

# Digital Personalization in Early Childhood

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# Digital Personalization in Early Childhood

## Impact on Childhood

Natalia Kucirkova

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## Personalized Pluralization

Some may argue that my account of personalized learning and personalized education has painted personalization in pure colours of an isolated practice, which, at its best, can support the enactment of the 5As (Chapter 6) and, at its worst, leads to technology-driven approaches to public education (Chapter 3). A focus on personalization in itself leads to a kind of interactional sterility. In this chapter, I aim to set the record straight and, in alignment with Bronfenbrenner's bioecological theory (Chapter 1), present personalized education as part of a personalized pluralization system. In personalized pluralization, pluralization, which is the antidote to personalization, constitutes its very existence.

I begin this chapter with a synthetic approach to the pedagogies of personalized education, with an attempt to bring them together in one pedagogical framework of personalized pluralization. I then summarize the material outlined in the previous chapters by returning to the main themes of autonomy, authorship, aesthetics, attachment and authenticity. I bring together the main concepts I have used in my account of personalization in early years and map a future for fruitful personalization studies.

### What is pluralization and what is its relationship to personalization?

Before I delve deep into the 'hows and whys' of personalized pedagogy, I interrogate the question of personalized education with a short reflection on the conflictual relationship between personalization and its counterpart: pluralization.

For decades, educational reforms in the United Kingdom and the United States have been going through a conflict between, on the one hand, mass education with its inevitable need for shared student performance standards, and, on the other hand, differentiated instruction, with student-centred teaching and self-directed learning. The latter is difficult to implement, while the former has been universally implemented with prescribed guidelines for curriculum, central control and organized progression of students across levels. The issues of differentiated versus mass instruction have been positioned in a binary relationship with a variety of terms used throughout the education history, including 'responsive teaching approach' versus 'teach-by-the-

numbers approach, 'student-centred teaching' versus 'instructor-centred teaching' or, more recently, 'personalization' versus 'standardization' educational debates. These distinct descriptors are in the history of education comprehensively referred to as personalization and pluralization, encompassing the full range of either plural or singular forms of learning (Kucirkova & Littleton, 2016).

As argued in Chapter 3, if positioned in isolation to other models (cf Prain et al., 2013), personalized education can easily become techno-centric, privileging the individual-centred industry agenda over community-focused pedagogy and the collective voice of the classroom. The absence of a guiding theoretical framework in personalized education has further widened the gap between government rhetoric and actual practice, with oversimplified applications of the personalization mandate, particularly in relation to technology deployment and curriculum content. Couched in terms of individualized lessons and adaptive teaching content, the personalization movement has led to an increased use of personal mobile technologies and schools' investments in customizable educational software. This trend runs in opposition to the pluralization trend: technology deployed within the pluralized education paradigm tended to respond to collective needs and focused on large-scale hardware deployment designed for collaborative learning, such as, for example, interactive whiteboards. It goes without saying that the dynamics in a classroom are different if all students attend to their individual screens instead of one.

Technology advancements do not always run in parallel to the developments in the education sector, but in terms of the personalization–pluralization pendulum, there has been some change to the curriculum and the key skills mandated in the national standards over the past decade. In a simplified representation, the standardized curriculum places emphasis on mathematics, problem-solving, reading and grammar, while the personalized education curriculum foregrounds the so-called twenty-first-century skills such as computational thinking, creativity and collaboration across media. I can see the value of talking about specific competences being relevant for specific historical eras, but I don't see much logic in describing certain skills as 'twenty-first century skills', especially if they relate to all-time skills such as communication, creativity or collaboration. I argued in my work that conceptualizing personalization as the opposite approach to standardized education means swinging the educational pendulum to another extreme. Such a definition risks oversimplification and amounts to a reductive view on learning which 'obscures essential questions about the social and communal purpose of education' (Philip & Garcia, 2013, p. 306). In Chapter 6, I proposed that the key themes of personalization – autonomy, authorship, aesthetics, attachment and authenticity – need to be approached from a humanist perspective to realize their socio-moral objectives. In the previous chapter, I suggested that humanist and democratic versions of personalized education could act as a connecting bridge between an individual and a collective voice. These considerations are all part of my efforts to develop a rhetoric that would reflect a personalization–pluralization synergy and that would combine the personalized and pluralized (standardized) concepts of education. Personalized pluralization is a pedagogical framework that can be applied with or without the use of digital technologies. Its theoretical and empirical origins are described next.



