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Theoretical Frameworks Relevant for Digital Personalization in Early Education

So far in this book I have considered various examples of digital personalization in education, and personalized books to illustrate the variety of practices and research traditions concerning personalization in early childhood. It has become clear that there are different terms, definitions and nomenclatures describing and capturing personalization, particularly if we look at psychology research and educational practice. It is difficult to establish what digital personalization means for education if we are not clear about what personalized education is. The next step in trying to define personalized education – and to specify digital personalization – is to determine the constructs and properties that are related to personalization, but that are, at the same time, independent of it. The obvious strategy in this process is to consider the terms used together with, or synonymously with, personalization. In this chapter, I consider the terms ‘customization’ and ‘individualization’, which lie at the lower end of the personalization spectrum and are used in the industry and education for different purposes. An insight into terminology can help us better understand personalization. In this chapter, I link this understanding to a selection of theories concerned with technology-enhanced personalized education.

Customization and personalization

For many people, there is no clear difference between the terms ‘personalization’ and ‘customization’; they are used interchangeably in business, education and other fields. In my doctoral thesis concerned with personalization in children’s books, I argued that when it comes to children’s books, there is an important distinction between personalization (personalized and personalizing) and customization (including customized and the process of customizing). I argued that although often used interchangeably, the two terms imply different processes and products on a theoretical, empirical and practical level. I extend my argument in this section, by highlighting the difference between customization and personalization in relation to the commercial agenda in technology-driven models of personalized education. This continues the logic discussed in the previous chapter wherein technology-driven

models of personalized education were described as lacking in pedagogy and a deep-seated judgement of what personalization is.

The commercial side of personalization

Personalization implies uniqueness, exclusivity and authenticity. Customization implies an adjustment, a change or alteration to a given template, or to a generic product. In Kucirkova (2014), I plotted personalization and customization as two end points on a spectrum line of personalized books, and argued that the key difference between personalization and customization is about the level of personal detail available within a given book. Focused specifically on personalized books, I specified three levels of personal involvement in the content and form of the books, leading to the three levels of highly personalized, semi-personalized and lowly personalized books. I argued that the lowly personalized books are the closest to the customization end of the spectrum, because their production involves less personal involvement and less personal data and elements. To explain, I use the example of the so-called 'Personalized Fairy Tales Books' for 1-year-olds, available from a range of sellers, including My First Years Ltd. and Prezzybox.com. The buyers of these books can add the child's name to the book cover and include a short message inside the book. In these books, the content is the same for everyone who purchases them, the only difference being the title page. By way of counterexample, the personalized books produced by Lost My Name publisher create a different content for each child, based on the letters of a child's name. The books in both examples are printed (physical books), with the same format and they are both described as 'personalized' by their publishers. However, because of the different levels of personalization embedded in each, the 'Personalized Fairy Tales Books' would be more accurately described as customized books and the Lost My Name books as semi-personalized books. Personalized is associated with bespoke and exclusive, while customized products, while customized has the connotations of generic and adaptable. This is probably why we find so many books (and other commercially produced artefacts) labelled as personalized rather than customized: personalization has a higher currency (pun intended) in the industry and business world.

When it comes to marketing, publishers are more likely to use the word 'personalized books' rather than 'adaptable' or 'customizable books'. Personalized products have always been more costly to produce than standardized and mass-produced products and clients are therefore more likely to pay more for something with the tag 'personalized' on. Thus, the terms 'personalized' and 'personalization' are frequently used by the industry, but they are often merely a buzzword rather than a genuine concept.

It would be too ambitious to expect that publishers will change their nomenclature when it comes to personalization and customization. However, we can demand a more precise nomenclature for research and educational practice of personalized resources. This is what I attempt to do in the next section. If we conceptualize

personalization and customization as two poles on one spectrum, we need to specify the parameters for each end of the spectrum.

