

Developing Competencies through Co+work and Tobitate Projects

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Abstract

The Co+work course, which started in 2016, aimed to cultivate competencies in autonomy, cooperation, and creativity through the interaction of students from the different fields and classifications as they tackled a shared project. The name “Co+work” is derived from the thought of having a need to create something by cooperating in practice. We have chosen to use “co-” for communication, consensus, commitment, cooperation, and collaboration. Similar exercises have been implemented in many universities and NIT colleges, but ours is unique in that the students consider and decide their own topics to tackle rather than the teachers deciding and proposing what projects to do for them.

Another program that builds competencies is the “Tobitate! (Leap for Tomorrow) Study Abroad Initiative.” Tobitate is a scholarship program provided by Japan’s Ministry of Education, Culture, Sports, Science, and Technology (MEXT) that aims to help eager and capable Japanese youth to take their first steps toward studying abroad. In NIT-Akashi College, seven students in 2015, twelve students in 2016, two students in 2017 and five students in 2018 received Tobitate scholarships and studied in schools, did voluntary work in NGOs, or worked in companies for one month.

This paper describes how students developed their competencies through Co+work and Tobitate and analyses their results on the Progress Reports on Generic Skills (PROG) Test. The PROG Test consists of 33 specific characteristics, 9 subcategories, and 3 main categories in competency. The change in competencies and the relationship between the students’ grades and experience are analysed. The PROG Test was conducted on 26th January 2016 before Co+work was implemented, then on 17th January 2017 and on 18th January 2018.

As a result of these projects, the social effect of seniority, the temporary decline in competence due to difficult experiences and the subsequent growth, and the growth difference seen in certain types of competencies became clear. As Co+work has been carried out for two years and Tobitate for three years, the competencies of NIT-Akashi College (NITAC) students have become significantly noteworthy in comparison to that at other NIT colleges and Japanese universities.

Keywords: PBL, grades, PROG, Co+work, Tobitate, competency, experiment, seniority

Introduction

This paper is a continuation of a report on a three-year project. In order to bring the readers up to date on how the project started and where it is going, much of the Introduction along with a portion of the Methods section, and Tables 1 and 2 have been re-printed from last year’s publication (Hiraishi, et al., 2017).

We are facing rapid social changes due to the recent circumstances in which globalization generates more people who have a wider and more diverse sense of values and in which advancements in ICT has made it easier to acquire information. This urges people to refresh and renew their own abilities constantly along with these social changes. Thus, an ability to keep learning actively has become much more significant now than ever before. We are also facing complicated problems that involve multidisciplinary issues which require an ability to cooperate with professionals from other fields to tackle these complexities. Rieckmann (2012) mentioned that universities may play very different roles in the future and could more or less be able to cope with global change and the complexity and uncertainty linked to these changes. Furthermore, the necessity of regular subjects for the purpose of nurturing generic skills in Japanese undergraduate education are advocated by Yoshihara (2007).

Unfortunately, in Japan, due to the declining birth rate and a growing tendency to have “play alone” single-child families, today’s youth have fewer opportunities to interact in groups. At the same time, passive education rather than active learning has remained mainstream in Japan. These circumstances make it difficult to cultivate competencies in collaboration, autonomy, and creativity.

In order to solve these problems, NITAC introduced Co+work to develop autonomy, collaboration, and problem-solving skills through challenging team experiments for creating goods or services that would make life happier for people. Hiraishi, et al. (2017) reported the educational effects of the first year of Co+work at ISATE 2017, which included the following insights:

- 1) In the past, in Kosen education there was no obvious competency growth.
- 2) Competencies of 3rd year and 4th year students obviously grew by the implementation of Co+work.

- 3) Competencies in problem-solving improved through Co+work because students set their own themes.
- 4) It is important to develop good relationships through team building in the initial stage.
- 5) The setting of themes that everyone can participate in is important for maintaining motivation to complete activities.

