

COMMENTARY

Architecting the 'third teacher': Solid foundations for the participatory and principled design of schools and (built) learning environments

Abstract

This issue of the *European Journal of Education* examines a crucially important, though largely overlooked, area in educational design research: architecting and building physical educational environments. Effective policymaking in school design necessitates the negotiated, shared and timely input of key educational stakeholders, including policymakers, architects, educational designers, pupils, teachers, and parents. Furthermore, practical, participatory and principled examples of the design and construction of bespoke learning spaces are warranted to guide those formulating and implementing policy, particularly the commissioning and construction of built educational environments. The articles exemplify how to engage diverse, key stakeholders in participatory design of school buildings, whilst practically illustrating design innovations in context. This commentary article offers reflections on the respective articles, informed by extant, relevant research on the history and praxis of school building design internationally. This includes the Reggio Emilia Schools' socio-material concept of 'the third teacher', a philosophy that is particularly germane to the participatory design of contemporary (built) learning environments. The article concludes with design sensitivities and SEAM framework (*space, engagement, aestheticity and media*), which can be used to explore and extend further the concepts, methods and technologies outlined in this issue.

1 | INTRODUCTION

The editors of this issue of the *European Journal of Education* set out to explore and enumerate concepts and methods to support the alignment of educational policy, architecture and construction, specifically in the area of school building design. To the credit of the editors and the authors of the five articles in this issue, this goal has been largely attained. This collection includes an introductory article by the guest editors and five articles that exemplify the application of participatory design practices to stakeholder-led, collaborative innovation in an area that - for its essential salience to the fundamental success of learning, teaching and assessment - has historically and problematically received relatively scant attention in the educational design research literature.

2 | PARTICIPATORY DESIGN OF (BUILT) LEARNING ENVIRONMENTS - MIND THE POLICY GAP

As the editors rightly note, there exists a dearth of research connecting policy cogently with the design of educational spaces: 'Clear policies about alignment between school buildings and offered curricula are often missing' (Könings & McKenney, 2017, pp. 247-252). This represents a problematic gap in educational design research for policy, especially considering the foundational and formative importance of the physical learning environments in which educational policy will either flourish or founder. Also important, but much less widely recognised, is the alignment of the educational vision with the physical learning environment, i.e. the building, as spaces for learning affect if and how the pursued

educational goals can be reached (Könings & McKenney, 2017, pp. 247–252; Nordquist & Laing, 2015) The articles make up a very timely special issue, a foundation stone so to speak, which should help to conceptualise and progress systematically the essential but frequently overlooked process of transposing school building design policy into effective and impactful architectural and pedagogical practice.

What is particularly noteworthy and valuable is the focus on design concepts, processes and technologies that are participatory, demonstrating for the educational design policy and research communities how novel collaborative methods can be deployed to involve key stakeholders inclusively and productively in school building design.

3 | REFLECTIONS ON THE CONTRIBUTION OF THE ARTICLE SET

Innovation in school building design – especially translating from policy to practice – is challenging and complex. The OECD's Centre for Effective Learning Environments (2011) has consistently emphasised the need to align our architecting and building of schools and educational spaces coherently and reciprocally with our developing and evolving understanding of pedagogy, teaching and assessment. In the innovative Reggio Emilia Schools, established in post-WW2 Italy to offer a much-needed, alternative, collaborative and creative approach to education, the physical learning space is attributed such importance that it is conceived as *the third teacher* (Strong-Wilson & Ellis, 2007). Furthermore, in the 'Reggio Approach', the prevailing pedagogical approach is students as *proteggazione* (or active protagonists) in their own learning. Educational design is regarded in this context as an inherently participatory, socio-material process – affecting and affected by the space in which learning is happening, and the formative interactions of learners, their peers and teachers within the designed environment.

What is especially noteworthy in the contemporary educational context internationally is the increasing diversity in school building design, reflecting a welcome, greater focus on bespoke development to suit embodied and inclusive pedagogy; the needs and requirements of pupils and teachers; and local school cultures and environs. Consequently, as Rigolon (2010) noted, de-privileging the traditional classroom as the predominant or exclusive site of instruction, and greater flexibility in the physical layout and design of learning spaces 'seem to be the major challenges of designing today's and tomorrow's schools'.

