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INTERNATIONAL REVIEW

Educational technology on a turning point: curriculum implementation in Flanders and challenges for schools

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Abstract In this essay, we state that establishing technology curricula by national governments causes a shift in the policy actions of educational technology support: from a technical rationale with a main focus on funding and resources to a pedagogical rationale with a main focus on student competencies. We illustrate our point of view by describing the formal educational technology curriculum recently administered by the government in Flanders. This curriculum is written in terms of attainment targets and has clear implications on the nature of educational technology which is no longer dependent on teachers' individual efforts or willingness, but is becoming compulsory at the school level. Furthermore, we present two levers that facilitate the integration process of educational technology in general and the realization of technology curricula in particular. Technology coordinators should act more as curriculum managers and change agents, and schools should jointly establish a technology policy plan.

Keywords Curriculum · Technology coordinator · Technology plan · School policy

Educational technology on a turning point

In response to economic and social changes countries all over the world have started to formulate policies that incorporate the use of technology in education. The majority of these countries have set national goals that identify the significant role technology will play in improving the system of education as a whole (Kozma 2003). In this respect, the use of technology in education is becoming an important part of educational policy making and has already brought about substantial expenditure (Mulkeen 2003). Until now, the primary function of most educational policies is to provide schools with funds or resources that address schools' needs for equipment, network infrastructure, and to a lesser extent teacher professional development (Jones 2003; Owston 2007). Recently, however, some national

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governments are broadening their scope by administrating technology curricula as a specific form of educational policy making. According to Yelland (2006), a reconceptualization of the curriculum is necessary if students want to acquire the skills and knowledge needed in the information age. Such a reconceptualization is more than using computers in the classroom or making curriculum activities electronic, it is also about creating *'contexts for authentic learning that use new technologies in integrated and meaningful ways to enhance the production of knowledge and the communication and dissemination of ideas'* (Yelland 2006, p. 122).

In this essay, we focus on technology curricula and its implications for schools. Due to countless definitions of the curriculum-concept (see Jackson 1992), it is difficult to define this concept in unequivocal terms. In general, curricula can be understood as that which is designated to be taught and learned. By this, curriculum refers to the official list of courses offered by the school. It also refers to the purpose, content, activities, and organization of the educational program actually created in schools by teachers, students, and administrators (Walker and Soltis 1997 in Hewitt 2006). The concept includes a set of decision-making processes and products that focus on the preparation, implementation, and assessment of general plans to influence students' behavior and insights (Armstron 2003 in Hewitt 2006). Van den Akker (2003) argues that a differentiation between various levels of the curriculum is useful and interesting when discussing curriculum and curriculum activities. The author makes a distinction between the system or state level (macro), the school level (meso), the classroom level (micro) and the personal (nano) level. A further distinction is made between three curriculum representations: the intended, implemented, and attained curriculum (Van den Akker 2003). The *intended* curriculum refers to the vision or underlying philosophy of the curriculum and the intentions specified in formal curriculum documents. The *implemented* curriculum comprises of the perceived curriculum as interpreted by its users as well as the operational curriculum, i.e., the actual process of teaching and learning. The *attained* curriculum refers to learning experiences and learning outcomes.

It is clear that the technology curricula formulated by national governments are situated on the *macro* level and refer to the concept of *intended* curricula. These curricula refer to societies' underlying vision and philosophy of the future role of technology in education. The formulation of such curricula is an important step in the policy of educational technology support. Technology curricula have a clear pedagogical foundation and tend to be more related to teaching and learning than to technical equipment and skills. It is thus arguable that the formulation and implementation of technology curricula causes a shift from a technological rationale, which has its main focus on funding and resources, to a pedagogical rationale. An analysis of national and international technology curricula by Tondeur et al. (2007b) reveals two general aims underlying these technology curricula. The first aim builds on the rationale that all children must be digitally literate to be prepared for the knowledge-based society. Indeed, attaining technological literacy through the educational process is a fundamentally important opportunity to give students (Dugger et al. 2003). The second aim is related to the assumption that technology can improve student learning, and emphasizes that technology should take its point of departure in pedagogy. Curriculum reconceptualization thus implies a rethinking of pedagogies (Yelland 2006). These aims are comparable to the educational and societal aims of Selwyn and Brown (2000).