Methods

The National Institute of Technology, Akashi College (NITAC) introduced Co+work to develop autonomy, collaboration, and problem-solving skills through

Table 1 The schedule of 'Co+work'

Week	Overview
1 st	Guidance and team making in the gym
2 nd	Ice breakers and brainstorming activities with teammates in the gym
3 rd – 7 th	Theme setting by each team
8 th – 13 th	Project progression by each team
14 th	Intermediate Presentations Four teams present their projects in one room. Seven minutes for presentations and 8 minutes for questions and comments.
15 th	Reflection by each team
16 th	Intermediate Guidance
17 th – 28 th	Project progression by each team
29 th	Final Presentations Poster session in the gym
30 th	Reflection by each team

Reprinted (Hiraishi, et al., 2017).

experiments for creating goods or services that would make life happier in spring 2016. Table 1 shows the schedule of the Co+work course, which took place in 90-minute sessions once per week.

Table 2 shows the competency structure used for the Progress Reports on Generic Skills Test (PROG Test) in the PROG Hakusho Project (2016). The PROG test was conducted on 26th January 2016 before Co+work was implemented and on 17th January 2017 and on 10th January 2018 after Co+work was completed. The students of the 2nd year, 3rd year, and 4th year were examined through their PROG test results. In accordance with the PROG Hakusho Project (2016), the test consists of the following three types of computer adaptive questions:

- 1) *The bilateral selection format* which presents two ambiguous answer choices positioned side-by-side with hidden values and which forces the quick selection of one's first impression of the answer which they can relate to more closely.
- 2) *The scenario assumption format (short sentence)* which proposes answers that are generally considered to be positive for conflicting situations that anyone may be experiencing and asks how often the subjects have reacted in a certain way.
- 3) *The scenario assumption format (long sentence)* which proposes answers that are generally

Table 2 Competency Structure of PROG

	Main Categories	Subcategories	Specific Characteristics
Competency	Collaboration	Affinity	Friendliness
			Consideration of others
			Interpersonal interest, sympathy, acceptance
			Understanding, awareness, and tolerance of diversity
			Fostering of personal relationships
		Trust building	
		Cooperation	Understanding of roles and collaborative behavior
			Information sharing
			Mutual support
			Consultation, guidance and motivation of others
	Leadership	Dialogue engagement	
		Opinion sharing	
		Constructive and creative discussion	
		Adjustments of opinion, negotiation and persuasion	
	Autonomy	Emotional control	Self-awareness
			Stress tolerance
			Stress management
		Creating confidence	Understanding of identity
			Self-efficacy and optimism
Self-transformation by new viewpoints and opportunities			
Sustaining action		Proactive behavior	
		Accomplishment	
Problem solving	Finding problems	Information collection	
		Understanding the essence of the problem	
		Cause pursuit	
	Planning a solution	Goal setting	
		Scenario creation	
		Plan evaluation	
		Risk analysis	
	Implementing the plan	Action taking	
		Modification and adjustment	
		Verification and improvement	

Reprinted (Hiraishi, et al., 2017).

considered to be positive in response to conflicting situations that can occur in work places and forces the selection of what actions to take in light of the subject's experience.

Table 3 shows the number of Tobitate scholarship students and their destinations each year. The total number, 26, is the second largest nationwide in the Tobitate Scholarship program for high school students. The specific characteristics and growth of the Tobitate scholarship students are clarified by the PROG test.

Table 3 Tobitate Scholarship of NITAC

	Number of students	Destinations
2018	5	Estonia, Garman, Philippines, USA (2)
2017	2	Italy, Indonesia
2016	12	Australia, Belarus, Costa-Rica, Garman, Nepal, New-Zealand, Philippines, Senegal, Spain, Taiwan, USA (2)
2015	7	Australia, Brazil, UK, Sri Lanka (2), Vietnam,