Yet, how do we systematically and effectively meet these complex challenges and engage with the main agents of change in education so that they are meaningfully and creatively involved in new and innovative school building design? How can we start to embody the third teacher design ethos of innovative approaches such as Reggio Emilia where the (built) learning environment is systematically accorded a more central role in our educational design policy and practice?

The editorial and articles in this special issue address key aspects – conceptual, architectural and technological – of how we might promulgate the better alignment of school building design, policy and practice. From an editorial perspective, the selection and ordering of the articles allow for complementarity. Also, the collaborative nature of the research and authorship lends an integrated dynamic and cogency to the articles and their presentation.

4 | ARCHITECTING STAKEHOLDER PARTICIPATION IN PARTICIPATORY SCHOOL BUILDING (RE)-DESIGN

A challenge for educational designers, policy-makers and practitioners is the dearth of comparative examples of systematic school building design, where the participatory design processes are outlined in detail, especially the phasing, elicitation and structure of stakeholder involvement. The first article by van Merriënboer, McKenney, Cullinan, and Heuer (2017, pp. 253–267) sets the context very well as a detailed and insightful enumeration of two comparable but contrasting school (re)-designs. The first design case study, the UCL Academy School in London, emerges as a green-field, new school build, whereas the second is a contemporary redesign of a school that is historically innovative and 'radical' in its ethos and mission, *De Werkplaats*, Bilthoven, The Netherlands, founded in 1926 by educational pioneer

Kees Boeke (Burke & Könings, 2016). Having myself visited the Kees Boeke School in September 2016, while a delegate at the Conference of the International Society for Design and Development in Education (ISDDE) in Utrecht, it was especially interesting to see this innovative redesign articulated in this special issue as a cross-context framework for participatory school building design. This cross-context comparative study is very salient, as it allows us to see the systematic unfolding of participatory design in two distinct settings, situated and developed within different socio-cultural and geographical contexts. A key contribution of this article is that it illustrates how policy can be instanced practically and pragmatically, helping to substantiate how school building design can translate from policy to practice across diverse school settings.

A key challenge in participatory school building design is facilitating – at the most opportune and timely stage – the right configuration and collaboration of stakeholders. Should too many stakeholders, without requisite, relevant ideas, be involved at a particular phase, the risk arises that the respective designs might become mired in extraneous, inessential detail. As the authors note: if too many features are suggested at an inopportune time, it can become very difficult to agree and settle on relevant constraints, possibilities and opportunity costs. Furthermore, the article clearly demonstrates how the early stages necessitate strong and clear, principled pedagogical direction – where the educational needs and requirements of the end users of the new (re)-designed learning space, are foregrounded *ab initio* from the very start of the design. In particular, this article makes a very important contribution in usefully clarifying what might be the best time to involve different stakeholders, and when is the most opportune point at which to seek and enfold their ideas in the design process. The research reported in the article should help policymakers, practitioners and educational designers to mitigate risks of not specifying the pedagogical design – sensitivities, principles and criteria – in a way that is driven by the 'pedagogical architects and builders' (Van Merriënboer, McKenney, Cullinan, & Heuer, 2017, pp. 253–267): the pupils, teachers, school management, etc. Importantly, as the authors of the article note, the design process is not a 'building project' *per se*, but rather a participatory design process involving structured, staged inputs from stakeholders at the points in the process where their expertise, perspectives and talents can have most effect.

