STEAM EDUCATION AT JAPANESE UNIVERSITY MUSEUMS: CASE STUDIES IN SERICULTURE AND SILK TECHNOLOGIES

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THEME:

STEM, STEAM, STEMM, STEM+C and STEM+ education

BACKGROUND AND AIMS

Science museums offer learners multisensory activities that inculcate scientific thinking and creativity within them and facilitate the increase of science specialists who can innovatively resolve sustainability issues in the context of STEAM education. University museums can become academic hubs that transcend the needs for cross-disciplinary knowledge; they occupy the unique position of bridging the past and present to elicit applications that will be required in the future. The present study explores object-based pedagogy at Japanese science university museums, posing the following question. What features of university museums contribute to the problem-solving of sustainability issues?

For this study, the museum at the Tokyo University of Agriculture and Technology served as an exemplar of museum-based science education to impart both discipline-specific and cross-disciplinary content. This science university has led the Japanese sericulture and textile industries since the 19th century and now promotes advanced research and education in sciences. Meanwhile, the Japanese silk industry is reconsidering its objectives at sustainable sericulture outcomes such as low environmental load and resource conservation.

METHODOLOGY OR PROCESS(ES) UNDERTAKEN

This study applied object-based learning to students, using models of silkworms, cocoon specimens, textile machines, and sericulture *nishiki-e*. Sericulture *nishiki-e* especially offer both academic and artistic value and demonstrate excellent characteristics for cross-disciplinary learning from discrete standpoints such as industrial history, art history, chemistry, cultural anthropology, and information technology (Fig. 1). The participants initially attained comprehensive historical knowledge of each target object in the museum setting via lectures from the curator and through object handling. They learned about the historical characteristics of their university as well as advanced silk technologies through academic interactions that included topics such as the liquefaction and powderization of silk for cosmetics, sponge and membrane formation for medicine, and the making of plastic resin for industries. The students were then asked to organize an exhibition. They were given three weeks to prepare for the exhibition before being trained to deliver a curatorial talk for visitors. Finally, content analysis surveys were conducted with the participants to determine the usefulness of object-based learning using physical items.

RESULTS AND CONCLUSIONS

The evaluation divulged that students were impressed by their introduction to the past and present through material objects resulting from research and educational activities and were pleased to connect theoretical and technological developments to ensure future sustainability. The efficacy of object-based pedagogy via authentic items at the university museum revealed

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that it functioned uniquely to bolster cross-disciplinary learning in students majoring in discrete disciplines.

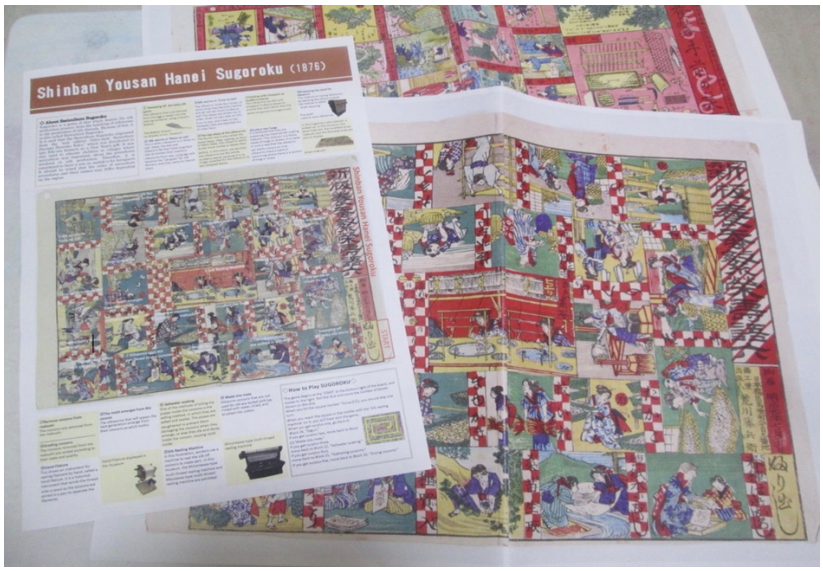

Figure 1. Sericulture *nishiki-e* for cross-disciplinary learning

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ABSTRACT
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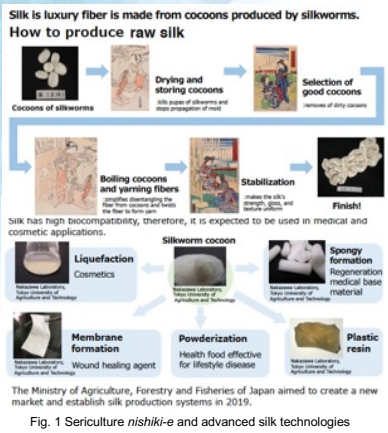

Fig. 1 Sericulture *nishiki-e* and advanced silk technologies

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