Results and Discussion

There were no obvious differences in competency scores between other NIT colleges and among 2nd, 3rd, and 4th year students in 2016 before introducing Co+work as shown in Figure 1. The numbers of participants from other NIT colleges contributing to the data were 1,539 second year students, 1,243 third year students, and 2,114 of fourth year students. The competency of 3rd year and 4th year students increased, however the competency of the 2nd year students increased only a small amount after a year of lessons in 2017. Again, in 2018, the competency of 2nd year students was low. The change in competency between 1st and 2nd year of the same students could not be compared, as the PROG test was deemed too difficult for 1st year students, hence they did not take it. In a comparison between competencies of 2nd year students in 2017 and 2018, the autonomy and problem-solving skills of students in 2018 were found to be much lower, as shown in Figure 2. One reason for this is considered to be that 2nd year students had difficulty committing to the project because of the large competency differences between the 2nd year students and 3rd and 4th year students who had prior experience with Co+work. However, the same students who became 3rd year students in 2018 had significant increases in competency scores in their second year of the project. By mixing different classes of students, those with seniority generally felt a sense of responsibility for taking on leadership roles. In addition, since it can be thought that the younger students can see

their own growth model, this observation was necessary for the effect of the mixed grade-levels to be realized.

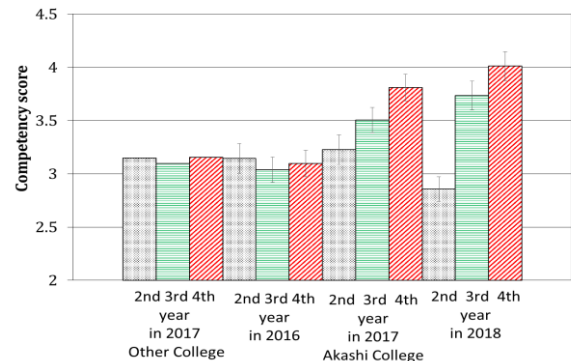


Figure 1 Competency at NITAC and Other College (Averages shown with standard errors indicated.)

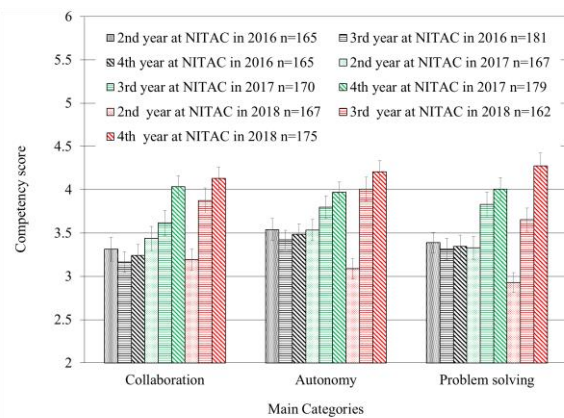


Figure 2 Main Categories Competency NITAC (Averages shown with standard errors indicated.)

Figure 3 shows student improvement from 2nd year in 2016 to 3rd year in 2017 to 4th year in 2018 to demonstrate how the same student's competency levels evolved from before to after Co+work implementation. Six specific characteristics have clearly seen growth from 2016 to 2017 and 14 specific characteristics have clearly seen growth from 2017 to 2018. The characteristics "Proactive," "Accomplishment," and "Making good behavior habitual;" however, have not seen an improvement. These competencies are difficult to develop in such a short time, as Co+work is generally limited to 90 contact minutes per week.

Examining the changes from 2nd year in 2016 to 3rd year in 2017 in Figure 3, we can conclude that only nine competencies have improved. Obvious growth is mainly seen in five specific characteristics under "Problem-solving." On the other hand, the changes from 2nd year in 2017 to 3rd year in 2018 in Figure 4, reveal fifteen specific characteristics under "Collaboration and Autonomy" that have improved significantly. The 3rd year students' full year of experience with Co+work is believed to have led to this positive difference.