5 | INCLUSIVE PARTICIPATORY DESIGN TOOLS FOR PROFESSIONALS AND NON-PROFESSIONALS

The second article by Janssen, Könings, and Van Merriënboer (2017, pp. 268–279) follows sequentially from the first, comparative, case-based study of school building (re)-design. It explores the key issue of the potential and role of design tools within multidisciplinary school building design projects where there are both professional and non-professional designers inputting to the process. Design tools for engaging non-professionals in specific educational design research activities and processes are still at a formative stage in their development. The research reported in this article is predicated on a very interesting conceptualisation of teaching practice as a sophisticated form of *rational bounded design* where teachers endeavour to attain multiple complex goals concurrently in their classrooms. The constraints and challenges that inhere in classrooms can militate against the success of teachers' achievement of these goals. Indeed, how do we *design* the process of participatory design, accounting for the complexities that educational professionals, such as teachers, must regularly apprehend and deal with in their classroom settings? This article presents tools to support non-design trained educational partners/users to engage creatively in specific educational design research. Furthermore, it instantiates and exemplifies how these tools can be deployed successfully in a classroom setting, specifically in the innovative teaching of biology. Hence, it stands as a complement to the other articles, illustrating practically how educational policy might be translated into practice through the development and deployment of design tools for non-design professionals engaged in educational design research.

The authors propose two high-potential tools to support policymakers and practitioners – who are often non-professional designers – in managing and progressing participatory school building design. The first is the *laddering tool*, which enables participants in the design process to map and share their multiple, diverse goals related to the

participatory school building design process. Secondly, the *building blocks tool* helps stakeholders to envision and examine real possibilities for the design of the innovative or new learning environment, aligning collaborative experiments in pedagogy with the practical layout of the classroom.

The conceptualisation of teaching as bounded rational design is also very interesting, reflecting – in a more realistic fashion – the practical, everyday exigencies and complexities that characterise modern classrooms. This article demonstrates how the two proposed tools are practically used by two teachers to experiment collaboratively and systematically in their teaching methods, and furthermore redesign/reorient their shared classroom layout so that it more effectively supports collaborative innovation in their teaching practices. The article also draws attention to the diversity and particularity of practice, even for teachers sharing the same space on a regular basis and teaching the same subject, in this case biology. Consequently, teachers need design heuristics such as the laddering and building blocks tools to make explicit, explore and collaboratively develop and redesign their teaching and the spaces in which their pupils learn.

6 | AN ARCHAEOLOGY FOR THE PARTICIPATORY DESIGN OF (BUILT) LEARNING ENVIRONMENTS

Following from the key questions raised in the editorial and first two articles, in the third article, Tondeur, Herman, De Buck, and Triquet (2017, pp. 280–294) take the reader through the compelling history of teachers' experiences of their physical classrooms and school buildings, covering a period of over 50 years, and brought to life through auto-ethnographical, biographical vignettes and reflections provided by the teachers themselves. They illustrate how we can unpack the 'black box of schooling' (Braster, Grosvenor, & Del Mar Del Pozo, 2011) using biographical-narrative enquiry methods, which are potentially very powerful in educational design, to excavate the often-hidden, but salient histories of school building design and the architectures that have scaffolded and shaped them over time. As Robinson (2010) implied, in trying to understand how we can effectively (re)-design education, we need to consider critically the barriers and resistance to educational change and reform in the 'habits of our institutions and the habitats which they occupy'. On reflection, in informing policy in school building design, how much do we know about classrooms and schools as physical environments, fossilised in their recent histories and pre-histories as lived educational spaces? Tondeur and colleagues note how we need to look deeply at the situated experience of everyday classrooms and teachers' experience of these spaces as living educational *places*. This reflects a critical contemporary debate in education, centred on the importance of both 'big' and 'small' data (Sahlberg & Hasak, 2016). The article thus makes a particularly valuable contribution in helping to clarify, inform and position our understanding of the crucially important, so-called 'small' data of biographical reflection and teachers' historical insight on the materiality of physical classrooms and school buildings. The research reported in this article demonstrates how we can give voice to teachers' perspectives. It brings teachers back into the design process by surfacing and examining their auto-ethnographic and biographical, narrative history as expert educational practitioners, both influenced by, and influencing the spaces in which they have taught.

The article addresses an impressive timeline: from c. 1960–2015, retrospectively and virtually excavating the histories and complex pasts of how teachers experienced teaching over this period in the emergent, changing physical spaces of their classrooms. The article usefully elucidates and exemplifies biographical-narrative methodology with teachers – particularly in respect of school building design. This could be adapted for and used in other countries and jurisdictions to support understanding from the critical perspective of educators and teachers of school buildings and classrooms, and the impact of their emerging and evolving, physical design and layout on learning, teaching and assessment. As the authors rightly conclude, the interesting and insightful teacher case histories and their aggregated analysis underscore the importance of looking at the learning environment as a complex ecosystem or *socio-material assemblage* (Latour, 2005). This is crucially important if we are to apprehend comprehensively and inclusively the many dependent variables that affect teachers and their interactions with

their pupils, fundamentally situated and constrained as they are by the physical design of their classrooms and schools.

