

Chapter 7

Key findings

There is evidence to support the notion that in OECD countries a large majority of young people, starting at an increasingly earlier age, already benefit from connectedness, that is, that they are able to use the opportunities offered by digital media and connectivity to their own advantage. Yet, when it comes to young people's expectations about technology use in learning, the resulting picture is complex. The evidence shows that young people's expectations and behaviours as learners in relation to technology use or connectivity in formal education are not changing dramatically. The vast literature defending the idea that formal education should radically change in order to cope with the expectations of young people is not supported by the facts. Empirical research has demonstrated that learners are not always comfortable with innovative uses of technology in formal education despite their social practices outside of the boundaries of educational institutions. Their attitudes stem from their prior experience in formal education, and their expectations can be succinctly reduced to three points: they expect technology to be a source of engagement, to make school or academic work more convenient, and, certainly, to make them much more productive. Yet, educators and policy makers should look at young people's current practices as a source of inspiration. Schools should not be expected to simply mimic young people's practices with technology, but this does not mean that they cannot learn from these practices and find inspiration in them. Moreover, the unprecedented challenges posed by connectedness require educators to pay attention to learners' voices.

Despite the claim by certain analysts that the recent emergence and adoption of digital technologies is no different to similar experiences in the past, and that there is therefore no reason to be too concerned about their educational implications, it does appear that the opportunities afforded by the current wave of technologies are indeed different in many respects. Contrary to what happened previously to older generations when radio and, particularly, television emerged, digital technologies and the services associated with them have brought with them something completely new: they modify not only the speed at which people deal with and manage information but also how they eventually transform it into knowledge. This is a good starting point for considering the implications that this fact may have when the users are children or young people, particularly as access to digital technologies is becoming almost universal in OECD countries. The following paragraphs summarise the main conclusions of the NML project discussed in this report:

1. **The knowledge economy and society are permeated and supported by connectedness and technology.** This has important implications for education because it has to deal with new challenges related to labour market requirements and social change. Firstly, education has to equip younger generations with the range of skills that are now demanded by the labour market in a knowledge economy. This is still a challenge in many OECD countries, particularly in relation to the development of 21st century skills. Secondly, the role that connectedness plays in new forms of socialisation and social interactions has crucial effects for the process of identity formation in adolescence. In both cases, formal education institutions have to design the best strategies to cope with these challenges since economic growth and social cohesion may be at stake.
2. **There is evidence to support the notion that in OECD countries a large majority of young people, starting at an increasingly early age, already benefit from connectedness.** Younger people do have a greater range of digital technologies in their household, tend to use the Internet as a first port of call, have higher levels of Internet self-efficacy, multi-task more and use the Internet for fact checking and formal learning activities. Nevertheless, generation was not the only significant variable in explaining these activities: gender, education, experience and breadth of use also play a part. Indeed, in all cases immersion in a digital environment (*i.e.* the breadth of activities that people carry out online) tends to be the most important variable in predicting if someone is a digital native in the way they interact with the technology. What is very clear is that it is not helpful to define digital natives and immigrants as two distinct, dichotomous generations. While there were differences in how generations engaged with the Internet, there were similarities across generations as well, mainly based on how much experience people have with

using technologies. In addition, individuals' Internet use lies along a continuum of engagement instead of being a dichotomous divide between users and non-users (Helsper and Eynon, 2010; Van Dijk, 2005; Warschauer, 2002). Clearly, connectedness suits young people's needs in domains that are critical for them such as entertainment and socialisation with peers, extending in time and intensity the influence that the peer group may have. The high levels of connectedness exhibited by the younger generations are yet an additional challenge for education. Both parents and educators should pay attention to this as well to other emerging concerns raised by connectedness and for which they lack clear guidelines based on previous experiences.

3. **Being more connected is not necessarily always a good thing; what matters is what young people do while they are connected.** Just because young people do more of something it is not always a good thing. While a strictly dichotomous classification of the effects of technology on learners into “good” and “bad” may make for nice headlines, such a simple scheme ignores the fact that human experience is intrinsically multidimensional; almost all experiences are “good” in some ways and “bad” in others. Not surprisingly, then, technology has been linked with both positive and negative effects (Bavelier *et al.*, 2010). While it is important to understand what young people are using new technologies for in debates about future developments in pedagogy and curriculum; it cannot be assumed that increased use of digital technology has a positive effect. For example, it is well known that young people multi-task more. However, we do not know if this is a positive or negative aspect of young people's use of new technology. Multi-tasking may have a negative impact on learning due to cognitive overload (Hembrooke and Gay, 2003). Similarly, while young people are more likely to use the Internet as a first port of call for information this does not mean they are in fact skilled in dealing with and critically assessing information (Livingstone, Ólafsson and Staksrud, 2011).
4. **As of today, there is not enough research evidence to demonstrate that technology attachment or connectivity has critical effects on cognitive skills development.** It may be too early to perceive significant effects. However, there are some indications that in the long run, due to continued practice, verbal intelligence levels may decrease to the benefit of image or spatial intelligence. Yet, claims about changes in the brain caused by attachment to technology or connectedness are simply not backed by evidence.
5. **The evidence shows that young people's expectations and behaviours as learners in relation to technology use or connectivity in formal education are not changing dramatically.** The vast literature defending