The variety dimension in personalization

One parameter that can help us decide what counts as personalized and what as customized is the depth or profoundness of personalization embedded in an object. However, to talk about depth might seem abstract when faced with concrete objects and depth might be better explained as the *variety* of personalized options. I will explain this parameter by referring back to the fictional example introduced at the beginning of this chapter about a personalized gift bought for a 4-year-old girl. Imagine you are getting a 'personalized gift' for your niece Lucy and, as a buyer, you can specify the name or initials engraved on a common product such as a cup, pyjamas or book. Because your niece's name is Lucy Kallender, you could order a pyjama set with either the name Lucy or LK. However, there are many Lucys or 'L.K.s' who could receive the same pyjamas and could consider it 'personalized' for them. When buying a 'personalized pyjama set' you are not changing the fabric to suit the unique sleeping position of Lucy or sewing her favourite bedtime story characters into the garment. You are not adding pictures of her falling asleep with her favourite teddy bear. You are simply adding her name on top of a generic set, predesigned for all girls of her age (or size). The pyjamas' production and final result are based on a template; they are mass produced and only allow for one element of personalization. The level of involvement of the personalizer (the buyer of the clothes) and the personalizee (Lucy in this example) and the variety of personalization options are minimal. I would therefore argue that a pyjama set with Lucy's name would be more accurately described as *customized* rather than personalized. Had the manufacturer offered more varied possibilities for customization, it is likely that the final product could become more unique and authentic for the recipient, that is, closer to the personalized end of the spectrum.

Let us pursue this example further to clarify the kind of variety necessary for a product to become classified as personalized. Imagine, for example, that for a 'personalized' teacup you are buying for Lucy's birthday, you are presented with the following options: you can modify the cup by choosing the cup's colour, size and weight. In addition, you can add to the cup your own photograph, or the recipient's name written in a fancy font or an inscription that goes on the cup. Let us suppose that you modify all six characteristics and present Lucy with a cup that is small in size to fit her small hands, is in the pink colour (because that is Lucy's favourite colour), has a thin rim (because Lucy likes cups with a thin rim) and has a photograph of Lucy and you from a recent holiday together. Based on the logic, such a cup would be closer to the personalization extremum.

If the depth of personalization can be defined as variety of elements, then producers and designers will naturally ask whether there are a specific number of elements needed to be personalized for an object to count as personalized. Therefore, I describe next the personalization/customization distinction along the quantity dimension.

The quantity dimension in personalization

At which point does a customized cup become a personalized one? Suppose we arbitrarily decide that a product counts as personalized if it has five elements that can be personalized. These five elements can be based on an individual's characteristics, needs or preferences. For a personalized book this would mean that it would need to contain not only the child's name, but also the child's address, date of birth, names of his/her friends and favourite foods (or any other combination of five elements). The difficulty with such an approach is that it assumes that all elements are equal. This is *practically* and, as argued later in Chapter 7 in relation to the Diversity Theory, *theoretically* difficult.

Practically, let us suppose that Lucy likes a particular shade of pink (e.g. the 'punch pink') and that when you are buying the cup, you have the option to insert any colour, not just a generic set of basic colours. In that case the number of elements to personalize the design is the same (colour, weight and size), but the level of their personal significance is higher (because the likelihood that many girls like punch pink is lower; other buyers might choose simple pink or flamingo pink or watermelon pink or taffy pink etc.). Similarly, if you are allowed to add a personal inscription on the cup, it is very likely this will be unique to Lucy. You are not simply adding her name but are tagging the cup with something special that you wrote, based on your knowledge and relationship with your niece. For example, you know that Lucy loves drinking Cola Cao in the morning and that she calls it 'CC'. You could write on the cup 'Lucy's morning cup of CC'. Such a message would be meaningful only to Lucy and those close to Lucy. Together with the authentic punch pink colour, your cup for Lucy becomes very unique to Lucy, even though you only personalized three elements of the cup. It was the level of personalization involved in the production process that made a difference – the final cup is based on your personal knowledge of your niece, which would be very difficult to be quantified. A quantitative expression of personalization needs to consider the level of personal involvement within each dimension. However, just like there is no magic formula to how many attributes are necessary for a phenomenon to count as personalized (as opposed to diverse and generic), there is also no magic formula for specifying the elements that carry more personal significance than others. Considering the cup or book examples, it would be very hard to place on a hierarchical scale the different possibilities for personalizing these objects. For example, is a date of birth more unique to a child than his or her first name? For one child, the colour of the cup (e.g. the punch pink) might feel more special and unique than to another child. Personalized, as the name reveals, should be about a *personal* connection to one specific individual, which is, by default, idiosyncratic for each individual. A quantitative expression of personalization is therefore very problematic.