Only recently, technology curricula are becoming compulsory in some European countries. In this light, national governments have administered clear societal expectations to schools in terms of standards, frameworks, or attainment targets. For example,

Krumsvik (2006) gives a description and discussion of the Norwegian situation, Bryderup and Kowalski (2002) outline the Danish situation, and for a description of the UK technology attainment targets see the website of the 'Qualifications and Curriculum Authority' (2007). In these countries schools and teachers have a clear understanding of what their government expects from them when it comes to educational technology. Before the formulation of these curricula, the use of technology in educational settings was mostly related to individual efforts and willingness of teachers and school leaders. It is thus arguable that, with the formulation of these technology curricula, the nature of educational technology is radically changed due to the compulsory or persuasive character of the policy guidelines (see also Vanderlinde et al. 2007).

Furthermore, while educational technology is becoming compulsory, also the school as an organization is being given greater responsibility and autonomy for putting these curricula into practice. The evolution of formulating technology expectations to schools fits with a broader evolution toward more decentralization of educational policy (Standaert 2001 for a detailed description). Hopkins (2001) describes decentralization as a move from a paternalistic approach to education to an approach whereby schools are not only encouraged, but required to take responsibility for their own development and for the implementation of educational reform. Interestingly, Kuiper et al. (2007) argue that schools within a decentralized curriculum policy system have ample opportunities for site-specific curriculum choices.

The government of Flanders has administered a compulsory technology curriculum to schools and is a good example of a region promoting decentralization of the curriculum policy. It thus supports curricular decision making at the school level. In the following sections we present in more detail the Flemish educational system and the Flemish technology curriculum. This will be followed by a discussion of possible levers that could facilitate the implementation of technology in education in general, and technology curricula in particular.

The Flemish technology curriculum

Flanders is the Dutch-speaking part of the Belgium federal state. The Flemish community, just like the French and German-speaking communities, has legal responsibilities within the geographical boundaries of the Dutch-speaking area. This means that domains such as education, public health, culture, and language are no longer national policy areas and thus come within the purview of the Flemish community (Ministry of the Flemish Community 2005).

Regarding educational policies in Flanders, one main characteristic is the decentralized approach to the organization of the educational system. Schools are free in the way they organize the teaching and learning process at the classroom and school level. With respect to the curriculum, the decentralized approach in Flanders has been translated into a core curriculum in terms of 'attainment targets.' These are defined as minimum objectives regarding the knowledge, insight, skills, and attitudes viewed by the Flemish Government as necessary for and attainable by students at different educational levels (Decree 4 February 2003). These targets are compulsory, they are arranged by decree and a distinction can be made between subject-specific (i.e., maths, languages) and cross-curricular targets (i.e., learning to learn, citizenship education, social skills). The attainment targets describe the 'what,' while the 'how' is up to schools to decide (Kuiper et al. 2007). To control, evaluate, and improve the educational quality, the inspectorate investigates each school

every four years with the main task of determining whether the attainment targets are being achieved by students in schools (Ministry of the Flemish Community 2005). Therefore, the inspectorate's main focus is on full inspections of schools as organizations (Standaert 2001).

