

THE EDUCATION UNIVERSITY OF HONG KONG
FACULTY OF LIBERAL ARTS AND SOCIAL SCIENCES

Research Output Prize
for the Dean's Research Fund 2021/22

Brief Introduction of Awardee's
Research Output/Publication and Future Research Development

Awardee (Dept):	Dr Sun Daner, Assistant Professor (MIT)
Publication/Research Output Title/project:	Design and Implementation of the Boundary Activity Based Learning (BABL) Principle in Science Inquiry: An Exploratory Study

A. Briefly introduce your research output/publication for which you have received the prize.

Research findings show that learning experiences in informal spaces can facilitate the acquisition of scientific concepts and the development of inquiry skills, as well as stimulate motivation. Educational documents (e.g. curriculum standards) also endorse teaching and learning practices in informal spaces. However, there is a limited number of successful programs or projects that integrate the merits of learning in informal spaces with formal learning. Nor have the existing programs been rigorously examined. Meanwhile, teacher competency in designing and implementing learning activities in informal spaces further hampers best practice of such learning. The result is an increasing gap between formal learning and learning in informal spaces. Although the ubiquitous use of mobile technology creates various opportunities for connecting the formal learning process with informal spaces, the record of success is limited in terms of curriculum design and implementation. Additionally, there is inadequate documental support (i.e. science curriculum standards, teaching materials, online resources) on best practices for connecting formal and informal contexts with mobile technologies. This constrains the sustainability and scalability of such learning and teaching practices. To address these issues, an innovative pedagogical principle Boundary Activity based Learning (BABL) principle has been proposed by Dr Sun and her collaborators, which extends formal learning into informal settings with the use of mobile technologies.

Guided by the Boundary Activity based Learning (BABL) principle, mobile technology supported inquiry learning activities were implemented in a primary four science class in Hong Kong. An exploratory study was conducted to examine the effects of the BABL guided inquiry activities on students' learning performance and to explore how the key element, the boundary object, operated in different learning spaces. In the study, mixed research methods were used

to evaluate students' conceptual understanding and their engagement in and attitudes toward BABL activities. The reciprocal interactions of students' cognition were qualitatively analyzed in terms of the forms and functions of boundary objects in the BABL environment. The results showed that students made significant improvements in conceptual understanding and were engaged in BABL activities. The study also revealed that the generation of abstract boundary objects, together with physical boundary objects, promoted students' learning and thinking as they shuttled between the classroom and the outside. This research contributes to informing educators about how to design and implement technology supported teaching and learning through the use of boundary objects in crossing learning contexts.

The output and the link:

- **Sun, D.**, Looi, C.-K., Yang, Y., & Sun, J. (2020). Design and Implementation of the Boundary Activity Based Learning (BABL) Principle in Science Inquiry: An Exploratory Study. *Educational Technology & Society*, 23 (4), 147–162.
- https://www.j-ets.net/collection/published-issues/23_4

B. How you used/will use your prize and perhaps its usefulness to your research development?

A part time researcher will be hired for analyzing related data of BABL principle in STEM education and further data analysis will be done for paper writing and publication.

C. Expected research outcomes/outputs/impacts arising from this prize.

- The principle of BABL will be further enriched with more data analysis and research findings.
- A journal will be submitted to journal in the area of educational technology or STEM education.