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Technology-Enabled and Technology-Driven Personalized Education in the Twenty-First Century

In the previous chapter, I considered how parents, teachers or technologies can create personalized education and how the different forms of personalized education have fluctuated in the history. In this chapter, I take a critical look at the assumptions behind the potentials and limitations of the currently most popular form of personalized education: that which is digital (or technology enabled). I begin by summarizing the status quo of technology-based personalized learning in primary schools in the Western world. I divide the practices in relation to technology-driven and technology-enabled education. My critical evaluation of the current practices continues with a consideration of a business-driven aspect of personalized education and a consideration of alternative approaches. I then turn to the research and summarize the psychology and education literature concerned with the personalization effect. This literature identifies some critical distinctions in personalized learning and prompts the observation that the existing models of personalized education have strayed far from the research on which early, non-digital personalization was based.

Personalized and digital personalized education: Status quo

I have written articles and blogged on several occasions about the lack of definition of what personalized education is and I'm certainly not the only one – there have been many calls for more precise definition of personalized education for the past ten years. For example, Hartley (2007) wrote that personalization could find its biggest application in education, but educationalists need to first address the 'lack of clarity in the definition and application of personalisation' (Hartley, 2007, p. 634). Roberts and Owen's (2012) attempted a definition, with the focus on potential benefits of personalized education. According to the authors, personalized education is 'an important process, providing significant benefits to academic performance, as well as improving students' capacity to learn through the development of meta-cognitive skills; fostering student autonomy and ownership of their learning; promoting student

engagement, mainly through greater motivation; and, facilitating effective and productive peer collaborative learning' (Roberts & Owen, 2010, p. 4). It is interesting to see in Roberts and Owen's definition the mention of the individual benefits as well as a link to collaborative learning. Without a doubt, giving children choices and providing them with a sense of ownership and relevance is motivating for learning (Niculescu & Thorsteinsson, 2011). What is less clear is whether and how personalization can support effective collaborative learning. This difficulty has not been reduced, but exacerbated with digital personalization (or technology-mediated personalized education).

The current status quo of personalized learning and digital personalized education is that many educationalists recognize the potential of personalization for education, but the link between personalization and education, and in particular, digital personalization and education, remains problematic. It follows that there are many versions and flavours to 'personalized education' and the term can refer to a number of different practices. In some schools, personalized learning means that students are involved in the decision-making process about the topics they study throughout the year. This can be as small and specific as co-creating class-based books for shared reading or bigger and wider as deciding on the main themes for a given month. In other schools, personalized education is interpreted as digital personalized learning, which typically means that children use tablets with adaptive algorithms.

Against the backdrop of varied and diverse approaches to personalized learning evolved in individual schools, a new, technology-based approach has recently begun to influence the provision of US private schools. This approach is not what I would describe in the neutral terms of technology-based approaches, but what I consider to be technology-*driven* personalized education.

Technology-driven personalized education

Technology-driven personalized education is a type of provision where the tool (technology) is given priority over pedagogy and is believed, in and of itself, to have a transformational effect on children's learning. This kind of education is typically provided to children in the form of personal mobile technologies and great autonomy in the activities undertaken during a school day. A notable example here are the schools set up by the educational start-up AltSchool, which has financed a group of schools, all focused on technology-mediated personalized learning. In these schools children have individualized plans of activities (or 'playlists of projects' to use the language of the providers and the business world) and their online engagement in these activities is directly monitored by their teachers and parents via apps.

Some scholars have critically examined these practices. Selwyn (2016) succinctly summarized the problem: 'The prospect of refashioning teaching and learning in the image of Netflix might make sound sense in the mind of Newt Gingrich, but surely overlooks some of the fundamental qualities, characteristics and values of what makes for "good" education' (p. 80). Selwyn refers here to Newt Gingrich's highly controversial article for CNN in which Gingrich, an influential American politician and businessman, claimed that technology can replace teachers and described personalized

learning to be the ‘education system’ for the twenty-first century (see Gingrich, 2014, online). Professor Selwyn criticizes this approach by arguing that such an approach marginalizes the ‘collective and communal’ aspects of education. I wholeheartedly agree with Selwyn on this issue. Indeed, in an article co-written with my colleague Dr Elizabeth Fitzgerald at The Open University, we argued that the personalized learning pushed forward by technology giants such as the Silicon Valley-sponsored AltSchool initiative has three major flaws:

First, education has always been about acquiring knowledge and skills relevant to a profession, but also about acquiring general knowledge. By feeding children only the content they’re interested in, we may end up with many specialists and few generalists.

Second, while learners may cope poorly with trying to learn in a way that’s not suited to them, in the real world life will not always be so accommodating. Their lack of ability to compensate may mean they suffer as a result.