## Personalized pluralization: Origins

The motivation for my development of personalized pluralization came from the lack of such a framework for personalized education, from my existing empirical and theoretical work, and a recent collaboration on a community-oriented digital personalization project (Kucirkova & Littleton, 2017). Inspired by the humanist agenda described by Todorov (Chapter 6), Vygotsky's theory and the emerging data on personalized books, I operationalized personalized education by connecting the dots between individual/personal and collective/pluralized sides of learning.

An adequate pedagogical framework should, in addition to a statement of teaching goals, also take into account the resources supporting the teaching and the impact these resources have on individual children. With the focus on a specific resource of personalized education – personalized books – I outlined in Chapter 7 the current research concerning the benefits and limitations of using personalized books with young children. Well-designed personalized books can support children's language development, but, at the same time, they heighten children's focus on self and could potentially restrict their collective identity. Similarly, there are two sides to the learning benefits of personalized education facilitated by touchscreens. In my summary of studies concerned with touchscreens in early childhood, I cautioned against universal assumptions behind personalization and illustrated with a number of case studies (Chapters 8 and 10) that not all students are motivated and skilled enough to take ownership of their learning. I drew on findings from the cognitive psychology research (Chapter 7) and the developmental psychology perspective on identity (Chapter 9) to explain that there is a delicate balancing act involved in harnessing the benefits of personalization for motivation and guarding against self-centred orientations.

Teachers can largely facilitate and accentuate the effects of personalized learning, especially if they adopt a community-based approach to personalized education and use the affordances of new technologies for authoring and co-authoring new contents with the children. Teachers can also develop particular 'rules of play' for the learning community in a given context. For practising, researching and deploying personalization in early childhood, I call the rules of play *personalized pluralization*.

## Personalized pluralization: Aims

Personalized pluralization intentionally integrates the two poles of educational practice: personalized/differentiated or individualized and standardized or collective learning. Personalized pluralization is a conceptual model, built to inspire practical application. As the name indicates, it consists of two parts: personalization and pluralization. The personalization part accommodates the 5As and the pedagogical techniques of creative teaching, design and digital making and haptic and embodied learning. Pluralization refers to standardized education, collective learning and socio-cultural approaches that foreground multiple ways of knowledge representation, the collective and communal rather than the individual and independent self. This book

is focused on the personalization part, and, therefore, I do not detail the pluralization principles – there are many other publications covering this subject in depth. For example, Anna Craft's (2011) 4Ps of digital childhood provides a useful perspective, in that she weaves plurality into other dimensions of childhood: 'plurality of identities (people, places, activities, literacies), possibility awareness (of what might be invented, of access options, of learning by doing and of active engagement), playfulness of engagement (the exploratory drive) and participation (all welcome through democratic, dialogic voice)' (Craft, 2011, p. 33). Building on this work and in the space remaining here, I offer an account of the synergistic relationship of the two sides of education. I explain the central premise of personalized pluralization by drawing on Vygotsky's theory, which integrates the personalized pluralized pedagogy with educational benefits in the cognitive, affective, intellectual and practical domain.