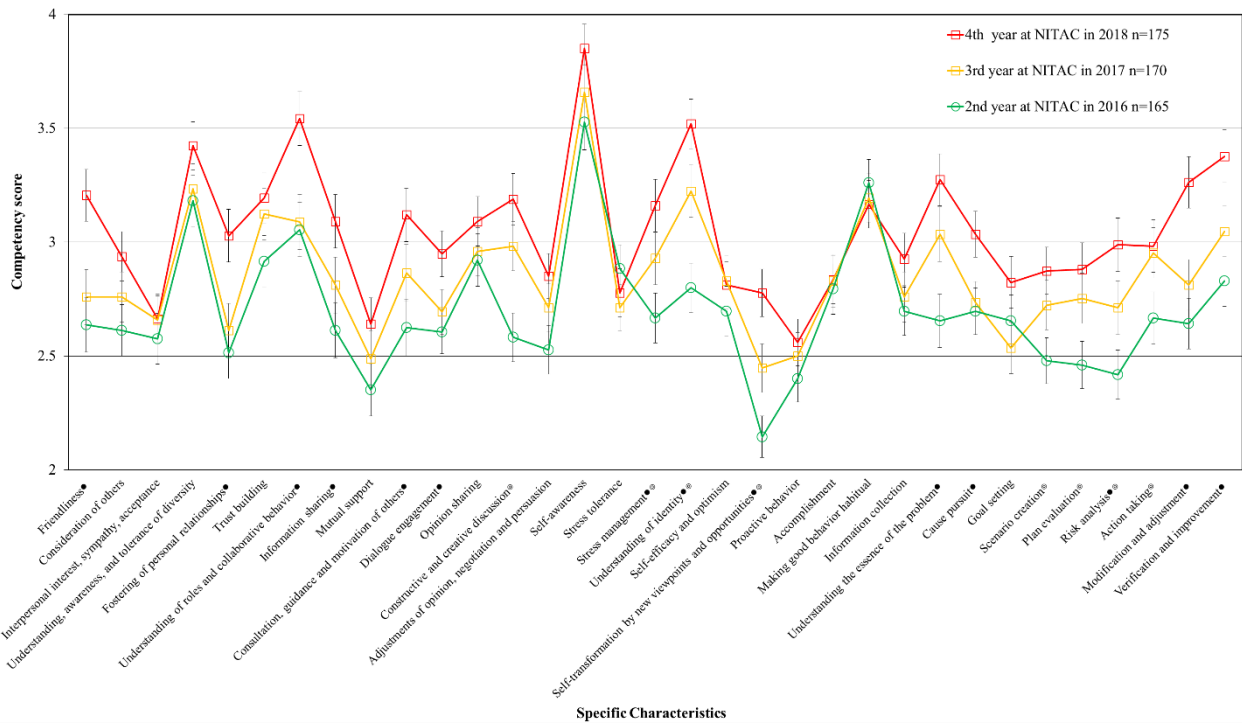


Figure 3 Specific competencies of students from 2nd year in 2016 to 3rd year in 2017 to 4th year in 2018 (Averages shown with standard errors indicated. Specific characteristics marked with “●” showed clear improvements in 3rd year to 4th year, and those marked with “◎” showed clear improvements in 2nd year to 3rd year.)