The variety and quantity considerations are focused on the *process* and *product* of personalization, not so much on the effects and impact personalization has on the recipient of the product – which brings me to another term, also related to personalization: 'individualization'.

Individualization and personalization

The term ‘customization’ is a preferred term in the business/industry, while ‘individualization’ is preferred in the education arena. Similar to personalization and customization, the terms ‘personalization’ and ‘individualization’ are often used interchangeably in education. Yet, the two are difficult bedfellows. Some educationalists, for example Professor Emeritus Dylan Wiliam, specify that personalized learning is not the same as individualized learning. He maintains that personalized learning is learning in which the *process* or path towards the same goal is different for every single child. Individualized learning, on the other hand, is about independent and autonomous (rather than group or collaborative) learning. However and unfortunately, apart from Professor Wiliam’s distinction presented in an online video, I could not find any academic literature clearly distinguishing individualized and personalized education. Past and present research and practice seem to refer to personalized or individualized learning plans and records to the same extent. These plans and records are based on standardized learning goals/national measures but are adjusted to the level of progress of a specific pupil. The actual format of these plans varies from school to school (or teacher to teacher) but it typically consists of a template with targets/objectives (based on the national curriculum or school-specified targets for all children), description of a particular activity responding to these objectives and an evaluation or outcome box describing the student’s progress. The aim of individualized plans is that they feed into future activities and capture the alignment between the stated objectives and the pupil’s actual performance.

If we follow the logic of the customization/personalization distinction applied earlier, we notice that again, an arbitrary cut between individualization and personalization wouldn’t make sense here. The unique and authentic nature of a student’s plan depends on the level of description of the students’ individual characteristics, determined by the teacher. The description can be more detailed because of the number of points/elements covered by the teacher or the variety of the teacher’s descriptive items. A teacher can specify the student’s level of engagement, progress and enjoyment of lessons by using the language of the national curriculum or the child’s own words; they can include multimedia elements to illustrate the student’s progress or simply tick a box in a template.

In my experience of inspecting individual learning plans in a range of UK preschools,¹ most plans developed for individual children were individualized rather than personalized. They were produced for each individual child but followed a generic template with only minimal adjustments to the template. However, there were some exceptions to the rule: for children described as ‘children with special educational needs’ or ‘children with a statement’ (an official statement from the school’s psychologist that the child needs extra support), the plans were more detailed, with provision of care adjusted to the individual child and daily controlled. For these children the individualized/personalized learning plans would typically contain more detail, including the practitioners’ critical reflection of the child’s progress and photographs of the child’s engagement in certain activities. Similarly, in some

settings, the practitioners developed records of progress (also called observation plans) which were bound folders (or online files) with children's artwork, pictures of their participation in the classroom activities and illustration of progress the children had made developmentally. Teachers referred to these plans as individualized or personalized interchangeably. It might be that the personalization propaganda characterizing the twenty-first-century public education system influenced teachers in relabelling individualized learning as *personalized* learning. It might also be that the use of the terms has been influenced by teachers' individual preferences and history of their professional training. Following the rationale for distinguishing personalization and customization, I would suggest that records and plans by which the teachers adjust their activities and resources according to individual children's progress are *individualized*. Records and plans, which use many and varied elements to describe the children's progress, are more accurately described as *personalized* because of the level of personal detail embedded in them. In other words, I define individualization as an educational version of customization and perceive it as different from personalization.

