

Frugal STEM

An ACES Vietnam Case Study

Introduction

The Frugal STEM case study takes place in Hoa Binh, a mountainous province in the North of Vietnam. It is part of ACES Vietnam's Playful School model which features the use of Playful learning and Frugal aspects in education. This case study consists of teacher training workshops in various districts, focusing on gamification, STEM hackathons, design thinking, and evaluation of a design based on Frugal and Playful aspects.

Target Audience

The project involved over 1,100 participants: 1,000 students and more than 100 teachers in three local secondary schools of both primary and secondary levels across three schools in Hoa Binh City, Noong Luong, and Cao Phong in the Hoa Binh Province. In addition, its indirect beneficiaries included the school children's family and the local community. This is also a model educational framework for other schools/institutions in the province and the nation.

Aims & Objectives

The Frugal STEM project aims to provide teachers with innovative pedagogical approaches and curriculum transformation in alignment with the Ministry of Education and Training's policy (2018). Teachers are able to (i) gain insights into Frugal and Playful education, (ii) co-design learning materials and activities, (iii) demonstrate their lesson plans and teaching; and (iv) showcase their curriculum development.

In the workshops, teachers and students experienced playful learning and frugal education through gamification such as Folding Scope, Recycled Fish Tank, Maze Maths, Rainbow Science, MadLib Theatre, Escape Games, History Improvisation, and more, guided by the ACES Team. They then worked together, analysed the frugal and playful aspects of their designs, and co-designed a toolkit of playful learning activities, which are both context-based and textbook-adapted, making use of frugal materials and cultural aspects.

These activities empowered teachers and students' capability in addressing local issues and the UN's Sustainable Development Goals: SDG 3 – Good health and well-being; SDG 4 – Quality education; and SDG 5 – Gender equality. Resilience, cultural awareness, and employability were also in focus to support younger generations in building their future.

Sustainable Development Goals Addressed

- [GOAL 3: Good Health and Well-being](#)
- [GOAL 4: Quality Education](#)
- [GOAL 5: Gender Equality](#)

Timeline

The case study has been active since September 2020 and is set to complete by June 2022. It consists of 4 major sections: (i) Introduction of ACES and Frugal STEM, (ii) Gamification/Design Thinking, (iii) Evaluation of a design based on Playful and Frugal Aspects, (iv) Gamification Hackathons and Showcases.

Locations

- **Hoa Binh City**, Hoa Binh Province, Vietna
- **Noong Luong**, Hoa Binh Province, Vietnam
- **Cao Phong**, Hoa Binh Province, Vietnam

Lessons learnt

- Building trust and creating a good rapport with local institutions.
- Maintaining strong collaboration and support between stakeholders and the team.
- Encouraging teachers' confidence and commitment by providing on-going facilitation and school-based development programs.
- Simplifying instructions and guidelines for teachers and teacher trainers.
- Facilitating and encouraging teachers to recycle part of their current lesson plan.

Implications/Recommendations

- For policy makers: provision of system levels support for curriculum transformation, with particular regards to innovative approaches.
- For school governors: provision of support for teachers' school-based continuous professional development (CPD).
- For teachers: commitment for CPD so as to become change agents other than responding to the requirements by fiat.
- For project team members: further support and collaboration in planning the activities and recycling resources.

Detailed activities

Activity 1: ACES Model Introduction (Sep 2020)

Stakeholders:

- Officers, managers from DoET and Hoa Binh College of Education (n=44).
- ACES team member.

Aims:

- Engagement with stakeholders.
- Introduction of the ACES project.
- Discussion on access to the site, permission for doing research in Hoa Binh, how to conduct surveys / interviews to collect data related to SDGs and Resilience with different groups of participants.

Consideration:

- The first site, geographical location.
- Confusion about the new approach: a community-based educational model.

Intervention:

- Creating a good rapport and mutual trust based on institutions and team members' 'reputation'/recognition/commitment.
- Modelling Playful and Frugal Stem activities.
- Explaining the terms.