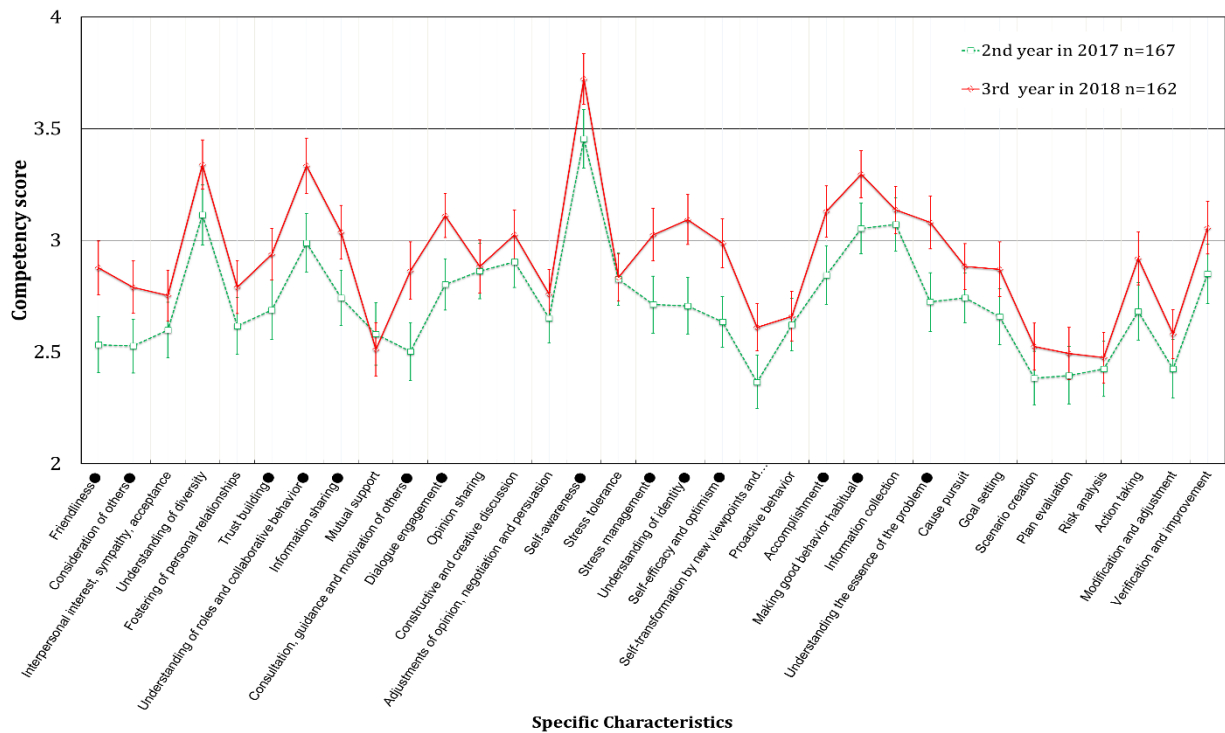


Figure 4 Specific competencies of students from 2nd year in 2017 to 3rd year in 2018 (Averages shown with standard errors indicated. Specific characteristics marked with “●” showed clear improvements)