Moving from practice towards theories

These definitions of customization and individualization can be used as starters for contemplating what personalization is. However, the fact remains that in education and industry, there is little clarity in the use of the terms 'personalization', 'customization' and 'individualization'. Given these inconsistencies, practice cannot help us construct an understanding of what personalization might mean for children's learning. What counts as personalized and what as *non-personalized education*, and where do we draw the line? If existing definitions and nomenclatures cannot guide the research, then we need to look elsewhere. As explained in Chapter 2, from a historical point of view, it is difficult to determine whether personalization is a new label for established practices or genuinely a new force in education. On surface, it might seem that what counts as personalized education today is very different from personalized tutoring in Ancient Greece: instead of a personal tutor, children have digital tutors in the form of adaptive courseware. However, one is tempted to say, personalization is more than just the mode of delivery. In the case of personalized books, I outlined that the form as well as content of a book can be personalized and their personalization can encompass both digital and non-digital elements. In fact, a review of commercially available personalized books revealed that there is a suite of dimensions that could be personalized with children's books.

I do not aim to develop a theory that would accommodate all these dimensions and explain all possible cases of personalized education. As stated in Chapter 1, my aim is to summarize the rich set of concepts and categories subsumed under the umbrella of personalized education and propose a framework that usefully integrates these concepts and facilitates future research of personalization in early childhood. For this purpose, I will now move to a consideration of existing theories that have been developed for technology-mediated personalization in education. I focus

on these selected theories because they all deal with technology-based or digital personalized education. Whether the definition of 'personalized' is in these theories more accurately described as customized or individualized is open to debate. We can reliably say that *digital* personalized education and technology-enhanced personalized products are new phenomena. My focus on new theories is thus an attempt to explain the current movements in education. The theoretical frameworks that I summarize here inspired my work in terms of their ability to deal with novel forms of personalization, rather than the nomenclature.

Oulasvirta and Blom's perspective on personalization behaviour

Oulasvirta and Blom's (2008) theory is based on the authors' observations of adults who have been adjusting the settings and display, that is, personalizing their own phones. In their article 'Motivations in personalisation behaviour', Oulasvirta and Blom (2008) define personalization in terms of 'control over appearance and functioning' (p. 1). The authors draw on Ryan and Deci's (2000) self-determination theory to explain why people enjoy adjusting technology to suit their personal tastes. The focus in Oulasvirta and Blom's (2008) work is on the personalizer, who personalizes an object for his or her own pleasure. This introduces a new consideration into our debate, which, so far, has focused on personalized gifts and books (which are typically personalized by someone for someone else). Oulasvirta and Blom (2006) specified the psychological effects of the personalization behaviour on the 'personalizer' by applying the key premise of the self-determination theory. Namely, they argued that people personalize their own technology because the action allows them to express three fundamental needs: autonomy, competence and relatedness. Autonomy is related to origin and authorship, a technology that is personalized becomes 'my technology'. Competence in this authoring process can be perceived competence or actual competence. Both kinds satisfy the personal need for self-determination. The third element of the self-determination theory – relatedness – is about ensuring that a given technology belongs to us and not anyone else; it is about boundary setting and negotiating our own identity by making specific aesthetic choices when personalizing our own resources/possessions. Oulasvirta and Blom (2008) further explained that personalization connected to aesthetics (e.g. someone adjusting the design to make it more beautiful) is centrally based on the idea of relating to others: 'Personalization of appearance is at least partially intended to have an effect on other people rather than the user herself' (p. 10). Whether it is our phone, entire home or local area we live in, we are keen to make adjustments to the environment because we want their appearance to evoke others' positive feelings. This behaviour is conceived to be fundamental to the basic psychological needs of identity, social status and inclusion by others.

