Enhancing Experiences and Productivity in K-12 Education: Modular Multipurpose Innovative Pods as Learning Environment Space - A Case Study

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Abstract

This qualitative study investigates the deployment of modular multi-purpose innovative pods as flexible learning environment spaces within a K-12 education setting, addressing the persistent challenges of traditional classrooms such as noise distractions, limited adaptability, and inequities in student engagemen.

Grounded in innovative learning environment (ILE) frameworks, the research focuses on two primary objective:

1. Capturing the diverse experiences of staff and students utilizing these pods for a range of acitivities, including solitary focused work, collaborative group sessions, small-group instruction, and quiet reflection.
2. Explicating the productivity experiences of users, encompassing improvements in concentration, task completion efficiency, creative output, and overall learning efficacy in dynamic school environments.

The study will be conducted over a four-month period from December 2025 to March 2026 in an urban public K-12 school with approximately 400 students, involving 50 students aged 10-17 and 30 staff members (including teachers and school principal) selected through purposive sampling based on their frequent interaction with the pods. Data collection methods included semi-structured interview to elicit personal narratives, non-participant observations to document real-time behaviors and interactions, self-reported productivity logs using Likert-scale assessments for quantitative insights into focus and output and focus group discussions to explore collective perceptions. Thematic analysis of the data, facilitated by NVivo software will be used identifying inductive themes. This research contributes to the evolving discourse on ILE by providing empirical evidence on how innovative pods can bridge gaps in traditional K-12 designs, promoting equitable and productive learning spaces. Practical implications include recommendations for school administrators on pod implementation, teacher training for optimal utilization, and policy guidelines for sustainable educational innovations.

Introduction & Context/Problem

The landscape of K-12 education is undergoing a profound transformation, driven by the need to accommodate diverse learning styles, integrate technology seamlessly, and foster environments that prioritize student well-being and productivity. Traditional classroom setups often exacerbate issues like noise pollution, distractions, and a lack of personalization. Innovative learning environments (ILE) emphasize flexible, adaptable spaces that support student-centered pedagogies.

Modular multi-purpose innovative pods feature acoustic insulation (30-40dB noise reduction), automated ventilation, customizable interiors (1-6 users), and mobility. These transform underutilized areas into dynamic zones.

This case study explores pods in ILE context, with objectives:

1. Capture staff/student experiences (emotional, social, practical).
2. Explicate productivity (focus, efficiency, creativity).

Context & Problem

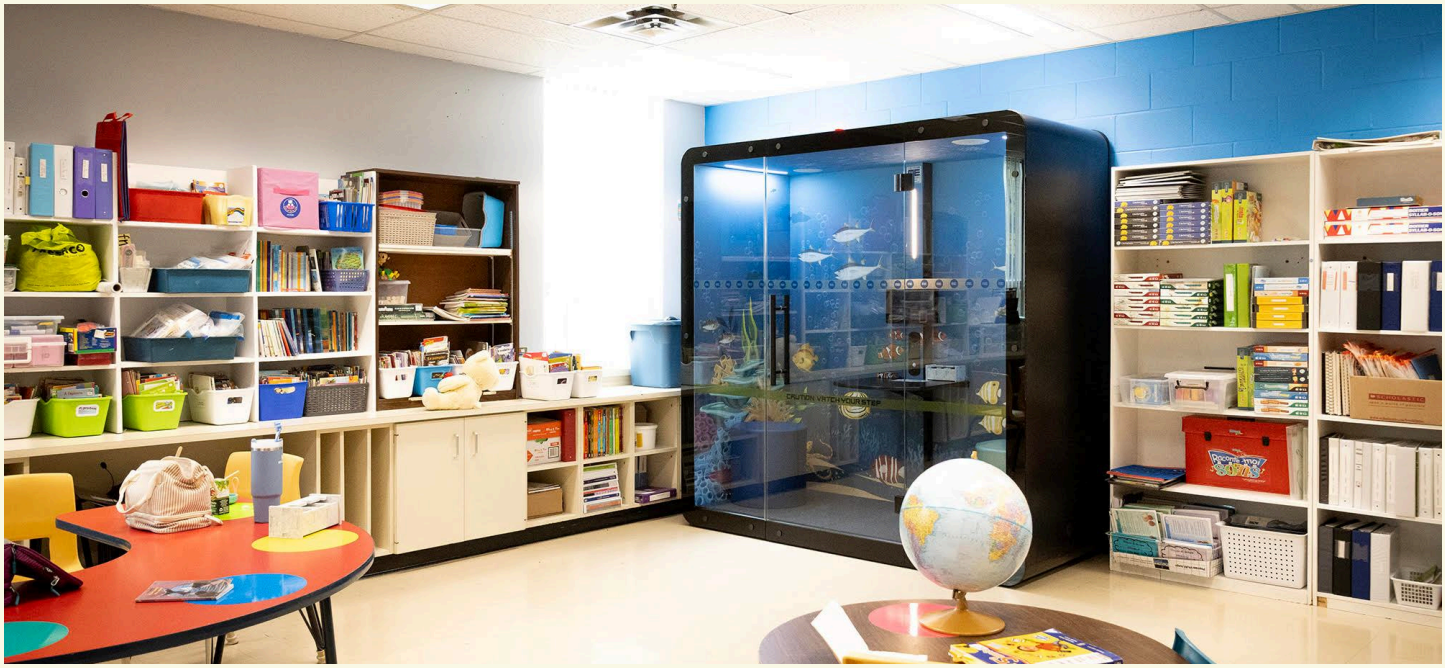
• **Challenges:** Ambient noise, spatial constraints, inequities for sensory-sensitive students.