It would be interesting and fruitful to apply the methods elucidated in the study undertaken by Tondeur and colleagues to the elicitation of useful, biographical and auto-ethnographical design data from the other key stakeholders, for example: tracing the history of school architectural design and policy through the case histories of experienced architects, educational planners and builders. Therefore, alongside instantiating innovative methods for undertaking elicitation and analysis of teachers' experience of the past and legacy of school building design, further cognate research of this kind is warranted, as it can help to uncover key issues we will need to consider, in progressing policy and practice in the (re)-design of school buildings and the architecture and configuration of their interior, 'formal' learning spaces.

7 | EXTENDING BIM TECHNOLOGY FOR PARTICIPATORY DESIGN THROUGHOUT THE SCHOOL BUILDING DESIGN LIFECYCLE

In the penultimate article by Koutamanis, Könings and Heuer (2017, pp. 295–305), the authors propose using a *de facto* standard in technology for architectural and building design, *Building Information Modelling* (BIM), and extending the potential of this powerful tool to educational stakeholders in the entire lifecycle of school building design. The authors recommend the use of BIM in this way to help to ensure that the ideas and requirements of different stakeholders marry in the ultimate building of the school.

Examined through retrospective analysis of the redesign and development of the innovative Kees Boeke School, the authors show how the deployment of BIM can help to foster closer, more effective collaboration where issues and problems can be identified and resolved as transparently and as early as possible in the process between educationists and key AECO (Architecture, Engineering, Construction, Operation) professionals.

As the authors rightly assert, ensuring the success of school building design is essential *ab initio*, as even small dissatisfaction with innovative or new school buildings can accrete and compound over time. The architecting and building of schools are intrinsically high-stakes enterprises and any misinterpretations or mistakes can prove extremely costly, especially in The Netherlands where schools receive a one-off investment for their buildings which is intended to cover a period of (at least) 40 years. This article is especially timely in that this is typical of policy in other jurisdictions where large-scale investments in school building and/or refurbishment are made only intermittently (den Besten, Horton, Adey, & Kraftl, 2011). Often, schools can find themselves for extended periods in physical disrepair or out-moded, so when investment is made available, there exists the imperative to 'get it right' with the school building (re)-design from the very beginning.

The empirical aspects of the research – exploring the troublesome disconnects and dichotomies that can emerge between educational stakeholders and AECO professionals – and the use of tools such as BIM to mediate more effective, aligned collaboration between these key design informants, makes for especially interesting reading and insight, both for policymakers and educational design practitioners. The authors rightly note how it is important to sustain the participatory input of teachers and school leaders throughout the lifecycle of school building design, as typically in the final Operation stage – where the school is finally being built – these key stakeholders can be less involved. BIM affords a shared 3D representation of the design of a school building and all communication between those in the design process. Exploring its affordances to extend its use to all stakeholders, and not exclusively to AECOs, throughout the lifecycle of design can help to mediate, support and augment closer, more effective collaboration between educators, learners and AECO professionals concerning what the final design of a new or innovative school will look like. This can help to offset potentially problematic and expensive design discrepancies and problems before they arise. The article illustrates how BIM can also be a very useful tool for supporting and visualising the kinds of rich descriptions that the preceding article excavates – the histories of the design and development of schools. This can furthermore help policymakers and practitioners to understand the living, socio-material ecosystem of the school and its built learning spaces and occupants over time.

8 | THE INTERDISCIPLINARY MODEL OF PARTICIPATORY BUILDING DESIGN

The final article duly ensues from the preceding four articles, and as the authors rightly note, collaboration processes for the many key educational stakeholders, in particular how they can optimally be involved in school building design, are not well defined or discussed in the literature. Through its drawing together of a range of systematic approaches into a cogent interdisciplinary design model, this article provides a useful 'capstone' to the issue.