Although the theory is not quite explicit about what exactly is meant under personalization (and how it differs from customization or individualization), it provides a useful framework for understanding the possible mechanisms underlying someone's interest and ability to personalize their own technology. For theoretical purposes, Oulasvirta and Blom's theory specifies that people are interested in

personalization (or that they engage in personalization behaviour) because of the universal human need for autonomy, competence and relatedness. This is interesting as it highlights the need for personal motivation driving any personalization behaviour.

Based on this theory, we could hypothesize that if we allow for personalization behaviour to be displayed in the classroom (e.g. by encouraging children to personalize their learning environments or resources), then the children will be more motivated to learn. Given that motivation lies at the heart of empirically verified models of learning (Skinner & Belmont, 1993), personalization could be predicted to enhance the reciprocal relations between motivation and students' learning. Indeed, motivation and personalization are often linked in educational research on personalized education. However, Oulasvirta and Blom's theory is also important from a psychological perspective: it indicates that people engage in personalization behaviour because they want to be inherently independent (autonomy); because they strive for competence and because they want to relate to others. These three concepts highlight the psychological processes behind a self-driven personalization behaviour. The theory does not specify what happens when personalization 'is done to us', that is, if someone receives a personalized object without their own explicit input as it was the case in the example of Lucy's birthday gift. How would the child's levels of autonomy, competence and relatedness be affected when they are positioned at the receiver's end of the personalization process? For instance, could we expect any motivation changes in Lucy's reading if she receives a personalized book designed by her aunt? And what about interpersonal differences – would boys and girls, young children and adult learners perceive such 'received personalization' differently?

Research with adult learners provides some insights. A study by Tossell, Kortuma, Shephardb, Rahmatib and Zhongb (2012) examined how twenty-four students (fourteen male and ten female) personalized their first smartphone (the participants did not have an iPhone before participating in the study) over an eight-week period. The researchers divided the personalization measures into three categories corresponding to Oulasvirta and Blom's framework (autonomy, competence and appearance). Based on several measures of personalization behaviour, the researchers found that female participants seemed to personalize their phones more for appearance reasons (e.g. changing the lock-screen picture), while the male participants personalized their phones more for autonomy and competence reasons (e.g. moving applications from one location to another). The study was small scale and correlational, but it provides some interesting insights into potential gender differences when it comes to personalization behaviour. Interestingly, Tossell et al. (2012) write that their 'findings supported previous work suggesting that user personalization increases the novelty of the device and creates a stronger attachment between the user and their customized technology' (p. 12). This is an important message for studies with young children, because we know that children can easily become attached to material possessions. It also introduces an additional consideration: the importance of attachment in personalization behaviour, which I pick up in the next chapter. In sum, Oulasvirta and Blom's theory provides a basis for explaining the motivational factors frequently linked to personalized education.

The theory is concerned with personalization at the individual (micro) level and is conceived from a psychological perspective. Next, I move from the micro-level of an individual to the meso-level of the school, and from the psychology perspective to an educational view.

Kearney, Burden and Rai's perspective on personalization

Based on a longitudinal study with teacher education communities using iPhones in Australia, Kearney, Burden and Rai (2015) created a theory and a pedagogical framework for mobile learning. These are based on three features of mobile learning: personalization, authenticity and collaboration. In this theory, personalization is one of the key elements of learning with mobile technologies. The authors define the individual elements as follows: 'the authenticity feature highlights opportunities for contextualized, participatory, situated learning; the collaboration feature captures the often-reported conversational, connected aspects of m-learning while the personalization feature has strong implications for ownership, agency and autonomous learning' (p. 14). Each element has some subcomponents. Personalization components are agency and customization, authenticity consists of situatedness and contextualization, and collaboration consists of data sharing and conversation. According to this framework, personalization supports autonomous learning and is related to the possibility of customizing, that is, adjusting the environment to one's own needs. Kearney et al. (2015) examined the extent of personalization available to Australian students who have used mobile technologies in the classroom. The researchers found little evidence for teachers providing their students with choices, in fact they found that teachers not only led most tasks in the classroom but also decided on the details of where or when specific activities occur. Out of the three concepts – authenticity, collaboration and personalization – measured by the authors, teachers who participated in the survey ranked personalization the lowest. As the authors admit, the low ranking of personalization may be because many students did not have their own personal device at the time of the study.