### Personalized pluralization and dialogism

Personalized pluralization is a model of education where personal gains are balanced out with the needs of the social community and the actual or implied influence of others. It is a model that draws inspiration from the field of dialogicality and dialogism. The literature names as the father of dialogism Mikhail Bakhtin, who has advocated for the recognition of a continuing dialogue between self-within-others and others-within-self in each human activity. Readers who consider dialogic and dialectic dimensions of Bakhtin and Vygotsky as opposite approaches may need an explanatory note for why I had introduced Bakhtin's ideas to the final discussion. My understanding of the relationship between Bakhtin's and Vygotsky's theory was sharpened after reading an informative piece written by Ravenscroft, Wegerif and Hartley (2007). In this article, the three UK leading professors of community-oriented applications of learning technologies explain that 'dialectic and dialogic are two relative dimensions that are not in opposition, as they focus on different yet equally important features of the dialogue process relevant to learning' (p. 46). While the dialectic approach of Vygotsky foregrounds cognitive dimensions of learning, the dialogic approach of Bakhtin foregrounds 'emotional and interpersonal dimensions, or the sort of "relationships" and "intersubjective orientations" that enable the spaces where learning can happen' (Ravenscroft et al. 2007, p. 47). Importantly, dialogic and dialectic approaches 'will always interplay and vary in emphasis based on what is wanted from a learning situation' (2007, p. 47). It is this interplay of emotional and cognitive, of intra- and interpersonal that I adopted for the personalized pluralization model, and the reason why I chose to include Bakhtin's work in its conceptualization.

Inspired by Merelau-Ponty's dialogism, in which the 'self and other are not merely positioned, but implied in one another in a way that secures both their intimacy and their differentiation' (Baerveldt, 2013, online), dialogism addresses the question of how personal meanings dovetail with those of others, and how they circulate through the embodied action and representations of these meanings in others and selves (see Markova, 1997, 2001). A more detailed discussion of Bakhtin's influence on my

conceptualization of personalization is in Kucirkova (forthcoming). Next, I outline how personalized pluralization relates to Vygotsky's socio-constructivist orientation.

## Personalized pluralization and Vygotsky's theory

Although the individual building blocks of a personalization–pluralization balance and affective/cognitive balance could be attributed to many scholars, it is in Vygotsky's writings, that we find a theoretical treatise of all aspects. Vygotsky's theory (1987) is based on two foundations: that of intra- personal and interpersonal ways of learning. Intrapersonal aspects refer to the personalization side and interpersonal aspects to the pluralized side. The two are positioned not in opposition to each other but function in an interactive and dialectical relationship of meaning-making. Vygotsky's recognition of the intertwined relationship between the two aspects comes out clearly in this quote: 'Any function in the child's cultural development appears on stage twice, that is, on two planes. It firstly appears on the social plane and then on a psychological plane. Firstly it appears among people as an inter-psychological category, and then within the child as an intra-psychological category' (Vygotsky, 1978, p. 57). In other words, Vygotsky argued that any mental or physical activity is always double-faced: it is not only about us, but also about others. As a fusion of antitheses in Janusian thinking, Vygotsky's (1978) two-layered conceptualization of mind laid down the foundations for an interchange between personalized and pluralized knowledge pursuit: a learning process in which every aspect of self operates on both personal and shared (or intra- and interpsychological) levels. The sequence or emphasis of the two depends on the learning situation and the socio-cultural context of the interaction, but the two are always present to at least some extent. According to Vygotsky (1928), the personalized and pluralized learning paths (or the inter- and intrapersonal aspects of human thinking) need to run in parallel towards one meeting space of meaning-making. In his later writings, Vygotsky (1967, 1978) positioned himself as a dialectic theorist, who emphasized the intersubjective (or pluralized) aspects of learning that are realized through shared social interactions.

## Personalized pluralization and the technology–teacher synergy

As mentioned in Chapter 1, according to Vygotsky (1967), a child's learning can be extended with the help of 'more knowledgeable others' as well as mediational tools. Relevant to his time of writing, Vygotsky defined the mediational tools as 'various systems for counting, mnemonic techniques, algebraic symbol systems, works of art, writing, schemes, diagrams, maps and mechanical drawings, all sorts of conventional signs and so on' (1981, p. 137). Today, the 'various systems' would include the many technologies that expand and reflect the individual and social knowledge of our times, notably those which offer powerful personalization and customization options such as tablet and smartphone apps or adaptive courseware. Vygotsky's proposition that tools are important knowledge mediators recognizes that some technologies can extend