Finally, children’s preferences are not fixed – in fact they often change as immediate responses to the environment. To predict content relevant for children there needs to be sensitive, human-directed input – not automation. Otherwise we end up with what might be called de-personalized learning, and classrooms with little conversation between student and teacher. (Kucirkova & Fitzgerald, 2015, online)

In addition to recognizing the financial or commercial orientation of the technology-driven personalized education models, we need to recognize that technology-driven models of education have not transformed instruction through pedagogy. Instead, it follows an education model that is based on a business agenda and one that marginalizes pedagogy.

Technology and the business model of education

I argue in Kucirkova (forthcoming, b) that the current models of digital personalized education privileges technology over pedagogy. This is problematic, because it focuses on the resource rather than the activity supported by this resource. As mentioned in the previous chapter, Selwyn (2016) makes a related point about the business tendencies in digital personalized education. He argues that the way this technology is deployed in, and developed for, the classroom resembles a business strategy in that it is being tested on the go and through trial and error. I extend this point and argue that the current mechanism embeds personalization in the educational *resources* (rather than their use), which is based on the model of commercial personalized systems.

Take the adaptive feedback mechanism of students’ reading library, for example. The algorithm developed for most digital library systems currently offered to young children follows the same logic as the recommendation programmes of Amazon or Google rankings. The system takes as its main comparison unit the book (the resource or the product to be sold to the customer) rather than the child’s interaction with the book (which would in education represent the key educational opportunity). The

system aims to offer the child many new titles and keep his or her interest by offering new exciting alternatives to the latest book they read or clicked on. This system doesn't aim to encourage the children to think critically and deeply about what can be achieved with the resources they already have. This is why we argued in Kucirkova and Fitzgerald (2015) that the current models of technology-enabled personalized education focus on the commercial profit of those who produce this technology, rather than the actual learning happening with the technology.

My other reservation of a business-inspired model of personalized education is that it assumes an entrepreneur and client-oriented mentality. This mentality is particularly dangerous for early childhood education. It might undermine the social mission of education, because it assumes that all children have a fully formed identity and are self-aware of who they are and who they want to be. It privileges smart, self-motivated students who are able to take ownership of their own learning, who can build on the automated feedback mechanisms embedded in the resource and perceive the rewards embedded in the system as motivational for their future learning. There are many signs of this mentality in contemporary educational discourse. For example, when Anthony Salcito, the vice president of Worldwide Education at Microsoft, gave a talk about personalization and education, he claimed that 'personalization and the "maker" movement in education are two forces can help change students' attitudes, and re-engage them' (cited in <https://marketbrief.edweek.org/marketplace-k-12/microsoft-exec-challenges-publishers-to-change-as-students-use-of-technology-shifts/>). When describing how this could happen, Salcito was quoted to say: 'If my book knew I wanted to be an architect, my math problems could give me architectural examples.' This quote illustrates where the problem lies: the model assumes that the children know what they want and that, therefore, the system should give them what they demand. However, it offers little to children who are not motivated to study and who do not have educational examples at home – be these educational examples in the form of resources or real human beings. If we are to ever close the inequality education gap, we need to make the personalized education model more pedagogy driven. This is where technology-enabled personalized education comes in.

Technology-enabled personalized education

Technology-enabled education is a model of education that aims to harness the customization options of new technologies and, at the same time, accommodate the standardized curriculum of the past. It harnesses adaptive and customizable technologies as the technology-driven models do, but it blends them with traditional pedagogies. Again, this means that technology-enabled personalized education can mean many different things in practice. Broadly speaking, for students at primary and secondary level, technology-mediated personalized education typically happens at the *device level*. Students are provided with customized personal devices, such as tablets or iPads, equipped with a classroom management software. This presents teachers with dashboards that show visualization of students' learning in the form of graphs or tables. The data are based on students' engagement with content uploaded to

their devices. Teachers have the option to select specific content for specific students; that is, they can individualize the generic content according to students' abilities. For students at the university level, technology-enabled personalized education happens at the *content level*. For instance, teachers can customize the textbook their students read (see Pearson's personalization offer for schools) or they can provide students with textbooks that contain dynamic assessment, stealth assessment, adaptive teaching or learning analytics. Adaptive courseware includes books produced by McGraw Hill Education with the LearnSmart system (McGraw-Hill LearnSmart, 2011). LearnSmart is described by McGraw Hill as 'an interactive study tool that adaptively assesses students' skill and knowledge levels to track which topics students have mastered and which require further instruction and practice' (McGraw-Hill, 2011, online). The system can adapt to students' learning by presenting them with selected learning content. In addition, it evaluates students' confidence and memory over time (through self-evaluation tests of students' confidence and predesigned memory tests) and selectively presents them with content tailored according to the students' performance on the tests. Similar to adaptive technology designed for primary and secondary schools, the system generates reports about the students' progress which position individuals in relation to each other and to an average score. Both the device-based personalization and the content-based personalization are calibrated in relation to standardized benchmarks of progress and are used as a tool to facilitate teachers' ability to monitor students' progress (or for older students to monitor their own progress) and to offer students the option of accessing the teaching materials at their own pace.