the idea that formal education should radically change in order to cope with the expectations of young people is not supported by the facts. Empirical research has demonstrated that learners are not always comfortable with innovative uses of technology in formal education despite their social practices outside of the boundaries of educational institutions. Their attitudes stem from their prior experience in formal education, and their expectations can be succinctly reduced to three points: they expect technology to be a source of engagement, to make school or academic work more convenient, and, certainly, to make them much more productive. At this point, some important lessons emerge:

- **Students want technology to improve teaching and learning, not to change it radically.** They value technology adoption in teaching and learning provided that it improves convenience and productivity in their academic work and school-related tasks. Teachers' perception of students' expectations regarding learning tend to overestimate students' degree of attachment to course adoption of technology. In this respect, the image of the New Millennium Learners goes far beyond the reality of the expectations of today's students and there are no indications that this will change in the soon. In particular, students' attitudes towards technology use in teaching and learning appear to be far from what many would wish to see emerging as the dominant patterns. Rather, students tend to be more reluctant in this respect than the image of the New Millennium Learner would suggest. Most of them do not want technology to bring a radical transformation in teaching and learning but would like to benefit more from their added convenience and increased productivity gains in academic work. The reasons for such reluctance might be related to the uncertainty, disruptiveness and discomfort that discrete technology-based innovations may cause for them. They may also be related to the fact that many of these students have not really experienced innovative uses of technology in their classroom.
- **Adults, specifically teachers, can 'speak the same language' as their students if they want to.** (Helsper and Eynon, 2010) – Recent evidence suggests that it is possible for adults to show the typical behaviour of digital natives, especially in the area of learning, by acquiring skills and experience in interacting with information and communication technologies (Bayne and Ross, 2011). The demographics are clearly very complicated and resistant to neat generational labelling. Clearly, much literature overestimates the impact of technology on the young and underestimates its effect on older generations (Williams and Rowlands, 2008). Evidence suggests that the differences in information behaviour, at a single

point in time, between young and early middle-aged students and faculty are much less significant than those between young and more mature (40- and 50-year-old) students. A much greater sense of balance is needed. Generation is only one of the predictors of advanced interaction with the Internet. Breadth of use, experience, gender and educational levels are also important, indeed in some cases more important than generational differences, in explaining the extent to which people can be defined as digital natives. The presumed gap between educators and students may not be supported by evidence, but if such a gap does exist, it is definitely possible to close it (Helsper & Eynon, 2010).

- **Educators and policy makers should look at young people’s current practices as a source of inspiration.** Schools should not be expected to simply mimic young people’s practices with technology, but this does not mean that they cannot learn from these practices and find inspiration in them. Connectedness is changing the way learners acquire information and elaborate knowledge. Their identities are shaped by interacting with peers in an enlarged digital landscape of opportunities, including those for learning. As previous OECD work on the New Millennium Learners has demonstrated [EDU/CERI/CD(2008)4], there is enough empirical evidence to show that young people’s use of digital media aligns with well-documented principles of social learning and knowledge management. Moreover, digital media allow a style of learning that is less about consuming knowledge and more about interaction and participation. Paying attention to how young people learn, play and socialise outside the classroom may be an important source of evidence and inspiration in the effort to introduce educational innovations. But the final criterion for technology use in learning should remain a professional judgment about the most efficient way to improve the quality of the learning experience and its results, based on sound evidence about what works.
- **The unprecedented challenges posed by connectedness require educators to pay attention to learners’ voices.** The whole issue of the gap between in-school and out-of-school practices related to education raises once more the need to consider, in any educational intervention, who the learners are and how they are changing. Policy makers, professional educators and parents, each at their own level, could benefit greatly from paying more attention to what learners have to say – not only about technology use but about learning in general. Research methodologies and national or institutional monitoring mechanisms can play an important role, but nothing can substitute for an open dialogue about the ways in

which learning conditions could be improved. More importantly, as already seen in the context of the New Millennium Learners Project, technology can also provide excellent opportunities to empower learners' voices in the dialogue concerning what a good learning environment should look like.

