



SPOTLIGHT REPORT 1 — IN BRIEF

RESPONSIBLE INNOVATION: DESIGNING SCHOOLS FOR TOMORROW'S LEARNERS

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- How are the dimensions of Responsible Innovation applied in the design and occupation of the newly built schools?
- What are the reported educational needs, outcomes, challenges and processes?
- What elements of the Responsible Innovation model can be adapted to support the future design processes of schools?

We systematically collected 8,000 empirical papers, narrowing to a final subset of 29 articles that focused on participant experiences in new build schools.

We used the Stilgoe, Owen, and Macnaghten Responsible Innovation framework¹ as an analytical tool to code the content of the empirical findings and to identify recurring themes and common and divergent points of interest.

We then compared and contrasted which educational needs and challenges were articulated by the framework's four dimensions (anticipation, reflexivity, inclusion, and responsiveness) and identified the elements that are important in aligning the design of the school with the education system and its users.

INNOVATION IN SCHOOL DESIGN

Innovation in school design has become a key feature of international education policy. To prepare students as lifelong learners with competencies necessary for success in the 21st century, schools are required to support learners to design their own learning and to collaborate with others. In response to this challenge, educational systems in many countries are

investing in the innovative design and construction of schools to facilitate new ways of teaching and learning.

Compared with traditional schools, where students are in a single class led by one teacher, innovative learning environments allow students to spend more time collaborating with one another and to work individually to design their own learning. These forms of active learning are expected to translate into beneficial learning outcomes, such as improved knowledge retention and academic performance.

Yet, newly designed schools do not always realise desired outcomes. A key reason for this is the poor alignment between the intentions of the school design and the needs, values and practices of users in diverse contexts.

The prevailing design philosophy for innovative learning environments:

- Open, flexible, comfortable
- Aesthetically pleasing
- Integrated with technology
- Able to be reconfigured and reorganised for different teaching and learning experiences

¹ Stilgoe, J., R. Owen, and P. Macnaghten (2013), 'Developing a framework for Responsible Innovation', *Research Policy* 42:1568–1580

RESPONSIBLE INNOVATION

Responsible Innovation is an emerging concept that aims to balance economic, social, cultural and environmental needs during innovation to develop responsible solutions to existing and future challenges. Frameworks developed to shape Responsible Innovation processes include incorporating stakeholder views to build knowledge; anticipating and managing future needs; and seeking better alignment between the goals of the innovation and the values of users.

The Responsible Innovation framework developed by Stilgoe, Owen and Macnaghten has been applied to a wide range of cultural and political contexts. It provides four dimensions:

1. **Anticipation** involves systematic thinking aimed at increasing resilience, while revealing new opportunities for innovation and the shaping of agendas for socially-robust risk research.
2. **Reflexivity** at the level of institutional practice means holding a mirror up to one's own activities, commitments and assumptions, being aware of the limits of knowledge and being mindful that a particular framing of an issue may not be universally held.
3. **Inclusion** involves consciously seeking public and stakeholder voices to question the framing assumptions, not just of particular policy issues but also of the participation processes themselves.
4. **Responsiveness** is a requisite of Responsible innovation that enables the shape or direction to adapt in response to stakeholder and public values and changing circumstances.

APPLYING RESPONSIBLE INNOVATION TO SCHOOL DESIGN

Anticipation: The challenge of clearly understanding the potential impact of the school design innovation

The dimension of anticipation plays a critical role in designing and building innovative learning environments that are fit for school needs. This involves identifying common challenges in innovative learning environments, envisioning how these might play out in local school contexts, and addressing these challenges before they present as major barriers. Anticipation must also include consideration of the broader socio-political and environmental contexts in which schools will be embedded over the building lifetime. This goes beyond 21st century learning and planning for technology-rich environments to consider trends like population growth and displacement, and environmental trends such as increasing temperature, drought and extreme weather.