• **Innovative Learning Environment:** Learning pods improved focus and motivation.

• **Pods as Solution:** Prefabricated enclosures mitigate distractions, promote autonomy.

• **Multifaceted Issues:** Budget limits, inadequate training, access equity.

• **Innovative Learning Pods:** Pods foster inclusive learning; students reduce stress, staff enable differentiated teaching.



Literature Review Summary

The literature emphasizes shift to flexible ILE for engagement and productivity (Imms et al., 2020).

• ILE Foundations: Spaces as active agents; promote autonomy (Charteris et al., 2017; Osborne, 2020). Modular units practical in constrained schools (Park & Lee, 2023).

• Pandemic Pods: Enhanced socialization, productivity (Horn & Staker, 2020; Public Impact, 2022). Equity concerns persist (McDermott, 2022).

• User Experiences: Positive attitudes, collaboration (McConnell, 2020; Mononen et al., 2023). Psychosocial impacts (Sundstrom et al., 2021).

• Productivity Outcomes: Design boosts problem-solving (Basister et al., 2025); creativity (Swanzy-Impraim et al., 2023); critical thinking (Bhuttah et al., 2024).

• Gaps: Limited qualitative studies on physical pods in K-12; this project addresses by focusing on multi-purpose use.

Research Methods

• Paradigm: Qualitative interpretive (Creswell & Poth, 2018).

• Setting: French urban K-12 school (400 students), pod in common area (Dec 2025–Mar 2026).

• Participants: 50 students (10-17), 30 staff (purposive sampling).

• Data Collection:

- Interviews (n=35, semi-structured).
- Observations (15 sessions).
- Productivity logs (200 entries, Likert scales).
- Focus groups (2 sessions).
- Analysis: Thematic with NVivo; triangulation, member-checking.
- Ethics/Limits: IRB-approved; single-site; future multi-site with quantitative metrics.

P	Date	Items	Description
1	Sept - Dec, 2025	Literature Review, tools, Ethics Approval	Selecting research articles, reviewing, and summarizing them; create and validating research data collections and analyses tools, complete the research ethics application to the University board, Data collection (consent forms for students, parents, school principals, letter of support from the school district).
2	Dec, 2025 to March, 2026	Data Collection Period beginning (Dec. 2025) mid-project February 2026) End (May 2026)	Communicate with school principals and teachers for times and periods, Travel to schools 1, 2, et 3, collect maps (from each interaction) and conduct all the interviews at three different moments of each case (students' project). Disseminate preliminary results
3	April to May, 2026	Analyze the Data relate to objectives 1 and 2	Conduct data analysis of each objective, summarize, interpret, and validate the findings
4	June. 2026 to Dec, 2026	Communication Of results to scientific community	Communication of results of the project to the scholarly and wider audiences research papers, communications at the scholarly events, as well as to wider audience (parents, industry partners, ministries, school districts government stakeholder, professional meeting, conferences, seminars (webinars), PD; sharing findings using different media (videos, webcasts, podcast)

Implications & Contact

- **Contributions:** Empirical evidence for ILE; bridges traditional design gaps.
- **Recommendations:** Admin implementation, teacher training, sustainable policies.

Key References

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