learning and understandings in fundamental ways. If we trace this concept back to the pluralized personalization education perspective, we can see how balanced learning is jointly constructed across the minds and bodies of individuals and communities of individuals, and how it is embedded in the objects we interact with, both in terms of the cognitive and affective dimensions. This principle has later become axiomatic to distributed cognition theories (see, for example, Dillenbourg, 1996; Salomon, 1998) in which others as well as various tools mediate the distribution of knowledge and, in doing so, they pluralize personal knowledge to various forms and contents.

Thus, according to socio-constructivists (drawing on Vygotsky's socio-cultural theory), best learning occurs with the assistance of teachers (or parents and other caregivers) as well as specific tools (i.e. teaching materials or technologies supporting learning). Technology can largely facilitate the learning process (e.g. challenging texts from various web sources, genres; using the words in various communities for discussion) but teachers are indispensable in providing learning environments to nurture students' intellectual as well as practical skills. Therefore, personalized education that is 'technology-assisted and human-powered' (Guernsey, 2016) is more visionary and theoretically sound than the current technology-centric personalized education.

### Personalized pluralization: Children's skills

Personalized pluralization is built on socio-cultural and humanist principles that accommodate children's authentic thinking but also challenge them to adapt flexibly and creatively their unique strengths and weaknesses to the myriad of influences that shape children's local and global contexts of existence. Such an approach addresses learner variability and orients the 'learners towards a lifelong learning vision of their knowledge and of the world' (Leone, 2009, p. 43). The skills I perceive as crucial are aligned with what Golinkoff and Hirsh-Pasek (2016) describe as the 6Cs of interrelated skills necessary for today's children: collaboration, communication, content, critical thinking, creative innovation and confidence.

Importantly, and to a large extent contrary to the current practice, personalized pluralization should support children's social awareness and provide a way for increasing similarity as well as difference among the students. In personalized pluralization, the teacher is assigned the role of a what I think of as a 'homeostatic regulator', who needs to ensure that the opposing forces of intra- and interpsychological aspects of self are in harmony and nurture balanced dispositions. The balanced dispositions correspond to the virtues of democratic citizens and to what Pring (2012) calls 'dispositions that enable one to live the distinctively human life, ensuring a proper balance between destructive extremes' (p. 323). Balanced dispositions are acutely needed in the current times: major population shifts, large-scale migration from poor to richer countries and the resulting multilingual, multicultural and transcultural societies that we live in create challenges for everyone, including young children. 'Successful navigation of these challenges will require a new generation of citizens with the abilities and dispositions to listen, take the perspectives of others, and collaborate. It will require

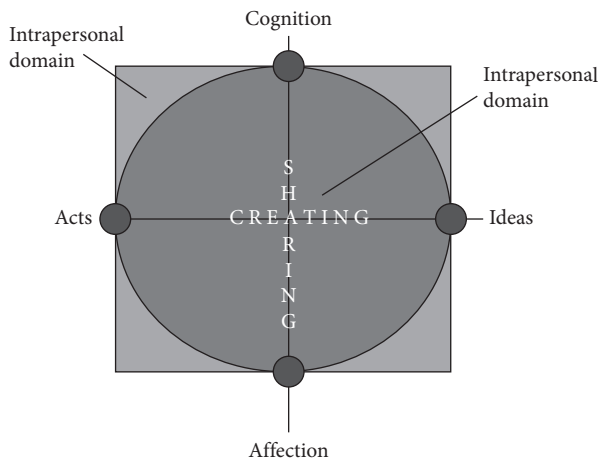
people and communities to act with a shared sense of humanity and fairness; to be able to act and solve problems democratically' (Mardell & Kucirkova, 2016, p. 169).

