please mark (x) in front of the appropriate information about yourself.

1.   **Gender**

☐ Male

☐ Female

2.   **School Grade**

☐ 1st Grade

☐ 2nd Grade

☐ 3rd Grade

3.   **Who introduced you to this school?**

☐ Family

☐ Friends

☐ Teacher suggestion

☐ Media

☐ Found it by myself

4.   **Why did you choose to study in this school?**

☐ Family suggestion

☐ Followed friends' opinion

☐ Teacher suggestion

☐ Liked it

☐ I want to work in this field in the future

In the following sections, circle the number that best reflects how strongly you agree with the statement.

SECTION B: **Student Perception of Training Material**	Strongly disagree	Disagree	Agree	Strongly agree
i. I was interested in fisheries vocational training prior to coming to this school.	1	2	3	4
ii. I came to this school, in part, due to its known strength in the fisheries vocational training.	1	2	3	4
iii. The overall quality of fisheries technical teaching in this school is high.	1	2	3	4
iv. The overall quality of the practical experience is sufficient.	1	2	3	4
v. Lectures and practical tasks for technical subjects were cohesive and interrelated.	1	2	3	4
vi. My classroom experience generated enthusiasm for vocational training.	1	2	3	4
vii. My practical experience provided appropriate preparation for my future career.	1	2	3	4
viii. I received an appropriate level of attention and encouragement.	1	2	3	4
ix. These training programs helped me to become a more independent learner.	1	2	3	4
x. These training programs improved my problem-solving skills.	1	2	3	4
xi. These training programs improved my communication skills.	1	2	3	4
xii. School facilities were appropriate to support my learning.	1	2	3	4
xiii. Integration of modern instruments enhanced my learning.	1	2	3	4
xiv. Teacher always taught according to the earlier planned curriculum.	1	2	3	4
xv. After this training, I planned to work in this field for my future career.	1	2	3	4
SECTION C: **General Impressions**	Strongly disagree	Disagree	Agree	Strongly agree
i. I am happy with my choice of a fisheries vocational training.	1	2	3	4
ii. I would recommend the fisheries training program at this school to a friend or family member interested in this field.	1	2	3	4
iii. The school administration cares about my learning.	1	2	3	4
iv. I am pleased with the sense of community at this school.	1	2	3	4
v. This school provides social activities for students and teachers.	1	2	3	4

水産系高等学校における生徒の学習意識に関する研究

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要旨：　水産系高等学校における生徒の学習意識に関するアンケート調査を実施した。アンケート調査の結果から水産系高等学校における生徒の学習に対する意識について，項目ごとに有意な差があることが明らかとなった。学系別にみると航海系は他学科に比較して自己効力感，教育方法に対する満足度，施設設備に対する満足度はいずれも高く，性別でみると女子は男子に比較し自己効力感や教育方法に対する満足度は低い。今後，学系別，性別により学習意識の差が生じる理由について詳細に調査する必要がある。

キーワード：　水産系高等学校，自己効力感，分散分析，多重比較