For young children at the preschool or kindergarten level, technology-enabled personalized education is in its infancy, but it is being piloted by some organizations. For example, the US-based Global Literacy Project developed the Curious Learning System, which aims to teach children to read with the help of a suite of apps delivered to children via personal mobile devices. The apps monitor students' progress and offer them activities depending on their responses. The team behind the Global Literacy Project believes that 'children are wired to learn, even without teachers, schools or books' (<http://www.curiouslearning.org/about>) and has used current research on reading development to inform the design. Similar approach was followed by the non-profit organization One Billion Apps, which has developed a suite of mathematic apps and has rigorously evaluated their use in Malawi and UK schools. The apps are designed to progressively develop children's knowledge of early mathematical concepts (such as count to 10, count to 20, 2, 5 and 10 times tables). In a randomized controlled trial with 283 Malawi children, Pitchford (2015) found that children who used the apps for thirty minutes per day for eight weeks had significantly higher scores on the test of their maths knowledge than the children who received standard instruction. Dr Pitchford concludes: 'Tablet technology can effectively support early years mathematical skills in developing countries if the software is carefully designed to engage the child in the learning process and the content is grounded in a solid well-constructed curriculum appropriate for the child's developmental stage' (n.d.). The study shows that new technologies have promising capabilities and they can offer an individualized educational experience

to each child. In classrooms with high teacher/pupil ratio (such as Malawi), the tools can be a great help for teachers as they offer real-time and comparable scores of all students at one glance. They are also useful because they differentiate the sequence in which they present the learning content to individual students. Overall, technology-enhanced personalized education could be considered pedagogical, as children learn by revising their current knowledge following the use of the apps. However, unlike in non-digital classrooms, pedagogy was in these cases embedded within the device rather than around it. Given that the creation of the software programmes used for this education model follows certain pedagogical principles, and is based on empirically driven notions, it is a step further than the technology-driven model. Clearly, it is still not a teacher- but technology-based model, which socio-constructivists might struggle with. However, the main issue with this model is that it problematizes, rather than consolidates, the tension between standardized and personalized education.

Standardized versus personalized education

A simplified explanation of the relationship between personalized and standardized education in the 20th and 21st century in the United Kingdom is as follows: since the 1980s, the United Kingdom's educational system has been using national standards in the belief that standardized education can address the ills of early years and primary education. In the late 1990s and 2000s, standards have been linked to rewards and punishments for teachers and administrators. These were supposed to reflect how well teachers and administrators support children in meeting the educational standards. In the early 2000s, personalized education received official recognition in many countries worldwide (e.g. Australian National Curriculum), including the United Kingdom. However, the push for personalized education came from a few political leaders (e.g. Ed Miliband in the United Kingdom) and high-profile entrepreneurs (e.g. Mark Zuckerberg from Facebook); it was not a whole-state or international educational reform. This meant that personalized education mediated by technology is being implemented in selected schools and is limited to pockets of practice. It is hard to predict the future of this tendency in light of the large financial investments technology giants are ready to make for these projects. However, standardized assessments and international tests are unlikely to go away in the near future; in fact, there seems to be an increased interest in more standardized international assessments for increasingly young children. These efforts are heavily criticized by many educationalists (see, for example, Moss et al., 2016), but the OECD and their flagship PISA tests have a considerable authority in currently thirty-five member states. So, even if some schools offer digital personalized instruction at the classroom level, they still have to follow standardized assessments at the national level. Keeping in mind the unclear history and disputed presence of personalized education, standardized education is definitely worth reflecting upon for future models of personalized education.

One way of mitigating against the limitations of digital (technology-driven or technology-enabled) personalization is to conceptualize personalized education as a gradual and iterative process (rather than a whole-system reformation or

transformation). In what follows, I outline research which suggests that given in small doses and well applied, personalization can offer unique learning benefits.

Personalized education: Possible ways forward

Thus far, I have focused on the limitations of digital personalization, highlighting how the current models clash with Vygotsky's socio-constructivist perspective and traditional pedagogical models. This section marks a departure from this focus by introducing the idea of personalized education as a technique, instead of a system approach. Instead of attempting an educational revolution, I turn to the possibility of personalization functioning under the umbrella of standardized education and offering its benefits in specific, individual areas.

Personalized education as a set of techniques

The rationale for this approach is that if personalization is offered to schools as a set of possibilities, then it is more likely to lead to a sustainable model of education, with broader relevance and significance to children. Policymakers often forget that each school caters for different children and that within each school children have different profiles: they come from different backgrounds and they have different needs and aspirations. Teachers too, are different in each school. Even in schools with a strong leadership and shared vision among staff, we find different interpretations of the school vision among individual staff members. It follows that it would be very difficult to think of a single approach to education and hope it will transform the educational experience for all children. This is why I explore a *set of pedagogical techniques* that could be flexibly used to support personalized education in Chapter 11 (the pedagogy of creativity, design and embodied learning).