### Personalized pluralization as an integrated framework

The balance between intellectual and practical skills, or, more broadly, thoughts and acts, is an important one, particularly in the age of heightened focus on the intellectual rather than manual and corporal aspects of learning (and knowledge and work). Vygotsky picks on the strand of mind and body relationship when he writes that 'mind is not a container that stores memories and knowledge but, rather, represents a dynamic system formed and expressed in actions' (Vianna & Stetsenko, 2006, p. 85). However, there is no rigid separation between thoughts and acts as one could find, in the body–mind dualism developed through the rationalist traditions – once children master the dynamic exchange between internal and external representation, there is a mutually dependent relationship between thoughts and acts (Vygotsky, 2004).

The pluralization-personalization framework brings together several lines of learning and development: it combines cognitive learning with affective learning; the mental or intellectual with bodily/physical processes of learning and teacher- and tool-mediated. These lines run across two axes of meaning-making: the intrapsychological (personalization) and interpsychological (pluralization). Figure 12.1 summarizes these theoretical propositions.

The figure illustrates that I conceptualize personalized pluralization as a balancing act between cognitive and affective engagement and between intellectual and physical endeavours. If I was to guess an ideal educational aim, I would say that the ideal educational situation lies in the middle, in the intersection between the four



**Figure 12.1** A graphical representation of the synergies and intersections of personalized pluralization

dimensions depicted in Figure 12.1. Being in two dimensions, the figure may seem to show the relationship between personalization and pluralization as an exclusive one. I intend it to be intertwined or cyclical, expanding through time and space as new learning contexts and resources emerge.

In sum, personalized pluralization advocates the development of children's emotional as well as cognitive skills together with pluralization within one learning model, as one integrated outcome approach. In light of the restrictive education systems of the past, and the countless dedicated efforts to change the status quo of public education, the personalized pluralization framework might seem as unrealistic and naïve. In the face of potential criticisms, I provide examples of projects and learning environments where the socio-individual dimensions of cognitive-affective and intellectual – practical binaries have been intersected, and where teachers and technology have jointly facilitated the learning process. These specific examples are not intended to represent some kind of gold standard of future education. The examples are an arbitrary choice to illustrate the present discussion and to assist in my efforts in ensuring that pluralized personalization becomes a pedagogy of practice, not a remote theory.

### Contemporary examples of pluralized personalization

I first mention a project, which, to me, is not only a demonstration of the personalization–pluralization pedagogy par excellence but also a community-based approach to technology-mediated learning. This project is a suite of various initiatives of the OpenScience Laboratory at The Open University. The OpenScience Laboratory hosts the nQuire project I described in the previous chapter, as well as iSpot and the weSPOT projects, with a dedicated webpage for each (see <http://www.ispotnature.org/communities/uk-and-ireland> and <http://wespot.net/>). The projects are related to the teaching of scientific concepts, combined with nurturing students' personal curiosity. At the heart of the projects is the premise that 'personal experiences and insights are the key for understanding scientific concepts while classroom learning is often de-contextualized from learner's everyday experiences' (<http://portal.ou.nl/en/web/wespot/coreideas>). The way the projects address this imbalance is through personal and shared enquiry-based learning: discovery is combined with writing and reflecting on the value of a scientific finding. For example, the weSPOT project builds on the theoretical conceptualization of an enquiry process developed by Mulholland et al. (2012) and enriches it with animated virtual models that support the development of students' hypotheses. There is an emphasis on the learner's self-control of the learning subject, which is combined with the school curricula approach supporting a badge system of remuneration. Students are expected to interpret and engage with the data in teams and several forms of representation, which may not necessarily match their individual needs or preferences. The learning is not individualistic, but individual within a community of learners. Students learn to appreciate and celebrate their local context *in relation* to the global context. For example, as part of the enquiry process, students are encouraged to ask questions related to their local problem (e.g. 'What

are the energy sources in the classroom?’), to link this to wider issues (e.g. ‘Is there a relation between external climate and energy consumption?’) and to collectively (in small teams) discuss the method for data collection and analysis in order to answer their questions. Conclusions are drawn individually as well as in teams and are jointly shared with other teams, parents and school management. At the end of a scientific challenge, students are encouraged to reflect on their progress and discuss the challenges and dynamics of the teamwork, an aspect of the project which promotes cognitive as well as socio-moral development. Teachers’ role is to foster a balanced manifestation of the personalization and pluralization objectives in the intellectual domain (i.e. children share their views on specific scientific topics) as well as to ensure the project has a practical impact on the community (i.e. specific activities are set up to support the local and/or global environment). New technologies, on the other hand, afford the opportunity to share students’ personal discoveries with other project participants worldwide.