6. **In education, stereotyped concepts such as the New Millennium Learners, digital natives or net generations have to be used prudently as they can be misleading.** Today's students are heavy users of digital media and tend to benefit as much as they can from connectedness; so, in this respect they can be conceptualised as a generation of New Millennium Learners. However, there is a variety of student profiles when it comes to the intensity of attachment to technology or the variety of its uses. All of them are already in educational institutions of all levels, and it would be discriminatory to develop policies based on just one of the profiles. Therefore, terms like these can be useful to describe a social phenomenon in which, on average, younger generations show higher levels of connectedness than adults. Even more, they can also be used as a resource to evoke the range of issues raised by disparities in connectedness among generations. Beyond this generic use, however, they can obscure the most important issues at stake: individual differences and needs, the range of skills required to benefit from an educational use of technology and whose decision it is to use technology in learning. In an educational context an image that is either too generic or stereotyped may cause more harm than good, discouraging genuine debate about significant issues:
 - **These stereotypes implicitly assert that all young people are the same with regard to technology, which is far from being true.** A mixed and far more complex picture exists than is often presented in most of the well-known essays on this topic emerges from the evidence. The concept of the 'digital native' is problematic, if not entirely inadequate for policy and educational discussions (Helsper and Eynon, 2010; Thornham and McFarlane, 2011) and has to be deconstructed (Thomas, 2011), if not totally abandoned (Bennet and Maton, 2011): it is a misconception that idealises and homogenises young people's skills and interests. Available evidence, albeit still scarce, suggests diversity rather than conformity. Such an image does not adequately emphasise that socio-economic status and gender still play a critical role. If these differences are not taken into account, generic policies towards technology in education that assume all learners are equally skilled at, and interested in, technology could result in wider differences in learning results, simply by amplifying the existing socio-economic gaps.

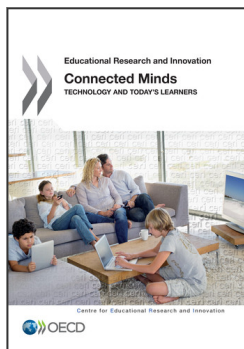
- **For the purposes of improving teaching and learning in formal education, it is the diversity of students and situations that matters most.** The implications of young people’s attachment to digital technology and connectedness are likely to be better understood by establishing a better footing for discussion and expanding the empirical research effort (Bennet and Maton, 2011). This can be done, for instance, by highlighting the significant differences within cohorts of young people in terms of their preferences, skills and use of new technologies (Kennedy *et al.*, 2008; Kennedy *et al.*, 2010). As Facer and Furlong already argued a decade ago (Facer and Furlong, 2001), young people are not a ‘homogeneous generation of digital children’.
- **The skills that young people develop by themselves with regard to technology do not necessarily help them to maximise their learning opportunities.** Young people are interested in technology because of the connectedness it helps them to achieve. Connectedness provides them a tool for entertainment, for extending anytime anywhere the ability to interact with peers and, eventually, for school-related tasks – but, in the latter case, quite often without the critical approach that their teachers would like to foster. Being familiar with ICT does not necessarily entail being able to use ICT in a competent way. Living in a digital environment does not reliably imply being digitally competent. This is a consistent finding across the board, not only in OECD countries but, in fact, in very diverse societies like China and South Africa (Li and Ranieri, 2010; Thinyane, 2010). Even though new generations seem to spontaneously learn to use technologies, there is not enough evidence showing that they instantly become digitally competent as, for instance, to be much more proficient in learning using the relevant digital skills. Well-designed instructional materials for developing teenagers’ digital competence are highly recommended and further research on assessing digital competence and improving ICT education and media education are urgently needed. Young people still need to be educated to make the most out of connectedness. Teachers often – and incorrectly – take for granted that the familiarity of students with technology automatically makes them savvy in information and communication skills. This is evidently not the case, and plagiarism is the clearest indication of the lack of adequate education in this domain. The range of digital skills that most students possess does not easily translate, without guidance, into improved learning skills.
- **These images implicitly convey the message that learners are urging institutions and teachers to adopt technology, which,**

at least today, is an oversimplification that confuses both policy makers and educators. The latter need to be reminded that connectedness is yet another tool at their disposal and that decisions about technology adoption have to be taken in the light of professional judgment, based on evidence. For instance, there are many calls for the use of Web 2.0 technologies in classes. The rationale can be described as follows: “It’s fun and cool to blog; lots of people are doing it; we know that kids get some information from blogs; therefore, blogs must have a place in our schools” (Palfrey and Gasser, 2008, p. 248). But this rationale does education no favours, and could result in exhausting teachers’ efforts to keep up with technology developments. The “novelty factor” has, by definition, a short-lived nature (Glover and Miller, 2001; Saunders and Klemming, 2003) and shouldn’t be used to replace a sound pedagogical foundation: the main reason for adopting a particular technology should be that it allows methodological change, promises improved results and offers greater learner satisfaction.

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