It is also worth reminding us here of the cliché that we do not know what we don't know. If we rely exclusively on technology-based personalized education, we will shut the door to children's exploration of alternative identities which might not be formed in digital spaces (e.g. dance and sculpture) and restrict many children to early specialization. In a shifting workplace landscape, where high-skill and low-skill jobs are on the rise but medium-skilled jobs are on decline (Coppola, 2014), this doesn't seem a prudent strategy.

For personalized education in the future then, it is more fruitful to think of it as a possibility for *some* schools and to examine the conditions and contexts in which it might work best. I will outline some of these contexts when discussing the use of touchscreens in British and Spanish preschools (Chapters 10 and 11), as well as when considering effective practices with personalized books in primary schools (Chapter 7). Common to all these contexts is the alignment between personalized and standardized education and the teachers' use of technology to enrich, not to revolutionize, the current practice. This was also the case in the eight British primary schools that were identified as 'using ICT effectively to enhance learning across the curriculum' (<http://edfutures.net/NP3>) in the new purposes, new practices and new

pedagogy (NP3) project in 2016. The NP3 project was a large-scale project led by Professor Peter Twining (The Open University), in collaboration with Lancaster and Manchester Metropolitan University and funded by the Society of Educational Studies. The aim of the project was not personalized education per se, but to find out, more broadly, how the NP3s play out in UK schools and impact on teaching and learning.

The project involved visits to those UK schools that have innovated their practices and have embraced new technologies to facilitate this orientation. As part of the project, I visited some selected cutting-edge schools and spent days observing their practices to get an insight into the ethos of these schools and teachers' attitudes. I noticed that in these schools technology was used as one of the many resources available, not the centre of the activities. The teaching plans and lesson objectives sometimes didn't contain the words 'digital' or 'technology', and, yet, digital tools were seamlessly integrated into the school practice and pedagogy. As for personalized education, teachers in these schools used adaptive software and personal mobile technologies as and, when possible, within the standardized system. Digital personalized education was used to make the learning process more motivational, multimedia and faster, but not radically different. These observations are symptomatic of the reality that in many innovative and effective schools, technology-based personalized education is used to enrich the best pedagogy, not to drive it.

Personalized education in the form of personalized resources

Another alternative way of integrating personalized education into current educational systems is to narrow it down to a set of personalized resources. I demonstrate this premise in this book by centring on the research and practice of children's personalized books. Personalized books combine traditional/classic texts with personal data that are embedded into the book's content. Such a story hybridization is a relatively new story genre, popularized with the recent advent of new technologies facilitating their production. For example, a personalized Cinderella story is a story in which the plot is threaded with excerpts from the traditional fairy tale but with some personal references to a particular child. For example, if the child reading the book is Emily, then instead of Cinderella the main character is called Emily, experiencing the life of Cinderella. Also, Cinderella's sisters are replaced with names relevant to Emily (e.g. Emily's friends or siblings). Unlike the example of technology-enabled personalization in the form of adaptive courseware (see section 'Personalized education: Possible ways forward' in this chapter), personalized books do not use personal data to monitor or accelerate children's learning. The primary aim of personalized books is to increase children's interest and motivation to read. The text is based on a classic tale, and contains rich literacy elements such as varied vocabulary or complex grammatical structures. This text is then combined with the personal data of the child which captures their attention and helps with their focused attention on the text. The personalized books could be thus considered to combine a standardized element (classic text which is the same fairy tale for everyone) with a personalization approach. Importantly, they do not privilege personalization above other learning mechanisms, they include

references to other unknown characters, wider, non-personalized topics and enrich child's language with new vocabulary. Research shows that well-designed personalized books can increase the reading comprehension of struggling readers (Bracken, 1982), that they can support the word acquisition of young children (Kucirkova, Messer, & Sheehy, 2014a) and foster bonding between parents and children (Kucirkova, Messer, Sheehy, & Flewitt, 2013).

Personalized books are an example of applying personalization in small doses, for a specific purpose. Personalized books call for looking for innovative ways of engaging children in traditional texts but not throwing the traditional texts out with the bathwater. In this vein, I suggest that future research and practice of personalized education should apply it proportionally and in small quantities. This suggestion is based on the evidence concerning personalized books but also other research concerned with the personalized effect. I continue this chapter with a short review of the research concerned with the personalization effect and children's language and cognition.

Extant research on the personalization effect

An area of research, where the industry could take inspiration from research for design of children's personalized resources, is the cognitive psychology research concerned with self-referential effects. A self-referential effect occurs when an individual, or when an object used by this individual, relates a piece of information to the individual. This can happen not only with the use of personal pronouns (such as I or me) or possessive pronouns (such as my or mine), but also, more indirectly, by using concepts that are specific to one individual (such as the individual's name and the school the individual attended). There are many studies examining the self-referential effect in relation to adult learners and its impact on learning as well as memory effects, that is, both in terms of acquiring new information and retaining it. These studies can give us some insight into the learning mechanisms implicated in personalized learning and lead us to some considerations concerning the design of resources for young children. Therefore, I summarize the main findings from these studies here.