Könings, Bovill, and Woolner (2017, pp. 306–317) look at a range of existing design approaches and methodologies in the synthesis of an innovative new model for participatory school building design. The article makes a significant contribution to the participatory design literature in education by exploring a number of the extant approaches, 'Action research cycle, stakeholder analysis model, ladder/climbing frame of participation and participation matrix'. This leads the authors to posit a bespoke, integrated framework, the *Interdisciplinary Model of Participatory Building Design*, which can be adopted and adapted collaboratively by the key educational stakeholders to support the principled, participatory design of school buildings and (built) learning environments.

The article echoes a key theme of the special issue, underscoring and highlighting the importance of multi-perspectival design, where key stakeholders' diverse concerns and viewpoints are effectively represented and enfolded in school building design, particularly the empowerment of teachers in a process that is genuinely and systematically participatory. As the authors note: while involving multiple stakeholders and their respective concerns and points of view is to be welcomed, encouraged and supported, the associated increase and divergence of perspectives can add significantly to the complexity of educational design processes. They rightly note how the richness of ideas and viewpoints can also lead to fruitful creativity and diversity in ideation processes relating to educational design, and if mediated and negotiated effectively, can result in useful and impactful contributions to the design and development of new school buildings and educational spaces.

The work reported in this article was situated empirically in the Teaching Hotel of the Hotel Management School in Maastricht, The Netherlands, which is itself a bespoke educational building design, foregrounding and promoting student voice and participation. The organisation of the 16 participants in the symposium into 4 heterogeneous groups, each comprising one architect, an educational designer, one student and one teacher, constitutes a very appropriate and interesting approach to commence a dialogue around how different educational stakeholders envision their respective and collective participation in school building design. The visual methods employed in the research and the plenary afforded interesting data around how we might best organise and progress authentic, participatory school building design.

Looking at the data collected in the symposium held at the innovative Teaching Hotel, Maastricht through the lens of a number of participatory design approaches, including Action Research Cycle and Ladder of Participation Tool, the authors also helped to highlight the roles assumed by different stakeholders and how these roles can change over time in the process, depending on the stage of a particular school building design. A further salient issue to arise in this research is the imperative to provide – at the right time – hands-on, high-fidelity material design resources and models of school building innovations – to help to concretise the design process. This can support stakeholders to envision the design of their new school and engage in meaningful discussion in order to progress a school design innovation concept towards completion. This research also shows us that school building design is essentially a spiral process – 'iterative, dynamic and progressive over time'.

The key output of the article, the Interdisciplinary Model of Participatory Building Design, makes a significant contribution by providing policy and decision-makers and practitioners a framework to address systematically the multiple stakeholder concerns, inputs and roles involved in participatory building design. It also affords guidance in terms of when their inputs are most effectively and opportunely sought and incorporated in the design process.

The synthesis of the different, extant models of participatory design in the Interdisciplinary Model of Participatory Building Design is especially useful, leveraging the insights and systematicity of the respective, structured approaches and frames that are incorporated within it. The accretive, cyclical and consultative framework of the

authors' proposed model follows an iterative *design experiments* (Brown, 1992) ethos, with an augmented 'snagging' phase, thus helping policymakers and practitioners to minimise 'the chances of making extremely expensive mistakes in the form of buildings that are not fit for purpose' (Könings, Bovill, & Woolner, 2017, pp. 306–317). Indeed, it is particularly noteworthy how the authors describe the potential of the participatory design process and model in continuing to inform the design of new school buildings as they grow synergistically alongside future educational innovations – most likely initiated and driven by policy – and schools' everyday, lived changes and dynamics as complex educational ecosystems.

9 | PROGRESSING THE RESEARCH POLICY AGENDA: DESIGN SENSITIVITIES FOR BUILT EDUCATIONAL DESIGN

A key challenge in participatory design-based research is to establish the ecological validity of our interventions and illustrate their potential scope and impact beyond the immediate design context. It raises the questions of whether and how we can take the potential of bespoke designs that are situated within specific educational contexts and transpose these to other settings which have their own respective constraints and possibilities (Thompson Long & Hall, 2017).