This theory is relevant for the context of mobile learning, that is, learning mediated by mobile technologies. Its relevance for other contexts is not known and would probably require a re-assessment of the key three elements. I fully agree with Kearney et al. that personalization is a 'distinct pedagogical feature' (p. 5) and have been following this premise in my own research concerned with mobile learning in early years classrooms. I'm in less agreement about the authors' definition of personalization. Kearney et al. conceptualize personalization in terms of adjustments to the learning environment and one's own device, and use it synonymously with customization. Such a definition appears to be geared towards practice but less towards theoretical predictions and does not resolve the tension between customization and personalization explained earlier in this chapter. Overall though, Kearney et al.'s inclusion of authenticity in theorizing technology-mediated learning is important, and has inspired my thinking about the key ingredients of personalized education.

Fitzgerald et al. framework

My ineffectual efforts to define and operationalize personalized education were somewhat remediated in a collaboration with my ex-colleague from The Open University, Dr Elizabeth Fitzgerald. Liz and I have been studying digital personalization from different perspectives and involving different age groups: I was interested in personalized books and stories in early years, while Liz studied adaptive courseware in higher education. However, we both observed some common ground in our studies, including a shared frustration concerning the lack of a guiding framework for technology-mediated personalized education. Together with five other colleagues from The Open University, we decided to map the field to develop a critical review of current personalization literature (Fitzgerald et al., forthcoming) and to propose a framework of technology-enhanced personalized education (FitzGerald et al., 2017). Collectively, the two papers lay the groundwork for future approaches to digital personalized learning and technology-based personalized education.

In both publications (Fitzgerald et al., forthcoming, and FitzGerald et al., 2017), we refer to digital learning as technology-enhanced learning (TEL) and review literature that has conceptualized technologies broadly, including mobile learning, learning with computers, interactive whiteboards or digital stories. We reviewed literature published in this area in the last fifteen years and included in our consideration both academic papers and government speeches or reports. We noted that a lot of the literature is concerned with formal rather than informal or incidental learning, which limits the generalizability of the studies to compulsory education (rather than learning overall). Personalization was in these studies defined as a way to deploy technology, and the pedagogy was conceptualized in relation to specific characteristics of learners using the technology.

We noted that the main advantages of such a technology-enhanced personalized education is that it raises learners' motivation and, in some schools, the pupils' performance on national tests. We also noted that in some schools, technology-enhanced personalized education offered a financially attractive package to the individual institutions. However, the review of studies revealed that TEL also had a number of limitations: a key limitation related to the integration of individual activities undertaken at different pace, in different places and often with different learning resources. Not all learning could happen with the same device, no matter how much the technology providers wished this was the case. Also, despite the industry promise that personalized education gives the control to the student, the vast majority of technology solutions designed for schools is based on a 'Big Brother' model where the control and adaptation are in the hands of the technology (or the teacher manipulating the technology). On a more theoretical level, the review revealed a limitation of following narrow definitions of personalized learning, particularly those definitions that are based on outdated ideas. Notably, some studies defined personalization in terms of individual learning styles or cognitive capacities, which is currently considered to be a flawed pedagogical model by many leading educational researchers (see Dunn, Beaudry, & Klavas, 2002). Cognitive capacities or preferences exclude the possibility that some learners might perform differently

in different contexts or under different circumstances – a view rejected by socio-constructivists. On the whole, the literature review led us to a framework that brought together the various perspectives on personalization in education and captured the essential aspects of technology-enabled personalization that have been documented in schools so far.