Self-referential effects studied in adult learners

The studies of self-referential effects began with a detailed, narrowly defined focus on the self-referencing phenomenon in short phrases and individual words. These studies were initially about personalization and personalized learning, but in them personalization was defined only as the act of self-referencing – that is, referring the text (word, sentence or an entire passage) to the 'self', or the person reading it. So that psychologists can experimentally verify the effects of such personalization, they need to minimize any influencing factors in the learning context. These factors include the effects of technology if the personalized book is a digital personalized book, or the support provided by an adult if the book is read to a child, for example.

On the one hand, the experimental conditions reduce the usefulness of the results for real contexts, but, on the other hand, a well-conducted experiment can provide insights into theories and causal pathways for impact. These studies have shown that the self-referential effect influences learning through directly addressing the students/learners/readers as 'you' through the text. A psychology research conducted by Professor Brunye and colleagues at the Tuff University shows that the use of the 'you' pronoun is more effective than the use of the 'I' pronoun' when it comes to teaching new concepts, and that both are more effective than the use of third-person pronouns (he/she or they) for learning and information processing (Brunyé, Ditman, Mahoney, & Taylor, 2011). In an experiment with thirty-six undergraduate students, Ditman, Brunyé, Mahoney and Taylor (2010) examined whether the manipulation of the personal pronouns ('I, You and He') would influence students' performance on a yes/no recognition test. They found that being addressed as an actor ('You are slicing the tomato' as opposed to 'He is slicing a tomato') is more helpful for students' retention of new information presented in this text. This would imply that books and texts written in the neutral style are less helpful for children when learning new facts than those addressing children as the main agent/actor. The researchers further identified that this self-referential effect is influenced by other linguistic cues appearing in larger chunks of texts (and especially so in prose or stories). For example, Ditman et al. (2010) note that verbs play an important role in retention, perhaps more so than the actual agent: 'Indeed verbs appear to lead to a more reliable memory trace, as readers seem to remember the described actions but not necessarily the referenced object/patient' (p. 176). Based on these experiments, we could speculate that to teach children new concepts through personalization, we need to address them as 'you' or main agents in the text and we need to link the new concepts to actions carried out by the agents. This is an interesting insight relevant to our discussion of defining personalization and understanding its possible influences when presented in the form of children's books and texts.

Other experimental studies conducted on self-referential effects show that self-referencing can affect memory processes. Rogers, Kuiper and Kirker (1977) studied how self-referencing helps with encoding new personal information. In an experiment with sixty-four undergraduate psychology students, Reeder, McCormic and Esselman (1987) tested four conditions (p. 244): '(a) self-reference ("As you read this passage, continually ask yourself whether this passage describes you"); (b) other-reference ("As you read this passage, continually ask yourself whether this passage describes Princess Diana"); (c) linguistic ("As you read this passage, continually ask yourself whether there are any misspelled words in this passage"); or (d) control ("Read this passage")'. The results were clear-cut: students recalled information best if it appeared in the self-reference condition. The second-best recall condition was the 'other-reference'. The authors conclude that 'under some circumstances at least, the self may function as a mnemonic for prose material' (p. 246). The study was field breaking because it moved from studying self-reference effects in relation to short phrases, disconnected passages or words alone to prose, suggesting wider educational implications. The study was also one of the first experiments to show that self-referencing can help students remember new facts.

Psychologists have studied self-referencing not only in terms of referring information to self, or incorporating a few personal references into a text, but also in terms of the text being presented in conversational style (as opposed to academic styles). Studies with this remit have been referring to this phenomenon as the ‘personalization effect’.

Personalization effect studied in adult learners

The personalization effect has been studied in relation to deep learning, in relation to digital (computer-based spoken instructions) and paper-based learning conditions (printed instructions on a piece of paper). In these studies, the formal style is characterized by third-person monologue speech, while the personalized condition includes the conversational style in which students are addressed as ‘you’ and a description of a phenomenon is not neutral, but presented as something which happened to ‘you’, in ‘your’ school.

Professor Richard E. Mayer at the University of California, Santa Barbara, the United States, has been studying multimedia effects and best conditions for learning over his lifetime. The work comprises a number of studies in which he compared the presence of personalization effect in printed and digital environments. In these studies, Mayer noted that the personalization effect is medium free; that is, students learn better when personalization effect is present, regardless of whether the information is presented as printed and spoken text. To explain the effects, Mayer (2003) uses the cognitive theory of multimedia. Developed by Mayer (1997) and Mayer and Moreno (2002), the multimedia theory posits that ‘personalized messages may prime the conversation schema in learners – that is, learners may be more willing to accept that they are in a human-to-human conversation including all the conventions of trying hard to understand what the other person is saying’. This effort is linked to organizing and integrating, which helps with information processing. Moreno (2001) further explains that ‘according to a cognitive theory of multimedia learning, self-referencing may promote deep learning in two ways: first, by engaging students in the active elaboration of the materials and second, by using less cognitive effort to process verbal information when it is presented in a familiar style (i.e. normal conversation) rather than an unfamiliar style (i.e. monologue) of communication’ (p. 5).