Across our analysis, professional learning was consistently identified as a crucial anticipatory support for teaching staff. Transitioning to more open, flexible learning environments involves building trust and skills to facilitate co-teaching processes and new forms of student behavior management. Teacher-focused professional learning is highly effective in supporting the transition into new innovative learning environments, but staff must be provided with professional learning opportunities that are sustained and authentic, and offer opportunities to shape school design processes as they reshape teaching practices. There is compelling evidence that specialised professional learning support for other key stakeholders – architects and designers, educational planners, and school leaders – is also necessary.

School leaders play a critical role in supporting the transition to new school buildings. When school leaders are able to follow through on the design, build, and transition processes, they can serve as important communication bridges between stakeholder groups, anticipating and mitigating challenges through all aspects of the process, but we found no evidence of professional learning support offered to school leaders to help them navigate these tasks.

Reflexivity: The challenge of aligning design, system and values with social and educational practices

The Reflexivity dimension is linked to questions about the purpose of education and about how school architecture supports that purpose. Reflexivity is applied across all levels of education, from system-level authorities and educational planners to architects and designers, school principals, teachers, and students.

Aligning the value systems and social practices of schools is a necessary, albeit challenging task. Educational planners, designers and architects first need to assess and reflect on how the design of the new learning environments will impact modes of teaching and learning across a variety of school spaces. Within schools, reflection and reflective practice have long been a feature of quality teaching and are considered essential for improving practice. School leaders state that their experience of innovative spaces prompts reflexivity and creates learning opportunities for changing practices, which in turn prompts the changing of spaces.

There is a strong case that school design should be analysed as a social practice that is driven by multiple motives, acknowledging the contradictions within the process. Using values-based decision frameworks helps to articulate the design intentions and develop shared understandings, which can then contribute to solutions for subsequent projects. Stakeholders have different expertise, agendas, accountability frames and motivations for the decisions that they make, and a values-based framework can address and make visible stakeholder differences throughout the design and occupation processes.

Inclusion: The challenge of including multiple stakeholders in the school design processes

Reflexivity and inclusion are highly interconnected concepts, particularly in the context of educational systems where inclusive access to schooling has been a persistent concern. It is clear that incorporating diverse perspectives into decision-making processes supports innovation and helps avoid mistakes. Bringing diverse viewpoints, with associated histories of exclusion related to ability, race, gender, class, sexuality, into collaborative contexts requires recognition of differential powers and privileges, both individually and institutionally wielded. Contextualising diversity is a critical ethical practice.

The evidence highlights that emotional capital is built through participatory design processes and that these affective investments in project outcomes are critical to the design of successful school innovative learning environments. Participatory design should be synergistic, combining perspectives and knowledge of different groups throughout the process.

Although there is growing understanding of the benefits of including students in design processes, we found only one study that examines how students were effectively engaged in a school design process. We also note an absence of research focused on including community perspectives in school design. There is increasing recognition that schools are multi-use spaces, with the ability to support community activities. Inclusion of community members as key stakeholders in the design process helps ensure that schools can more effectively serve the needs of students, families, and diverse surrounding communities.

Responsiveness: The challenge of adjusting and adapting school design innovation

Responsiveness has been primarily concerned with adapting practices to align with flexible and open spaces in new schools. Adaptation is often driven by testing and experimenting with various teaching and learning arrangements that include critical reflection and then action. These changes can disrupt traditional ways of working and create tensions for teachers.

School leadership plays an important role in supporting change within the school environment. Effective school leaders – principals and head teachers – recognise that new learning spaces represent invitations or provocations to do things differently. Opportunities for teachers to experiment, adapt spaces and change practices are enabled by the organisational conditions shaped by leaders in schools.

Structure and constrained flexibility also play a role in supporting transitions to new school spaces. The physical design and organizational features of the school can serve to constrain one behavioural choice and encourage another, thus supporting sustainable behaviour change. When spaces are designed for dynamic and fluid occupation, more opportunities for team teaching practices and for collaborative student learning emerge. However, in order for these structural nudges to function effectively, it is important for school leaders to foster a mindset of risk-taking, and a culture of trust.

