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Project 4C-Minecraft

Developing 21st Century Skills in Schools for the Future Workplace

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Background

21st Century Employability Skills

Employer surveys indicate that occupation-specific skills and knowledge is insufficient in the ever-changing global workplace (OECD, 2017). Employability skills, also known as 21st century skills, transferable skills, transversal competences, soft skills or generic skills, are in demand at all levels of employment, either among entry-level or established employees.

In the 21st century labour market, employability skills are also necessary for sustained career success and job satisfaction. Students need to be equipped with higher-level cognitive skills and digital literacy required by potential shifts in future occupations; to be disrupted by automation in at least 60 percent of global occupations and at least one-third of the constituent activities (Manyika et al. 2017).

Brunei’s SPN-21 Curriculum

Therefore, in the formal education system, approaches to teaching and learning has to be reimagined to help students acquire higher-level cognitive skills, digital literacy and versatility to adapt to new and different job requirements.

SPN-21 (Acronym for Sistem Pendidikan Negara Abad ke-21) is Brunei’s reformed National Education System since 2009, to align its school system with global emphases on skills for a digital and information world, to develop student competence to support emerging ways of working, living and learning in a digital 21st century society.

Teachers are encouraged to integrate the broader skill sets (21st century skills) such as ICT skills, thinking skills and problem solving into content subjects in Brunei’s SPN-21 curriculum to develop thought processes for future job flexibility.

Overview

| Implementing Institution(s):       | Chung Hwa Middle School |
| Country and/or localities where practice has been implemented: | Chung Hwa Middle School, Department of Mathematics, Brunei Darussalam |
| Timeline:                          | May 2016 – ongoing |
| Target group:                      | High School Students |
| Total cost incurred/resources required: | • Windows 10 (version 1511 above) / macOS / iPad / Office 365 account  
• BND$50 for building the prototype |

Implementation of Project 4C–Minecraft

Chung Hwa Middle School (CHMS) in Brunei uses an immersive game-based platform to teach real-world employability skills through the mathematics syllabus. Minecraft Education Edition (M:EE) is used to develop the skills of 4Cs: critical thinking, creativity, communication and collaboration.

Minecraft Education Edition

Minecraft Education Edition, which Microsoft launched in November 2016, is a special version of the Minecraft game with added features, controls and tutorials to facilitate education use.

With an Office 365 education account, students could login to Minecraft Education Edition, whose
Beta Version was acquired for free with unlimited logins. Currently, it is USD$5 per user, for a year of unlimited logins. A free trial is available where users will be given a number of logins (25 logins for educators; 10 for students).

An educator can experiment at the classroom instructional level, needing just a school-specific email address provided by the education institution.

**Contexts and Phases of Implementation**

Project-based Minecraft was first implemented in 2016 in the Mathematics Department for classes of high school students. The students work in groups of 3-4 to build math-based structures; first as a virtual 3D structure on M:EE followed by the real-life 3D structure.

There are six phases of activities:

**Phase 1: Plans and Permits (1-2 weeks)**
- Deciding structure/building to create. Reviewing and previewing layout designed by each group. Drawing 2D using graph paper is recommended. If approval is made, they can proceed to the next phase.

**Phase 2: Design and Build (2-3 months)**
- Using Minecraft as a tool to build blueprint of their decided structure.

- Creating the 3D structure/building, practicing both plane and solid geometry, measurement as well as architecture skills.

**Phase 3: Mathematical Concept Findings (2 weeks)**
- Discussion among group members on mathematical skills used in creating the structure
- Drafting & measuring the structure using ratio & proportional in order to proceed to next phase.

**Phase 4: Prototype Building (2-3 weeks)**
- Building prototype of their structure/building.

**Phase 5: Presentation (1 week)**
- Group presentation on both Minecraft structure & 3D prototype structure.

**Phase 6: Assessment (1 week)**
- Individual & Group Assessment
- Feedback from Peers & Teachers

**Impact of Implementation**

Project 4C-Minecraft develops a 21st century classroom that focuses on both core content together with life and career skills, learning and innovation skills and digital skills.

In the context of mathematics subject content, the students demonstrated ability to explore area and
perimeter, reasoning with shapes, geometric measurements, analysing patterns and scaling. At the same time, the completion of the process skills of 4Cs were also developed in context.

1. Critical Thinking

Students are challenged to think about real-world requirements of design, encouraging higher order thinking skills such as thinking logically, solving problems, formulating creative solutions and finally taking action in designing building solutions in various simulated contexts.

2. Creativity

Students demonstrated creativity in designing structures, buildings, landscapes and virtual worlds, using their own idea, to move at their own pace to design and build their immersive environment, to freely experiment and learn from mistakes. Their imaginations are being stretched in a safe context.

3. Communication

Students are required to communicate their design ideas in the group, negotiating and agreeing on the best solution. They learn to communicate digitally through the chat feature in Minecraft Education Edition. Both one-way and interactive communication in physical and virtual world are essential 21st century personal and workplace skills.

4. Collaboration

Students work in teams as up to 30 students join in together in the same world in Minecraft Education Edition. Students / players have to learn how to settle with agreed compromises when there are different opinions, for the sake of moving forward to the next phase. Learning from and contributing to the learning of others. Meeting and working with other students from different culture and collaborating with teachers to complete a shared project.

Lessons Learnt and Future Outlook

Project 4C-Minecraft which integrates project-based and game-based learning to simultaneously develop content knowledge and 21st century employability skills has been implemented as an enrichment activity and has the potential to be replicated for other subject areas.

Institutions should design for 21st century learning which are necessary for future work competencies by planning project-based activities around the contents and standards.

In any TVET education institution, leveraging a game-based platform such as Minecraft Education Edition could be adapted to embed 21st century soft skills (or transversal skills) into any content or skill-based curriculum. The potential of digital games could also be used to engage the interest of the gaming generation.

Education Minecraft Edition already has lesson plans in a wide range of subjects for a variety of ages on website https://education.minecraft.net that could be a resource for replication to adapt to teaching and learning contexts.

Some lessons learnt as shared by the team to improve further implementation include:

- Teachers must guide / facilitate the lessons throughout the phases of implementation
- An introduction to the game and playing tips should be given before the start of the project
- Connect the project requirements to real-world takeaways
- A peer support system where expert students guide the newbies was useful. This should be considered in the grouping of students

Conclusion

Project 4C-Minecraft is an instructional strategy to integrate 21st century employability skills such as critical thinking, creativity, communication and collaboration into the classroom through a
common subject such as mathematics; via Minecraft Education Edition as a game medium using a project-based learning approach. This not only develops valuable career skills of critical thinking, creativity, communication and collaboration but also support STEM education and digital citizenship.

References


Further Information

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“Good Practices” are chosen according to selection criteria that have been created by a working group. They aim to serve as benchmarks for transformation towards quality TVET. However, they reflect on the individual circumstances of the submitting country and may only be adopted with context specific modifications.

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