Overall, the studies with adult learners show that the conversational style of presentation and the change of third pronoun to the second pronoun are implicated in memory processes and, as such, can reduce the cognitive load in the learning process. The findings stand in contrast of educational practice and the anecdotal assertion that ‘the more familiar something is, the more likely we are to use our memory. Framing learning around an unfamiliar context might actually encourage a higher degree of attention and potentially encourage more thinking and the retention of more new memories’ (Quinlan, 2013, p. 155). Readers interested in understanding these processes in more depth might wish to consider reading upon the key learning theories applied in this branch of research: the cognitive load theory (see Sweller, Ayres, & Kalyuga, 2011) and the cognitive theory of multimedia learning (Mayer, 2003).

Personalized speech studied in young children

While self-referencing is an established area of psychology research with adult learners, there is a dearth of evidence about self-referencing in developmental psychology. However, an area that is related to self-referencing and that has been studied in depth by developmental psychologists is children's discussion of their feelings and emotions, the so-called 'emotion talk'. Emotion talk includes discussing not only how a child feels subjectively but also how the child thinks others feel. Emotion talk is an important aspect of children's development because children who frequently discuss emotions with their parents develop emotion understanding which later predicts social competence and empathy (Denham et al., 2003), that is to say skills which are crucial for social relationships and interactions. Parents who label their emotions when they talk to their children (e.g. I feel sad today) enable children to reflect and regulate their own feelings and fine-tune their emotional understanding (see, for example, Martin & Green, 2005).

Children's emotion knowledge (i.e. children's understanding of others' emotions) has been studied in relation to not only what children say to their talking partner but also how they perform on theory of mind tasks (Meins et al., 2002) or engage in joint attention with the adult (e.g. Tomasello & Farrar, 1986). There are methodological difficulties of observing and interpreting what is happening in young children's brains and the interested reader can find out about alternative measures of children's emotions in Moore et al. (1995) in relation to theory of mind tasks and in Corkum and Moore (1995) in relation to attention, pointing and general interest. What remains a fact is that there are many intervention studies aimed at supporting mothers in discussing their own and their children's emotions (e.g. the Talk To Your Baby initiative by the UK National Literacy Trust), and that there is a keen research interest in studying which contexts and with which resources might be most effective for parent-child emotion talk.

In a study with Dr Virginia Tompkins (see Kucirkova & Tompkins, 2014), we examined how mothers and children personalize their emotion talk according to a different conversational context. A literature review conducted as part of this study revealed that although much research has been concerned with children's emotion talk, researchers have not distinguished whether the emotion discussed by parents and children relates to the child, or to the parent or to a third person. Given my interest in personalization, I was keen to establish whether a particular context of mother-child conversation might influence how mothers talk about emotions to their children and how they relate them to the child or other people (i.e. whether they personalize them). It is well known that parents contextualize their talk to the child when they read a book to them or discuss a past event, but it is not known how specific aspects of this contextualization (such as personalizing emotions) may change in relation to different situations, different children and other factors. In this study, the focus was on three conversational contexts: reminiscing, reading a wordless book together and playing with a toy. With Dr Tompkins, we hypothesized that when talking about the past without any props, the mother and child will mostly focus on their own emotions, whereas if they talk about a book with a book character or play

with a dolphin toy, they will focus on the emotions of these characters. We added to the initial definition of internal state talk by Howe, Rinaldi, and Recchia (2010), who measured emotions, likes and preferences but not to whom these emotions relate. We labelled talk related to self 'personalized talk' and compared it to the talk related to the mother's emotions or the emotions of someone third, who could be the story character in the book, the toy dolphin the mothers and children interacted with or a person they reminisced about. The study was a secondary data analysis, with a repeated-measures design to control within-group comparisons (i.e. contextual differences). The three contexts of investigation were reminiscing, discussing a wordless book titled *Pancakes for Breakfast* and a play with a toy. The contexts were not limited in their length or nature, so we used proportions of codes for each category instead of total frequency. Transcript data of mother-child talk were available for all three contexts, for forty-seven American mothers and their 3- to 5-year-old preschoolers.

Emotion talk was coded in the same way across the three contexts and across mother's and child's talk. For the personalization aspect, we applied Sigel's theory and defined the personalization variable as the degree of distancing from the 'self'. According to the cognitive distancing theory (Sigel, Stinson, & Kim, 1993), parents and children need to resolve the tension between their own and the other partner's perspective to arrive at a shared meaning. So that parents and children reduce the distance between each other's perspectives, they need to engage in what Sigel calls distancing behaviours, which include comparing and contrasting each other's perspectives and emotions.

