

A CASE STUDY ON ADOPTING STEAM TO PHYSICAL EDUCATION TEACHING METHOD CLASS FOR UNDERGRADUATE STUDENTS: THE LEARNING PROGRAM "TEACHING JUMPING"

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THEME:

Teacher education and professional learning in STEM

BACKGROUND AND AIMS

It was known that female teachers tend to have less confidence to teach ball games, track and field, and gymnastics in Japan (OYA and Shinbo, 2016). In former research we found that the STEAM learning program of "Teaching Throwing" was useful for female university students' conceptual change about "throwing" (Ohnuki et.al., 2021). In this research, we analyzed their conceptual changes in STEAM program "Teaching Jumping" developed in Ishizawa et. al. (2021).

METHODOLOGY

The contents of the STEAM program were; learning about the trends and issues of children's ability of jumping, evaluating their own standing long jump (mathematics/technology), making a model of human leg to understand mechanism of jumping movement and doing experiments to find appropriate angle and strength for long jump (engineering/art and design/science), and planning activities for children based on what they learned.

The research of the conceptual change of the students in the physical education method class was done using image mapping. The comparison of the contents of pre-maps and post-maps, which were made by the students (N=9), were analyzed.

RESULTS AND CONCLUSION

After the learning, contents of "adjustments for jumping", "movements", and "animal kinds" in image maps were increased. It indicated that students could understand the components of jump movements scientifically, and apply their knowledge to planning activities for children. The activities included mimicking various animals' movements.

Ishizawa et al. (2021) had reported that this STEAM program had positive effects to the students' self-confidence on teaching jumping. As a conclusion, it was suggested that these cross-subjects understanding of jumping were the reason for that.

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Abstract

In the former research, we developed the STEAM learning program “Teaching Jumping” in Physical Education for university students. This research aimed to identify the changes in young female pre-service kindergarten teachers’ understanding of “jumping”, based on this program. After taking the learning program, students’ self-awareness about jumping were enriched. From the students’ image maps, it was shown that their concept of “jumping” became wider and clearer. Their awareness of the meaning of these cross-subjects learning was also shown in their final reports. Therefore, it was suggested that the “Teaching Jumping” program in Physical Education was effective for female pre-service kindergarten teachers.

Background & Aims

It was known that female teachers tend to have less confidence to teach ball games, track and field, and gymnastics in Japan (OYA and Shinbo, 2016). In former researches we found that the STEAM learning program “Teaching throwing” and “Teaching jumping” had positive effects to students’ self-confidence on teaching throwing and jumping (Ishizawa et al. 2019,2022). In addition, Ohnuki et.al.(2021) had reported that the STEAM learning program “Teaching Throwing” was useful for female pre-service kindergarten teachers’ scientific conceptual change about “throwing”. In this research, we focused on the other students’ scientific conceptual changes in STEAM program “Teaching Jumping” developed in Ishizawa et al.(2022) and analyzed its effectiveness.

Methods

Targets of this research was the pre-service kindergarten teachers (N=9) who took “Teaching throwing” program in the physical education method class. Their scientific conceptual change were shown in the image mapping. Then, the contents of pre-maps and post-maps were compared and analyzed.

STEAM program “Teaching Jumping”

- pre-map making(e.g., Fig. 1a)
- learning about the trends and issues of children’s ability of jumping (science/mathematics)
- self- and peer-evaluation of jumping motions using VTR (Fig. 2a, science/technology/mathematics)
- making a model of human leg using a paper cup and rubber bands to understand mechanism of jumping movement (Fig. 2b, engineering/arts and design)
- doing experiments for long jump using paper cup rocket to find appropriate angle and strength for long jump (Fig. 2c, science/mathematics)
- planning jumping activities for children based on what they learned (Fig. 2d, STEAM)
- final report and post-map making(e.g., Fig. 1b)

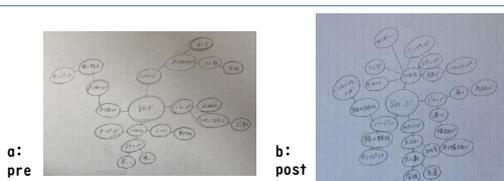


Fig.1 The example of students’ image maps of “Jumping”

Results

We divided the contents except directly unrelated to jumping in the image maps into nine categories (sports and activities, animal kinds, movements, jumping materials, place and occasions, human being and relationship, emotional feelings, adjustment for jumping, and body parts). From the comparison the pre- and post-image map, total number of words in increased from 157 to 173. Fig.3 shows the number of words in each category.

The contents of “movements” (e.g., hopping), “adjustments for jumping” (e.g., angle) (e.g., leg) were increased, which indicated that students could understand the components of jump movements scientifically. The contents of “sports and activities” (e.g., rope jumping) and “animal kinds” (e.g., frog,) were increased, too. They applied their knowledge to planning activities for children and the activities included mimicking various animals, relay race and high/long jump etc. In final reports, they didn’t know STEAM education before, but this program helped their integrally understanding for jumping. They noticed that there were many types of jumping activities and how to use the body for jumping were different in each. Thus, they seemed to think teachers’ need to provide children the opportunity to play with various jumps.

As a conclusion, it was suggested that these cross-subjects learning of jumping was effective for the pre-service kindergarten teachers.

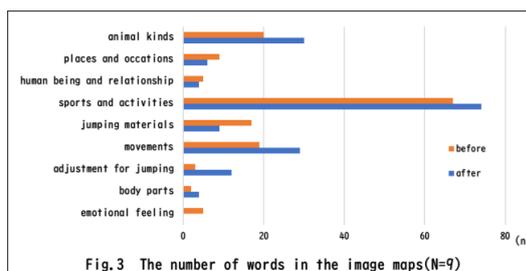


Fig.3 The number of words in the image maps(N=9)

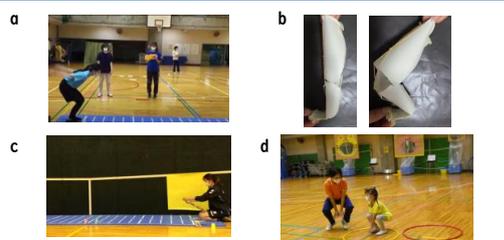


Fig.2 The contents of the STEAM program

References and Acknowledges

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