My second example of personalized pluralization ‘in action’ is the Remembrance project. The Remembrance project exemplifies the possibilities of the personalized pluralization model for early childhood and community learning. The project combined the use of Our Story with a robust technological solution developed by the company AirWatch. The study, described in detail in Kucirkova and Littleton (2017) and Kucirkova (2016d), was a ten-month-long story-writing project on the theme of Remembrance and World War II, undertaken in partnership with the local community group LoveWoburn Sands and a lower primary school. Together with Professor Littleton, we followed the work of two teachers and their classes of Year 4 children (age eight years). The analysis consisted of ethnographic observations and interviews undertaken with the teachers and the school’s head teacher.

In order to create their own personalized stories with the Our Story app, the children, working in groups of four, needed to devise and conduct audio-recorded interviews with members of the local community who visited the school to share their wartime reminiscences and stories. The children then collaboratively planned, wrote and edited stories based on these accounts and their own relevant research of the war times. They used the Our Story app to support the collective creation, reviewing, editing and revision of their stories in both text and audio and used pictures from the web and from the community members. Each finished story was shared, discussed and reviewed with other children in the classroom. The Airwatch technology TeacherTools facilitated secure and efficient storage and transfer of the stories from child to child and within the local community. The final stories were shared at a school assembly and became part of the local archive, thus combining the virtual and physical experience of personal story-sharing.

The cognition–motion balance was a guiding construct in ensuring that stories created by children support the development of not only their language and literacy skills but also their socio-emotional skills such as respect for classmates and local community members, appreciation of others’ memories and pro-social orientations. Final stories were not kept in the teachers’ drawer – they were shared with the community, in an act of honouring the fallen of the past and appreciate the present. The project brought together elderly members of the community with young learners

and, in an intergenerational exchange, enabled the two groups learn from each other. The community members learnt from the children about iPads and digital making which were to them new skills and new resources. The children, on the other hand, learnt from the elderly about history and the reality of living in war times. Overall, the study illustrated that any learning content can carry a personal reference and, at the same time, be part of a wider collective narrative with a socio-moral purpose.

The third example is not a unified project but a set of some promising practices related to the use of the Minecraft software. I have not been personally involved in these projects and have mostly seen them documented in non-academic literature such as the teachers' and students' personal blogs online. I include these projects here because they show that personalized pluralization doesn't need to be always recognized in academic literature and that it can be part of ongoing or occasional practices, not only in the concentrated effort of one project.

Minecraft is a popular interactive game that has been available since 2009 in the United Kingdom. Minecraft 'allows players to create content using textured cubes' (Callaghan, McCusker, Losada, Harkin, & Wilson, 2012, p. 2). In 2013, there were about twenty million paying users worldwide, with many more playing a free version of the game (Diaconu, Keller, & Valero, 2013). A modified version of the game (MinecraftEDU) has begun to be used in several schools in the United States and the United Kingdom. The game has almost unlimited number of building options, and its open-ended design means that teachers can use it flexibly for a variety of subjects by incorporating curriculum-specific content (Drzewiecki, 2014). The game promotes individual learning as well as collaboration. To support personal learning and students' self-confidence, children can create their own worlds with their own characters and objects. In addition, however, players can create shared worlds and simultaneously collect resources for a joint project (e.g. building a city together). The ethos of a collaborative learning community is reflected in the numerous YouTube videos of Minecraft players who showcase their achievements and strategies with the game. In the speak of the previous chapter, the Minecraft community is a global, online community of creative makers and designers who democratically share their learning with each other and through this process enhance their personal knowledge as well as that of the group. As Risberg (2015) puts it: 'Players of Minecraft are both learning on their own and putting into practice the skill of collaborating to share knowledge and creativity' (p. 46). The development of Minecraft and the Our Story app followed different purposes, budgets and stages, but the two tools share the open-ended character of their design. I therefore draw here some parallels: I described how the open-ended design of Our Story positively influenced children's learning (Chapter 10), and I hypothesize similar effects with Minecraft when it comes to authoring children's own content in the classroom. Children are likely to develop thinking and problem-solving skills in parallel with their construction skills of the virtual worlds, and this combination is likely to open up learning in a variety of subjects, including biology, ecology, physics, chemistry, geology and geography. What is noteworthy about the affordances of Minecraft is that in addition to collaboration and creativity (Saez-Lopez, Miller, Vázquez-Cano, & Domínguez-Garrido, 2015), playing the game supports children's understanding of wider global issues around environmental awareness. This