We found that when mother and child talk spontaneously in these three contexts, they mention their own emotions most when reminiscing about the past and least when discussing a wordless book together. Mother-child talk was correlated in each context, indicating that at this age children respond to the emotions discussed by their parents. This shows that some contexts naturally lend themselves to the discussion of our own emotions (such as reminiscing) and some contexts to the discussion of others' emotions (such as books). In broader terms, the study found that some learning contexts offer naturally more opportunities for adult-child personalized talk than others.

The self-referencing effect and personalized emotion talk are examples of studying personalization in the textual and verbal (oral) mode. Personalization can be also represented visually, as a pictorial clue – an approach researched by Professor Kieron Sheehy and colleagues.

Personal pictorial cues: The 'handle technique'

Sheehy (2002) took self-referencing to a different direction and applied it to the recognition of new words, important for children's word learning. He and his colleague Howe (Sheehy & Howe, 2001) compared three ways of teaching word recognition to children with severe learning difficulties: presenting them with the word alone, or with integrated picture cueing (typical procedure) or with an author-developed 'handle technique'. The handle technique was invented by Sheehy as a way of helping students remember new words by attaching a personal value to them, in the form of a small

pictogram. The 'handle' is a small visual representation of the children's meaning that is immediately understandable for the child. The children might see their own handles as being pictures, but they are usually not accessible to anyone else. These handles help children with word recognition. The picture is based on the students' own cues, something they say that the word reminds them of. For example, if a child thinks of a blanket in relation to a chair, then a picture of a blanket will be added to the chair to remind them of that connection. These personal cues are unique to each child and should be provided by the child. In an experiment with children with severe learning difficulties (intellectual disability) aged between 8 and 13 years, word recognition with the handle technique was found to be the most effective method for teaching them new words (Sheehy, 2002). Sheehy later showed that pictures can work through personalization in many different ways (Sheehy, 2002, 2005). His research thus extends the self-referential research with two important insights: it suggests that personalization could be applicable to pictorial cues; that is, personalization effects could be medium free and apply to visual as well as textual or verbal forms. It also suggests that such personalization influences recognition of previously seen information, which, in addition to recollection of information, is another key learning mechanism.

In sum, psychology research shows how personalization, which can be presented in various forms and different contexts, is implicated in the learning processes in various important ways. This knowledge can be used by children's designers/producers in the development of personalized resources and by educators when using the resources (e.g. by linking verbally the information in the text to the child). It restates personalized education with a focused, much more nuanced view on what counts as personalized and how it could benefit children.

As mentioned, to bridge the gap between research and practice, it is important to establish not only the various ways in which personalization can be embedded in resources, but also the amount of personalization necessary for a specific learning effect to occur. The current models seem to give little consideration to the latter aspect. Personalization is used either haphazardly or as a whole-classroom approach. My experience with commercial producers of personalized products for young children is that so far, the amount of personalized elements is very much hit-and-miss. Clearly, the personalization options will be different for different resources and for different contexts. My research has focused on the resource of personalized books and on the context of shared book reading of parents and children. When I started in 2011, there was no nomenclature or classification scheme to categorize the various levels of personalization available for personalized books. I approached the gap systematically, focusing on both paper-based and digital personalized books and various levels of personalization possible for them.

Levels of personalization: The case of personalized books

Personalized books and personalized resources often combine multimedia kinds of personalization into one product. For instance, with some commercially produced

personalized books (e.g. *Personalised Fairy Tales* from www.my1styears.com), we find that only a few words are personalized – the rest of the book is written in the same style for all children. In other books, for example, those produced by Mr Glue Stories, children's own drawings appear on a printed page of their own personalized book. Some books address children as you; some keep a neutral tone. In previous research, as mentioned, for Mayer's experiments the students received entire passages written in conversational style, while Ditman et al. (2010) studied a specific sentence. In Sheehy and Howe (2001), the children received a small pictorial cue to make the new and unfamiliar information personally meaningful. How can we make sense of the different kinds of personalization options here?

In my doctoral thesis (Kucirkova, 2014), I examined the impact of paper-based and digital personalized books on children's language development (see Chapter 10 for details). To distinguish the various kinds and types of personalized books available at that time, I suggested a rubric based on three levels of personalization available for children's books. Personalization was in these research studies conceptualized as the extent to which a book was unique to an individual child, and the rubric focuses merely on the final product (the personalized book itself), which can be produced with or without the use of technology. It considers the level of personalization according to the book's content and format. Table 3.1 contains the three main levels of personalization I had identified for these books.