Activity 2: Playfulness towards an inclusive, safe and resilient society (11-13 Dec 2020)**Stakeholders:**

- Primary and secondary teachers (n=56).

Aims:

- Needs analysis.
- Tree of expectation.
- Teachers' perceptions of Strengths/ Weaknesses/ Threats/ Opportunities (SDGs and Resilience).
- Teachers' perceptions and readiness for playful learning and being an ambassador.
- Evaluation of the effectiveness of the ACES workshop.

Consideration:

- Teachers' poor awareness of Playful aspects.

Intervention:

- Follow-up discussions and sharing with teachers.
- Facilitation in teachers' lesson planning, using Playful aspects.
- Provision of sample Frugal STEM toolkits.

Activity 3: Frugal Education for Developing Social Resilience (26-27 Dec 2020)

Stakeholders:

- Secondary teachers and student teachers (n=30).

Aims:

- Teachers' perceptions and readiness for frugal education.
- Evaluation of the effectiveness of the ACES workshop.

Consideration:

- Teachers' poor awareness of Frugal aspects.

Intervention:

- Follow-up discussions and sharing with teachers.
- ACES's facilitation in teachers' lesson planning and redesigning an activity using Frugal aspects.
- Provision of sample Frugal STEM toolkits.

Activity 4: Playful teaching practices (Jan 2021)

Stakeholders:

- Secondary teachers (n=30).

Aims:

- Further guidelines on Design Thinking.
- Teacher's demonstration of Playful teaching practices.
- Teacher's reflection on one successful/impressive lesson, success factors, potential challenges of Playful and Frugal education, possible solutions and suggestions.

Consideration:

- Teachers' concern about the implementation of the ACES model in the current curriculum.

Intervention:

- Discussions and guidelines for teachers.
- Further facilitation in designing activities.
- Consultation and support from the school to assure that teachers are encouraged to make change in the syllabus.

Activity 5: Playful teaching practices (Follow-up activities) (Jan 2021)

Stakeholders:

- Primary and Secondary teachers (n=45) and
- Students (n=500).

Aims:

- Co-creation of lesson plans using Playful and Frugal Aspects.
- Further explanation of Vietnam ACES Model.

Consideration:

- Teachers' concern about the implementation of the model in the current curriculum.

Intervention:

- Discussions and on-going facilitation for teachers, particularly in co-designing activities.
- The School and ACES team's support in pedagogical approach, logistics and constructive feedback of teachers' demonstration.
- Teachers' reflection.
- ACES team's reflection.

Activity 6: STEM Fair (June 2021)

Stakeholders:

- All the school teachers (n=60) and students (n=500).

Aims:

- Implementation of Frugal STEM.

Consideration:

- Classroom management.
- Lesson planning.

Intervention:

- Teachers' reflection.
- Further guidelines on designing an activity and engaging students in co-creating a learning activity.

Activity 7: Implementation of Frugal STEM (June 2021 – August 2022)

Stakeholders:

- All the school teachers (n=60) and students (n=500).

Aims:

- Implementation of Frugal STEM.
- Guidelines on how to evaluate a design, using Frugal and Playful aspects.

Consideration:

- Teachers' commitment and readiness.

Intervention:

- Teachers' reflection.
- Further guidelines on designing an activity and engaging students in co-creating a learning activity.
- Co-creation of the toolkits.
- Observation of teachers' demonstration.
- Provision of on-going training and cascade training.
- Encouraging teachers' engagement in the STEMBucket Challenge.

Activity 8: Evaluation of Frugal STEM (Sep – Dec 2022)**Stakeholders:**

- All the school teachers (n=60).

Aims:

- Modification of Frugal STEM.

Consideration:

- Teachers' commitment and readiness after the completion of the project.

Intervention:

- Teachers' reflection.
- Provision of on-going support.
- Recognition of teachers' improvement as agents of change and ACES ambassadors.