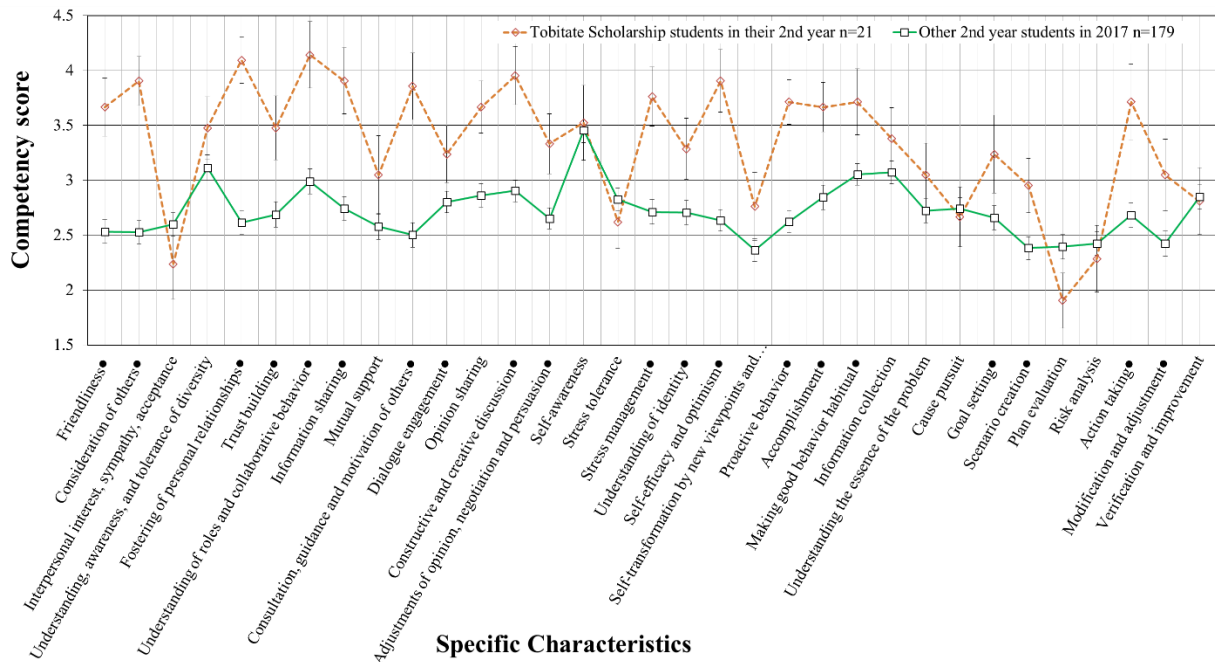


Figure 5 Specific competencies of Tobitate Scholarship students in 2nd year and all students in 2nd year in 2017 (Averages shown with standard errors indicated. Specific characteristics marked with “•” showed clear differences)

Figure 5 compares specific characteristics of Tobitate scholarship students to all 2nd year students in 2017. Tobitate scholarship students saw significantly high scores in most of the competency categories, except “stress tolerance,” “cause pursuit,” “plan evaluation,” “risk analysis,” and “interpersonal interest, sympathy, and acceptance.” It can be said that Tobitate scholarship students are typically those who have comprehensively high competency and are strongly independent but are not deep thinkers.

Figure 6 shows the competency scores from Tobitate scholarship students and other students with respect to each grade. The competency scores of the Tobitate scholarship students are obviously higher than that of the other students. However, the competency scores of the Tobitate scholarship students slightly decreased from 5.2 in the 2nd year to 5.1 in their 3rd year, and the standard error increased as well. Then, their scores shot up again in their fourth year. This shows the tendency for Tobitate scholarship students to slightly lose their confidence during or just after their tough work they have done alone and overseas followed by the realization in the following year that they have learned and grown from the experience.

Looking at subsequent growth from 2nd year to 4th year of the Tobitate Scholarship students in Figure 7, the Tobitate Scholarship students developed “Cause pursuit,” “Plan evaluation,” and “Risk analysis.” However, “Interpersonal interest, sympathy, and acceptance” and “Stress tolerance” were not changed. And, “Making good behavior habitual” was significantly decreased. It was assumed that the students realized their abilities were not enough for the project whilst abroad. They then recognized that effort was necessary, but their daily actions did not demonstrate the level of effort necessary to reach their personal goals.

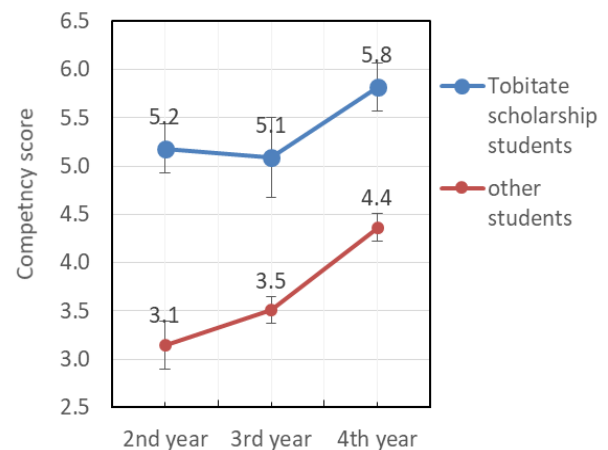


Figure 6 Tobitate Scholarship students and other students

Conclusions and implications

The following conclusions can be made from PROG test results with respect to the continued implementation of Co+work for 2 years and the competencies of Tobitate scholarship students:

- 1) Competencies were almost the same between other NIT Colleges and NIT, Akashi College before the implementation of Co+work
- 2) Competencies of 3rd year and 4th year students obviously grew by the implementation of Co+work
- 3) Competency scores of 2nd year students did not grow significantly during the first time they experienced Co+work; however, they did grow in

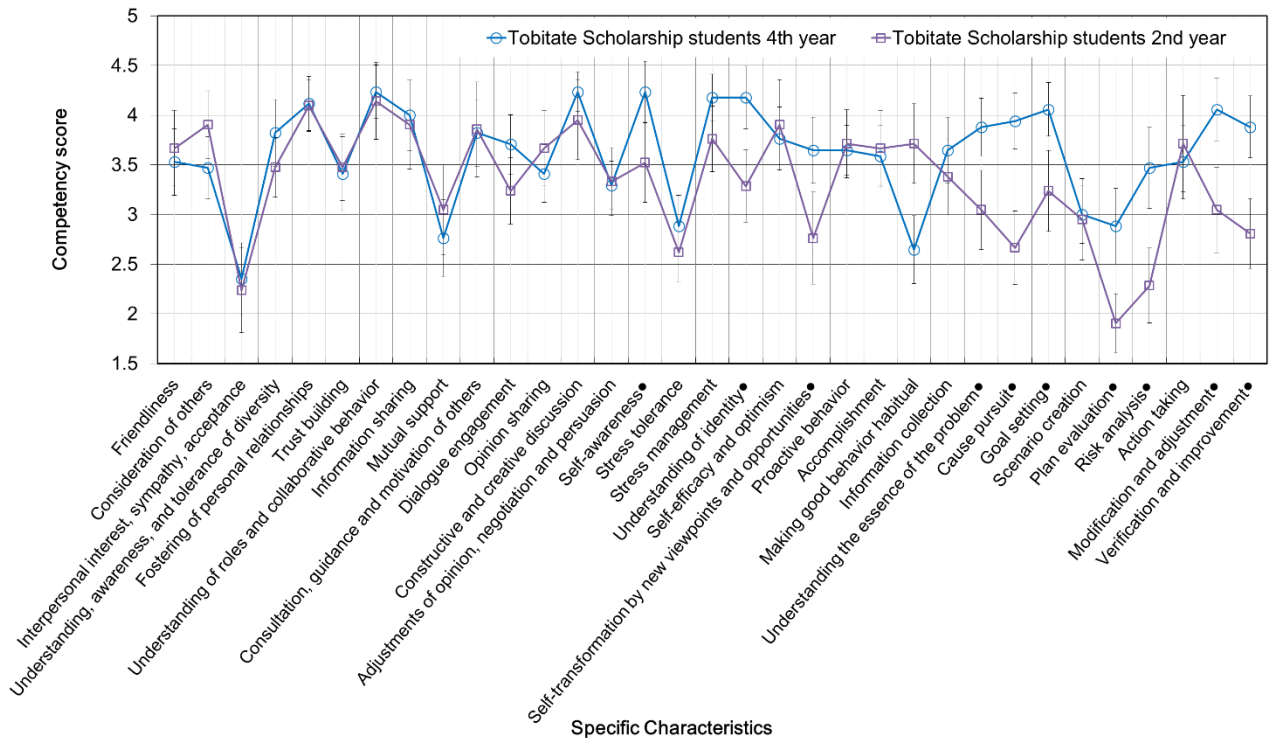


Figure 7 Specific competencies of Tobitate Scholarship students from 2nd year to 4th year
 (Averages shown with standard errors indicated. Specific characteristics marked with “●” showed clear improvements)

the next year when, as 3rd year students, they already had a full year of Co+work experience.

- 4) The chain of seniority within the Co+work project teams affected the results of competency growth.
- 5) The competencies of Tobitate Scholarship students were higher than other students.
- 6) One of the subcategories, “Sustaining action,” which includes, “Proactive behavior,” “Accomplishment,” and “Making good behavior habitual” should be the next target for developing our students competencies.

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