The special issue affords concepts, methods and tools that can help policy to advance in terms of participatory design where the physical learning setting and pedagogical activity are conceived of as mutually interdependent and enhancing.

However, continued research is now warranted to verify further the ecological validity of the concepts, methods and theories across a wider set of diverse learning settings. For example, it would be instructive to look at schools where it would not be possible to develop a greenfield site – or where an innovative ethos is not extant –, but rather, where existing, more traditional school buildings and teaching spaces need to be redesigned and repurposed.

Furthermore, although this special issue engages with key aspects, there are elements of the built educational design that remain unaddressed, e.g. technology-enhanced learning. It would be instructive to identify and explore the other critical components of the architecture of school design, and how these can be combined and integrated with the work presented here, to offer a comprehensive toolkit for the design of schools and (built) learning environments.

The robustness and usefulness of educational design are achieved through the specific types of outputs described by McKenney & Reeves (2012). At the *proximal* level, the impact on learners locally helps to show the sustainability and practical efficacy of the design, whilst the *distal* contribution can provide more general 'design sensitivities' (Ciolfi & Bannon, 2003). Thompson Long and Hall (2015) added a third, *medial* dimension, to include adaptable resources, which would include artefacts such as blueprints, rubrics, software specifications, syllabi, timetables, etc.

This special issue makes significant contributions across all three axes of impact, illustrating conceptual and theoretical approaches, exemplar processes, and new technologies for participatory design of built learning environments. To this we can synthesise and add some key ontological themes to help orient subsequent and future participatory design work that might ensue from this special issue.

Considering the pedagogical importance of the physical space as the third teacher, what design principles and ontological sensitivities are salient as we seek to build on the solid foundations and scaffolds provided by this special issue? By way of an initial synthesis, and predicated on my analysis of the articles in this special issue set in the context of extant research on the design of technology-enhanced embodied learning environments (Flanagan & Hall, 2017; Hall, 2012), I would like to suggest an ontology of emergent, key design sensitivities: *space, engagement, aestheticity and media* (SEAM).

SEAM proposes to expand our unit of analysis beyond the school, to look at the interconnection of schools with other formal and informal learning spaces and settings. It is intended as an integrative, working framework for design, seaming together four key areas of focus for progressing the imperative research agenda outlined in this special issue.

1. Space – not only interior learning spaces, but how design becomes enacted, experienced and lived across indoor and outdoor learning spaces and formal and informal education; how schools physically connect to and reflect other important educational sites, e.g. museums, educational gardens, aquaria, science galleries, etc.

2. Engagement – allied to a multi-site focus, we should also consider the process of *flow* (Csikszentmihalyi, 2014), and particularly how it emerges and changes as children, learners and teachers move in and between built learning spaces, indoor and outdoor, informal and formal.
3. Aestheticity – how we can make schools and all formative (built) learning spaces beautiful and attractive for children, learners, and educators; furthermore, how might we make learning spaces multi-sensorial and truly aesthetic, in the sense of activating and engaging learners' different senses and the full range of their creative modalities – the *hundred languages* of learning as they are called in Reggio Education (Strong-Wilson & Ellis, 2007)?
4. Media – and what role does the digital play in this, whether mobile or ubiquitous computing, or blended and mixed reality technology? How can we integrate technology effectively within the socio-material design of built environments for learning that are beautiful and inspiring so that it augments the educational experience?

10 | CONCLUDING NOTE

From biographical enquiry to unearth teachers' histories of their physical school environments and novel design tools for engaging diverse stakeholders, including design non-professionals, to innovative pedagogical applications of architectural design technology, this special issue helps critically to inform policy and practice in the design of school buildings and (built) learning environments. According to Damasio (2000, p. 252), the correct and comprehensive understanding of the human mind and learning is as an embodied process, construed from 'an organismic perspective/ related to a whole organism possessed of integrated body proper and brain fully interactive with a physical and social environment'. Policy needs to engage systematically – in a principled and participatory fashion – with the design of the (built) physical learning environment as the third teacher. The articles in this special issue provide promising and timely concepts, methods and technology to inform educational policy and take forward the important work of creating places for learning, built on solid foundations, both architectural and pedagogical.

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