

# EXPLORING A TEACHING MODEL INTEGRATING SUSTAINABILITY AND STEM EDUCATION

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## THEME

STEM education and sustainability.

## BACKGROUND AND AIMS

According to the EPA (United States Environmental Protection Agency) sustainability is to create and maintain the conditions under which humans and nature can exist in productive harmony to support and future generations. To address the deficiencies in the area of sustainability, the term of sustainable development appeared in the World Commission on Environment and Development (WCED). Education is an important way to strengthen people's concept of sustainable development.

STEM education aims to cultivate talents capable of meeting 21<sup>st</sup>-century demands. Their relationship is that sustainable development is a theme, while STEM is interdisciplinary education, as shown in Figure 1.

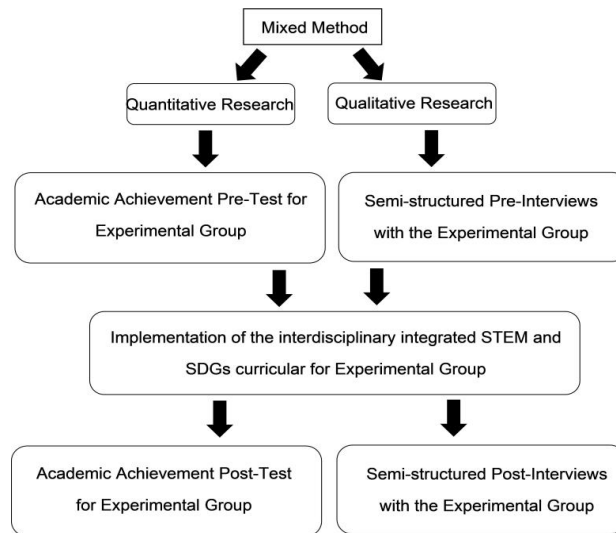


**Figure 1.STEM education and sustainability**

Dotson et al. constructed a circle learning model connecting the sustainability and STEM (Science, Technology, Engineering and Math) improved the awareness of sustainability and increased the skills of STEM. However, challenges remain in the sustainability and STEM education, the integration of STEM and sustainable development goals is rare in inclusive courses. This study focuses on the construction of interdisciplinary integration of STEM and specified SDGs which cultivate the core competence of 21<sup>st</sup>-century demands, raise awareness of next generation and improve skills of STEM.

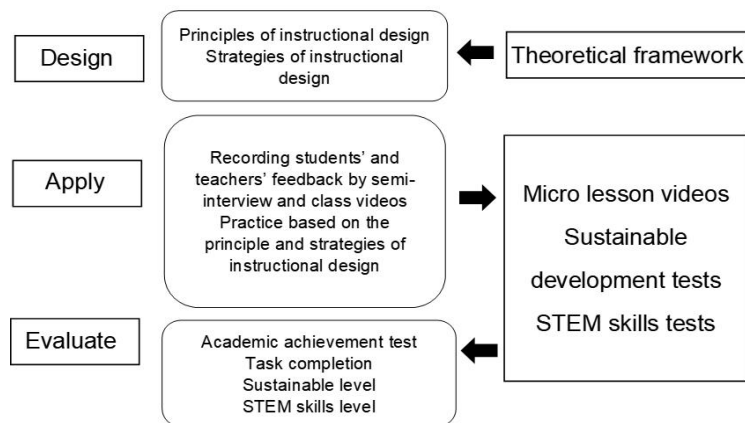
## METHODOLOGY OR PROCESS(ES) UNDERTAKEN

A mixed method, quantitative and qualitative analysis, was applied in this study. This mixed method is shown in Figure 2.



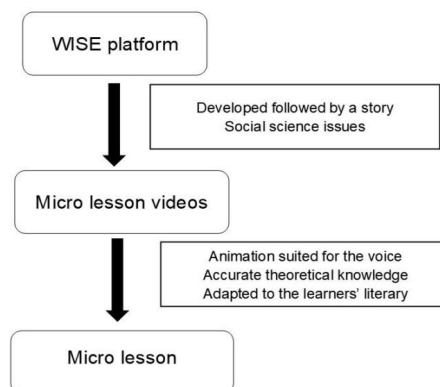
**Figure 2 Mixed study used in this study**

The method of construction of the interdisciplinary integrated STEM and SDGs curricular is Designed Based Research (DBR). The model of this curricular is shown in Figure 2.



**Figure 3 Designed Based Research approach**

The case curriculum designed by the SDG13 Clate Actions, the curriculum had been iterated for three times, the first time designed by the platform of WISE, and then the second time revise the problem of lacking social issues, the last production is revised by three micro lessons based on the modification of the curriculum language in second version. The model of third time iteration is shown in Figure 4.



**Figure 4 Model of the curriculum**

## RESULTS AND CONCLUSIONS

The interdisciplinary integration of STEM and sustainable curriculum could update the theoretical development and improve students' ability of STEM skills and the awareness of sustainable ability and improve teachers' sustainable development.

## REFERENCES

- EPA. (2022, March 9). *Sustainability*. United States Environmental Protection Agency.  
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- Dotson, M. E. , Alvarez, V. , Tackett, M. , Asturias, G. , & Ramanujam, N. . (2020). Design thinking-based stem learning: preliminary results on achieving scale and sustainability through the ignite model. *Frontiers in Education*, 5.