



## The impact of the Curriculum on the Teaching of Integrated Learning (Inquiry) Time the Effects of Changing Attitudes and Developing 'STEAM Education Skills'

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### Abstract

*In Japan, the Courses of Study, which will be fully implemented from 2022, set up "time for integrated learning (inquiry)" [1] in elementary, junior high and senior high schools, which integrates learning in academic subjects and other subjects. This is against the background of the promotion of 'Japanese-style school education in 2021' [2], the enhancement of STEAM education [3] and the aim to contribute to the SDGs through school education. To realise this, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has established "Teaching Methods for Integrated Study (Inquiry) Time" as a teaching subject at universities, and teacher training that enables teaching in school education is being promoted. Therefore, in this study, we would like to examine what kind of changes in awareness there are in students who have worked on the 'Methods of teaching time for integrated learning (inquiry)', including how the 'three qualities and abilities' that are shown in the 'STEAM educational ability' as qualities and abilities to be fostered are transformed. In this study, the three qualities and abilities to be developed are (i) the ability to step forward, (ii) the ability to think through, and (iii) the ability to collaborate, each of which also has a subcomponent. The curriculum for the "Integrated Learning Time Teaching Method" implemented in this report consists of 15 lessons, and the lesson plan calls for a pre- and post-awareness survey and overall information sharing (3 lessons), as well as experiential learning (4 lessons), mid-term reporting (2 lessons), lesson development (4 lessons), final reporting (2 lessons) and making a video clip of about 8 minutes.*

**Keywords:** SDGs, STEAM education, the period for integrated studies

### 1. purpose of the study

To develop an effective curriculum for the teaching subject 'Time for Integrated (Learning) Inquiry' in order to develop human resources equipped with these competencies, based on the 'STEAM educational competencies' that are required of school teachers in the future.

The 'three perspectives' and 'three qualities and abilities' are positioned as 'STEAM educational competences'. The objectives of this study are twofold. One is to present a prototype for the development of a new pedagogy that promotes leading, innovative and effective student development as a foundational study in teaching subjects in our country. The other is to establish a hybrid validation system to verify these initiatives.

### 2. philosophy of this study

This research will be implemented with four basic theories set out below.

1. psychological safety assurance: 'psychological safety', an idea presented by organisational behaviour researcher Amy Edmondson of Harvard University in 1999. Attention to psychological safety among students.

2. Kolb's experiential learning model: David A. Kolb (1984) is an American philosopher who simplified John Dewey's learning theory (2004) into the experiential learning model and worked to promote it as a theory that could be used in practice. The experiential learning model consists of four stages.



(1) concrete experience, (2) reflective observation, (3) abstract conceptualisation, and (4) active experimentation.

The theory states that learning is acquired by repeating these four stages: (1) concrete experience, (2) reflective observation, (3) abstract conceptualisation, (4) active experimentation and (5) active learning. In this project, the aim is to implement this theory. 3.

Expectation-value model: Nasu (2014) organises the 'expectation-value model' from the perspective of motivation to learn in motivational psychology. He states that in order to increase motivation to learn, consideration should be given to maintaining and further increasing expectations, and the cycle presented here is respected in this study.

4. peer assessment activities: Goto (2018) shows that deliberately incorporating initiatives that utilise peer assessment, which is participatory assessment in which learners themselves participate in assessment as learning, can deepen learning and increase the awareness of learning independently, and can be effective towards improving problem-solving skills.

### 3. practice of this research

The 15 teaching opportunities will be based on group work, with peer evaluation throughout, including mid-term and final presentations. The learners receive multifaceted opinions not only from among themselves but also from the instructor. Through the experience of examining, selecting, and improving these opinions within the group, the learners learn proactively and, as instructors, aim to develop the ability to structure lessons in such a way that learners can take the initiative.

### 4. results and discussion

The following questions were asked in the various surveys, but were of particular interest.

Table 1.

Question item	I think I can change my country and society (% of positive responses)	
NF survey (2019) Positive responses n=1000	18.3%	
(Ref.) Japan's de 18 year olds. Nippon Foundation Survey (2022) Positive responses n=1000	26.9%	
	2023 Admission Cohort Students	22022 Admission Cohort Students (Reference)
Practice A University Before initiative 3rd year at university, N=39	29.3% (N=41)	20.5% (N=39)
Practice A University After the initiative University, 3rd yearN=39	71.8% (N=41)	71.8% (N=39)



Table2 . Legend

	Before I consider myself an adult.	Before I consider myself a responsible member of society.	After I consider myself a responsible member of society.	Before I have a dream for the future.	Before I have a social issue I want to solve in my country	Before Actively discussing social issues with family, friends, and others	after Actively discussing social issues with family, friends, and others
FY 2023 41 persons	39.0%	65.9%	79.5%	73.2%	87.8%	36.6%	64.1%
FY2022 39 persons	48.7%	87.2%	100%	82.1%	76.9%	46.2%	82.1%

After the students' efforts, they were asked, "What is the most important skill you acquired in this class?" The following responses are highly relevant to the STEAM educational competencies that were established.

#### Presentation and communication skills

Presentation and communication skills improved through the process of theme selection, research, discussion, presentation, and reflection with team members.

#### Information organization and expression skills

Information organization and effective expression skills were improved through the creation of easy-to-understand PowerPoint presentations, and skills in writing concisely on the board were emphasized.

#### Class structure and planning skills

Skills related to planning and class progression were developed in situations where class content and structure were considered.

#### Ability to reconstruct and improve presentation materials

Improvement skills were developed through reorganization and improvement of presentation materials based on reflections after the interim presentation and external evaluation.

#### Worksheet creation and teaching skills

Through worksheet creation and taking charge of roles in the educational process, teaching and worksheet creation skills were improved.

#### Initiative in creating materials and the educational process

The students took initiative in creating materials, lesson plans, and mock lessons, and grew through the process.

#### Collaboration and cooperation

Through cooperation and exchange of opinions with team members, revision of materials and compilation of opinions with group members, the students acquired the ability to cooperate and collaborate.

#### Problem-solving and application skills

Problem-solving and application skills were developed through responses to problems and improvements in presentations, reflections, and Q&A sessions.

These skills seemed to grow individually and through the actual presentation and educational process, leading to learning for the team as a whole.

## References

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- [3] The Case for STEM Education: Challenges and Opportunities,38