The framework for technology-enabled personalized education is described in detail in FitzGerald et al. (2017). It is based on six dimensions that can guide the research and practice of technology-enabled personalization. The six dimensions are not theory – but practice – based and are intended to map the field, identify gaps and possibilities for digital personalized education. In developing the framework, we were inspired by the categories outlined by Martinez (2002) for the design of learning objects and the key descriptors of personalized education that we could identify in government reports. Martinez (2002) specified that for designing learning objects, personalization can be categorized into five gradually increasing elements: name recognition, self-described personalization, segmented personalization, cognitive-based personalization and whole-person personalization. This model works in the design of Intelligent Tutoring Systems and Adaptive Educational Hypermedia. In these areas, personalization is put into practice through adaptive links, adaptive content or adaptive presentation of resources. The model is less useful in the area of personalized education overall or for early childhood in particular. As for the government reports, the UK Department for Education and Skills suggested, in 2004, five components for personalized education: assessment for learning, teaching and learning strategies, curriculum entitlement and choice, a student-centred approach to school organization, and a strong partnership beyond the school (see Pollard & James, 2004, p. 5). In a report written for teachers and leaders interested in personalized education, Hargreaves (2004) termed these components ‘gateways’ to personalized education and added four other elements: new technologies, workforce development, advice and guidance, and mentoring and coaching. We built upon these published works and the socio-constructivist approaches to learning, and arrived at six key dimensions which can be deemed to model personalization in technology-enhanced learning:

1. The focus of personalization (content, assessment, curriculum or resources)
2. The type of learning (formal, non-formal and informal)
3. Personal characteristics (demographic, personal preferences, history or needs)
4. The agent of personalization (learner, teacher or computer software)
5. The way in which personalization is carried out (adopting Martinez’ framework of five levels: name recognition, self-described personalization, segmented personalization, cognitive-based personalization, whole-person and personalization)
6. Impact of personalization (the key stakeholders benefitting from the personalization process).

In our paper, we applied these six dimensions to some examples of technology-enhanced personalized education. Our objective was to consider several aspects of personalization, including the issue of control and choice – that is, the questions

of who is making decisions and who is making choices about the personalization mechanisms employed in a given learning process.

The framework could build an effective basis upon which to build a programme of research in technology-enabled personalized education and could expand the current research to the meso- and macro-levels of individuals, schools/home learning environments and communities. We applied the framework to our own research and paid close attention to the role of technology in the development of TEL and personalized books. As such, the framework could be a useful resource for designers of personalized software and educational resources when analysing existing implementations and designing future personalized technologies. The framework is thus not theoretical, but it deals with the practical application of digital personalization. The six key dimensions can be used to investigate in terms of their interaction or individual contribution to children's learning outcomes.

What the framework doesn't accomplish is to offer guidance for researchers or educational professionals interested in the pedagogy and theoretical aspects of personalization. This mantle is still to be taken up, and will take teams of researchers and years of empirical work to complete. I attempt a few steps in beginning this process in this book: I propose a theoretical framework of personalization for children's personalized books in Chapters 6 and in Chapter 12, I propose a framework for the pedagogy of personalized education.

Chapter summary

This chapter begins with a discussion of the difference among personalization, customization and individualization, which provides an appreciation of the range and variety of the personalization phenomenon. Next, the chapter brings together some key works on personalized education that have been influential in my thinking about digital personalization in early childhood. Oulasvirta and Blom's theory of personalization behaviour taught me the importance of attachment, aesthetics and personal competence in self-driven personalization. Kearney et al.'s framework of mobile learning highlighted the relevance of authenticity and its close relationship to personalization. My work with colleagues at The Open University in the area of technology-enabled learning has led to a set of six dimensions that model technology-enhanced personalized education in the extant literature. In the next chapter, I present a theoretical account of personalization, which has been inspired by the frameworks presented in this chapter and my research with children's personalized books.

Note

- 1 In 2007–2011, I worked as a fieldworker on the Graduate Leader Fund project, which included visiting a significant number of preschool settings in the United Kingdom (there were overall 238 UK early childhood settings visited as part of the study, each at two time points). See more details in: Mathers et al. (2011).