The leadership dimensions of particular importance in creating effective learning environments are:

- Establishing school wide commitment to the identified practices
- Building professional capacity and communities of practice
- Promoting the use of student data as a mechanism for improving teaching and learning and well-being
- Creating a culture that includes collaborative decision-making and the on-going development of positive relationships with members of the school community

Hitt, H. D. & Tucker, P. D. (2016), 'Systematic Review of Key Leader Practices Found to Influence Student Achievement: A Unified Framework', *Review of Educational Research* 86(2):531–569

CONCLUSIONS

Research confirms the overall benefits of well-designed schools that are well used. For students, these benefits include increased autonomy and self-regulation, and flexible and collaborative learning. For teachers, benefits include increased agency and creative, high-trust collaborative teaching environments. In addition, there is an increased sense of belonging across all school community members.

Our analysis shows that investments in participatory design and associated professional co-learning opportunities can support successful transition and occupancy of innovative environments in schools. When co-learning takes place across a range of stakeholder groups such as designers, builders, and educators, it builds social and emotional capital amongst participants. This encourages relations of care and investment from all in making a successful transition to innovative learning spaces. Initial design processes which include discussion of underpinning values are critical for broad participation, involving not only designers, builders, and educators, but also students, families, and community members.

RECOMMENDATIONS

For researchers

A proliferation of research in the last five years has provided evidence to support the critical role of participatory design, professional learning, and effective school leadership. However, there remain significant gaps in our understanding of how to support Responsible Innovation within the school building sector.

- **Cross-disciplinary, interdisciplinary and transdisciplinary research**

It is critical that new school investments are *future-resilient*, able to adapt to uncertainty and variance. Educational researchers need to work alongside sustainability scientists, futures analysts, economists, and others to create research programmes that inform the design of future-resilient schools. Both forecasting and foresight need to play prominent roles in designing new school buildings. In the case of forecasting, this involves using recent data on climate predictions and population growth patterns including rural-urban, inter-state and international migration. Foresight requires synthesising expert judgment across a range of educational, architectural, and scientific disciplines, as well as using deliberative democracy, community asset-mapping, and other participatory methods to elicit ideas and concerns from the school and the broader community.

- **Collaborative, multi-sectoral research**

This is critical in both the design process and in the post-occupancy evaluation. There is a dearth of empirical evidence to support decisions about how and when to include students, families, and communities in the design of new schools, and regular evaluation of how school spaces are experienced by stakeholders, both immediately following the transition period and over time, are necessary. Decisions about new-build schools must be evidence-informed and involve authentic, multi-sectoral engagement.

For policy-makers

We propose five recommendations to help guide future innovations in school design and support governments, educational system planners, architects and school leaders to consider the suitability of school design in terms of its alignment with its users. It is hoped that engaging in Responsible Innovation will result in school learning environments that are well-designed and well used and sustainable.

1. **Develop understanding**

A clear articulation of the intended uses of an innovative space and the values that underpin the design is a prerequisite to building understanding among stakeholders.

2. **Ensure school designs are flexible and adaptable**

To be future-resilient, the physical spaces need to be easily reconfigured for multiple teaching and learning purposes, diverse user contexts and changing conditions.

3. **Engage multiple stakeholders**

Sustained engagement of diverse stakeholders in the design and occupation processes is critical to align policy with design and use. Professional learning and participatory practices should be employed to engage students, families and other members of the wider school community in these processes.

4. **Prioritise school leadership**

School principals with the autonomy to provide oversight and make changes are necessary to build capacity and create flexible organisational structures that will be able to respond effectively and sustainably.

5. **Embed assessment and evaluation**

Evaluation of individual schools is essential for determining potential educational, social and cost benefits, and for informing future development and innovation in design.

The Education Futures Spotlight Report *Responsible Innovation: Designing Schools for Tomorrow's Learners*, including the full list of references used in this research, is available on the Education Futures website.