In September 2007, the Flemish Government formulated cross-curricular technology attainment targets. These replace the already existing but non-binding technology guidelines proposed by the government in 2004 (Tondeur et al. 2007a). With this development the Flemish Government clearly delivers its vision of educational technology to schools and expects them to put this formal technology curriculum into practice. From now on, schools have the responsibility to provide all children with equal opportunities to attain technology knowledge, attitudes, and skills. The Flemish Government wants every child to be digitally literate when leaving compulsory education. In other words, to cope with social inequity in education is the main policy goal underlying the technology attainment targets. Other policy goals include the role educational technology can play to meet the challenges of the information or knowledge based society and the economic importance of information and communication technologies (see Vandenbroucke 2007). The Flemish policy initiatives fit into broader European policy initiatives, particularly the Lisbon European Council (March 2000). This council stipulates that the European Union must become the most competitive and dynamic knowledge-based economy in the world by 2010. In response to concerns expressed at the Lisbon European Council, two specific European policy initiatives can be mentioned as influential to the development of technology attainment targets by the Flemish Government (see Vandenbroucke 2007). The first one is the strategic policy framework for the information society (i2010) launched by the European Commission in 2005. This framework promotes the positive contribution that information and communication technologies (ICT) can make to the economy, society, and personal quality of life. A second initiative is the formulation of eight key competencies for lifelong learning by the European Commission in 2006. These competencies set out what are considered the essential skills, knowledge, and attitudes that every European should have in order to prosper in a knowledge-based society and economy. One of these competencies is digital skills which *'involves the confident and critical use of information society technology (IST), and thus basic skills in information and communication technology (ICT).'*

The Flemish technology attainment targets do not focus solely on technical skills, but emphasize the integrated use of technology within the learning and teaching process (see Table 1). The Flemish Government believes the implementation of the attainment targets should foster students' ability to use educational technology in a functional way to both support and reinforce the learning processes. Moreover, the Flemish Government views educational technology as a catalyst to educational reform (Vandenbroucke 2007) and more concretely to the realization of innovative teaching and learning approaches. To sum up, all policy goals of the Flemish Government can be translated to Selwyns and Browns (2000) aims: economic, societal and educational aims lay behind its decision to establish a compulsory technology curriculum in terms of attainment targets.

The establishment of a formal technology curriculum has clear implications on the whole educational system in Flanders: it will affect students' learning processes, teachers' practices, schools' infrastructures and policies, pre-service and in-service teacher training programs. In this respect, Flanders is potentially going through a process of systemic change. Other policy initiatives have been launched, which serve as preconditions for the successful implementation of the technology attainment targets (see Vandenbroucke 2007). A first initiative is related to the 'policy making capacity of schools'

Table 1 Framework for educational technology attainment targets in Flemish primary education and first grade of secondary education (http://www.ond.vlaanderen.be/dvo/ICT/ICT_BVR.pdf)

1. Students have a positive attitude towards educational technology, and are willing to use educational technology to support their own learning process.
2. Students use educational technology in a safe, responsible and effective way.
3. Students can work independently in a learning environment enriched by educational technology.
4. Students can learn independently in a learning environment enriched by educational technology.
5. Students can use educational technology to elaborate their ideas in a creative way.
6. Students can use educational technology to search for, process and store digital information.
7. Students can use educational technology to present information to others.
8. Students can use educational technology to communicate in a safe, responsible and effective way.
9. Students can chose adequately between a number of different educational technology applications, depending on the specific goal to be achieved.
10. Students are willing to redefine their actions after reflection on their own and others' use of educational technology.