requires the teachers' input because teachers can link the game to community actions such as a school project focused on recycling or pollution. The learning is authentic, because children work with real-life concepts; they have to mine resources from the earth and turn them into usable materials for construction. By building and inhabiting their own civilizations, students learn citizenship skills and responsibilities and they 'quickly realise that some materials are more scarce than others and that they are not evenly distributed' (Marsh & Spiller, 2015, online). Thus, similarly to the nQuire software or the Our Story app, the Minecraft game can be a suitable resource for the pedagogical framework of personalized pluralization, as it can tap into emotional, cognitive, physical and intellectual skills and through teachers' orchestration, support children's individual as well as collective authorship of authentic content.

## Conclusions

In this closing section, I weave together the strands of my contribution to digital personalization in early childhood.

The purpose of this book was both theoretical and empirical. I scrutinized the character of technology-based personalized education to substantiate the claim that the current models of personalized education tend to be technology driven with little pedagogical understanding of the value of personalization. I reflected on the key ways in which new technologies such as iPads/touchscreens and personalized books could provide innovative pedagogical support for personalized education and condensed these into the 5As of personalization: autonomy, authorship, aesthetics, attachment and authenticity. Based on the insights from research with typically and atypically developing children, I proposed a sustainable pedagogy of personalized education for the future, called personalized pluralization.

Overall, this book is not a handbook of digital personalization in early years but an introduction to an emerging field. In reviewing the extant research on digital personalization, I drew predominantly on my own work in this area, thus involuntarily excluding other work and reducing the richness of my insights. On the other hand, I have attempted to offer an in-detail look at one aspect of personalization, which I hope will be inspirational for future research in this area. The book is best understood as a summary of my empirical and conceptual work in this area thus far and its main novel contribution relates to the 5As framework and its integration with the notion of personalized pluralization. The educational approaches and examples cited in the book are not intended to endorse the specific projects but rather to concretize the outlined ideas. The list of theoretical and empirical studies reviewed for the book is not comprehensive and involved a degree of selection. In presenting my research, I attempted an even-handed review that would encompass the potential benefits as well as limitations of personalized books and authoring tools in early childhood, such as the Our Story app. The key insights that I sought to offer in this publication were as follows:

In the first part of the book, I addressed the literature that describes the current models of personalized education as techno-centric and I outlined the concern that

personalized education lacks a pedagogy. These criticisms tally strongly with my own concerns around technology-driven personalized education and have, to a large extent, motivated my search for an alternative definition of personalization.

In Chapters 4 and 7, I summarized the empirical evidence and current commercial offer concerning children's personalized books and stories. I argued that identity and creativity are closely related to personalization and showed how vital research issues in creativity (from the educational perspective) and identity (from the developmental perspective) can provide important insights into the new field of personalization studies. Based on these findings and a theoretical review, I suggested that the 5As – autonomy, authorship, attachment, aesthetics and authenticity – are at the core of personalized education and could be a useful lens for assessing the degree (or level) of personalization embedded in learning resources and practices. Lastly, I proposed a pedagogical framework – personalized pluralization – to integrate the pedagogical approaches of personalized education (pedagogy of design, embodied and democratic learning) with the humanism agenda and Vygotsky's dialectics. Before closing, I add a few remarks related to the 5As and personalized pluralization.