Table 3.1 Different levels of personalization in personalized books

Level of personalization	Format	Content	Possible to be generated by technology
1 Highest	√	√	X
2 Middle	X	√	√
3 Low	X	X	√

Source: Adapted from Kucirkova (2014)

The first row in the framework corresponds to the highest level of personalization available for digital or non-digital personalized books. Such books are created without the use of any template for their content or layout. If a child creates such a highly personalized book, his or her creativity and imagination are fully present in the final product, which is likely to be a unique artefact, with original format and content. The box in the last column in the first row indicates that, currently, such highly personalized books cannot be created with technology. This is because the use of technology would influence the format or content the book would take. Although advances in 3D printing are made on a daily basis, as yet, there are always some restrictions that mean the users have to adjust their vision to the practical constraints of the technological production process (e.g. the set of colours available for toners). Highly personalized books are therefore by and large self-made books, created with resources or materials available to the creator, but not printed by a digital printer. An example of a highly personalized book would be, for example, a set of pages bound together with a ribbon, with each page being cut out by the book's producer, with different marks of autumn

leaves on each page, or with a few pages scented with the person's perfume and some poetic excerpts or pages with scribbles or stuck glitter. The production of such books takes considerable time and effort. Such highly personalized, self-created books are often created by not only young children but also some adults, as a gift for someone else or as personal diary. They are rarely found in classrooms and schools, but they can appear in the so-called third learning spaces when they are created as part of various summer camps, workshops and youth club activities. For the most part, however, highly personalized books are hidden from the public eye; they are an intimate unique literacy artefact stored at home.

For a semi-personalized book, technology is used to provide a fixed format, and users are free to add their own content. The final product can be either digital book or a printed book. For the latter, technology runs in the background, in the book production process. In addition, semi-personalized books can also be created without the use of technology. Indeed, many teachers encourage the creation of semi-personalized books in their classrooms (without necessarily knowing they do so). Teachers can provide children with a fixed format, the same for every child (e.g. a block of blank pages) and ask each child to fill it with his or her own story. In that case, the content is personalized to the child, but the format is standardized for the class. A very similar result can be achieved with tablet/smartphone tablet story-making apps. Story-making apps provide users with a template for the story, including a set of options for the story setting and story characters or props. The users can mix these to their will and add their own content.

The low end of personalized books are books that border on customizable books. Lowly personalized books have the content and format predesigned by the publisher (book producer). The user can personalize only a few elements of the predesigned story, such as the characters' names. Often, users can choose the gender of the main characters or the colour for the background. Such books can be created by the child, but most typically, these books are created as gifts for the children by their family members or friends. For example, when buying a personalized *Snow White* book from the supermarket Asda, all a parent needs to do is to supply the system with the name of his child and a few other key facts (e.g. whether his child is a boy or girl and what the names of his/her best friends are). The system incorporates this information into the classic story plot of *Snow White* and generates a 'personalized *Snow White*' in which the main character carries the child's name. The final book is a printed book, individualized to the customer.

The levels of personalization and content/format consideration are a simplistic division of personalized books, but they enabled me to encompass the broad range of research available for personalized books. As outlined in Chapter 4, there are some interesting community-oriented studies with highly and semi-personalized books for young children. My own research has been mostly concerned with the semi-personalized books, that is, book produced by parents and children following a fixed format and open-ended content. Lowly personalized books are easy to mass produce and are the kind of books currently popular with young children. We know very little about the educational impact of these personalized resources. I listed my basic rubric for personalized books in detail here to illustrate the various levels and possibilities we

could contemplate with in regard to other personalized resources developed for young children. The framework merely focuses on the intensity of personalization and is broad to accommodate pictorial, textual or verbal kind of personalization. The content and form will be different for each type of personalized learning, but a simple three-level rubric system can help streamline the process of identification and evaluation of learning benefits.

Summary

Technology-based personalized education can be divided into two models followed by the children's designers: technology-driven and technology-enhanced personalized education. The former could be said to lack pedagogy and follow a business-oriented approach to learning, while the latter embeds the pedagogy in its design, which often clashes with the standardized assessment agenda. An alternative approach to digital personalization in schools could consider how technology enriches current best practice and apply personalization only to specific activities and specific resources. This would be more aligned with extant research on personalization effects. Extant research considers self-referential effects and personalization effects in texts, books and reading resources and could be emulated for other resources developed for personalized education. However, when applying the insights from studies with adult learners to early learning, we need to be mindful of the fact that these experiments were carried out with undergraduate, mostly male North American psychology students. We also need to be mindful of the specific level of personalization available to students in these studies. The current psychology research does not explain how the personalization effect changes with different age groups, different kinds of texts (fictional, non-fictional, narrative and non-narrative) and children coming from different backgrounds, with different skills, needs and abilities. Importantly, we cannot apply findings concerned with cognitive gains (learning, memory) to all activities mediated by personalization. In the case of reading, for example, in addition to memory effects, learning happens in the form of story comprehension; word acquisition and fact retention are important outcomes but they are not the only ones. Emotional or affective outcomes – such as parents and children having a positive bonding time together, children learning about others' stories and children forming their identity as a reader – are similarly important. The ethical implications of technology-based personalization need to be considered and better understood by future design – an aspect that I do not develop in this book but recognize as crucial future research and policy avenue. When considering the range of personalization options, the various levels of personalization available for personalized books can provide a good source of inspiration for future research. The next chapter builds on this theme and summarizes the various kinds of personalized books currently available for young children. This illustrates the wide range of personalization options potentially influencing children's learning.