The integration of autonomy, authenticity, authorship, aesthetics and attachment into a multiset of '5As' purports to offer a set of principles by which educators can evaluate the personalization 'dose' in a given resource or activity. The 5As also offers a set of thinking tools for future theorizing of personalization and a set of criteria for future design and development of personalized resources for young children. The framework suggests that children's experiences and resources become personalized when children's agency (autonomy), authorship and aesthetics are honoured and celebrated. It also suggests that children's attachment to (or ownership of) a resource, is linked to the overall authentic (original and unique) character of that resource. Indirectly, it accords with the view that children's ownership and agency are indispensable ingredients of genuine personalized education.

The 5As were conceptualized in the context of personalized books and should be therefore understood as a starting point for further theorization of personalization in other contexts. The individual elements of 5As are not positioned in a particular relationship to each other, and as explained in Chapter 9, they are difficult to be measured in a quantifiable or hierarchical manner. The study of cross-correlational and longitudinal relationships among the 5As will require longitudinal and collaborative studies. I listed a few questions to guide these efforts in the area of personalized books and pointed out areas of existing work that could refine the importance of the individual elements. These notions include multiplicity when it comes to identity and expression of authentic versions of self through digital stories; the concept of diversity when it comes to authorship and child-driven literature; the presence of an intertwined cognitive-affective influence on children's attachment to personalized books; the importance of individual and collaborative creativity supporting children's aesthetic choices and the understanding of autonomy as a force that is intertwined with socio-cultural enactments of the self.

By definition, the 5As invites a view of personalization as a multifaceted phenomenon and reminds us that personalized teaching approaches should not be reduced to children's authorship or autonomy. Rather, personalization should be

studied and understood as a variable in its own right, defined as the product of the 5As which affect children differently, depending on the context (domain and subject) of the activity and the affordances of the resources supporting this activity. Therefore, in addition to the 5As, educational researchers and practitioners need to consider the range of affordances of specific resources (such as format, multimedia, number of access points, options to edit and others), which interact with personalization and impact independent and collaborative learning – as we saw in the chapters focused on creativity and identity.

My focus on the personalization side of the personalized pluralization carries the danger that the 5As become understood as individualistic. It would be remiss to close this book with the implication that practices of personalized education are removed from the humanist socio-moral concerns. The 5As lie at the heart of personalization but their positive impact on children's learning is realized only if they are applied in concert with the pluralized, democratic and humanist principles. It is this conclusion that I wish to disseminate among public spheres and pursue examining in my work.

### Final remarks

It is clear that technology advances, together with the broader societal changes of the first two decades of the twenty-first century, pave the way for embracing personalized education. Personalization is often perceived as panacea solution for the educational woes of standardization. The history of education is replete with examples of reductionist applications of innovative ideas and the current models of personalized education seem to be following this trend. As such, there is the danger the standardized and personalized educational systems begin to resemble an hourglass, where the personalized education bulges in the 5As, with a narrowing waist that fuses the personalized and pluralized elements. Such a model is unsustainable and short-sighted. Instead, we need a model of personalized pluralization, which leaves a large merging radius between personalized pedagogies and their pluralized counterparts. I therefore argue that personalized education can only become a sustainable educational model if it is combined with pluralization ideas and if it addresses children's holistic development, which is cognitive and affective skills and theoretical and practical understanding. The projects cited in this book make it clear that in specific curriculum subjects, with or without technological meditational tools, this is possible, as long as educators are empowered to infuse children's learning with a balanced dose of personalization. It is my hope that the ideas I shared in this book will provoke fresh breakthroughs in the study of personalization and that the snapshot of digital personalization presented in this book will be challenged and enriched through future empirical and theoretical work.

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