(Van Petegem et al. 2006). This means the Flemish Government encourages schools to work out a technology policy that fosters technology integration (see infra). For this task, schools can count on their technology coordinator. Since 2003, Flemish schools have received additional resources to appoint such a coordinator whose main tasks are related to the coordination of the technology integration process and the technical support of teachers (Department of Education 2002). A second cluster of initiatives is concerned with the professionalization of the teaching staff: developing student teachers' technical skills, attention for the attainment targets in the curriculum of teacher training institutes, and new in-service teacher training programmes. Third, as implementing technology attainment targets is impossible for schools without a qualitative technology infrastructure, the Flemish Government provides funds for schools to 'update' or 'renew' their technology infrastructure. In this context, the government will also launch an information campaign about the safe use of technology, referring to themes such as cyber-bullying, illegal software copies, SPAM, etc. Safe use of technology is a hot topic in Flemish educational policy and recent research provides clear evidence of unsafe Internet use by primary school children (Valcke et al. 2007). A fourth initiative is related to the use of educational software and digital educational tools. The Flemish Government will create an educational portal site that brings together information about educational technology, examples of good practices, software information and digital content. A last initiative is the development of an educational technology monitor. This monitor will track the mastery of technology competencies in students and teachers, the technology infrastructure in schools, the integration of educational technology for educational purposes, and perceptions of the value and use of technology in education. The technology monitor is envisaged as a policy instrument: data representing different aspects of technology integration at different educational levels (primary, secondary, and adult education) will be collected every two years to inform the Flemish Government and to guide future policy decisions.

Discussion and implications

As mentioned above, the administration of technology attainment targets to schools fits in a decentralized educational policy approach. The Flemish Government encourages and

supports curricular decision making at the school level and Flemish schools are provided with strong autonomy and responsibility to translate the broadly formulated technology targets into concrete learning and teaching activities. It is up to schools to implement the technology attainment targets (see Table 1) in a way that is consistent with their mission and vision statement (Vandenbroucke 2007). As schools are assumed to have the capacity to determine their own curriculum (Standaert 2001) they are free to develop implementation strategies and learning and teaching activities relevant to their particular educational context. Furthermore, such a decentralized approach acknowledges teachers' professionalism. Teachers are seen as competent professionals and curriculum reform can only be effective if teachers feel responsible for it (Kuiper et al. 2007). However, the formulation of a compulsory technology curriculum does not guarantee successful implementation in schools and classrooms. Voogt and Pelgrum (2005) rightly note that there is a potential gap between the intended and the implemented and attained curriculum. Schools will interpret and translate the technology attainment targets according to their particular context and perspective and there is no guarantee that this translation process will result in a school curriculum that is consistent with the curriculum proposed by the government. Based on the framework of van den Akker (2003), this questions the *implemented* technology curriculum: how are the attainment targets interpreted by schools and what are resulting changed teaching and learning activities? In this context, Goodlad and Su (1992) speak about the institutional curriculum as the curriculum a school develops derived from the societal curriculum.

Regarding the potential gap between the *intended* technology curriculum and the *implemented* curriculum in schools, two levers can be mentioned that could facilitate the integration process of educational technology in general and the realization of the attainment targets in particular. Firstly, a changed role for the technology coordinator could be put in place whereby the technology coordinator is referred to as a curriculum manager. A second lever comprises the joint process of establishing a school based technology plan. These levers are worth exploring as they are underexposed in the research literature. There is a lack of research on both the leadership and curriculum roles of the technology coordinator (Lai and Pratt 2004) and on the processes of technology planning (Bryderup and Kowalski 2002; Fishman and Pinkard 2001; Fishman and Zhang 2003).

An extended role for the technology coordinator

There is a growing interest in the work and roles of school technology coordinators, largely due to their potential to guide the process of technology integration (Lai and Pratt 2004). There is, however, little consensus on how their role and position should be defined (Frazier and Bailey 2004). The role of a technology coordinator is complex and demanding (Kennewell et al. 2000) and has been aptly described as one where the individual is 'wearing many hats' (Frazier and Bailey 2004).

It is arguable that, as educational technology is on a turning-point, so too is the future role of technology coordinators. Recent research points out that, in Flanders, the role of school technology coordinators (appointed in 2003, see above) is too often restricted to technical support and that they do not reserve appropriate time for more pedagogical and management tasks (Tondeur et al. 2008). The Flemish technology curriculum opens perspectives for a changed role for the technology coordinators and the Flemish Government expects that technology coordinators will guide teachers and schools while putting the technology attainment targets into practice. In other words, technology coordinators must act more as curriculum managers and change agents. Within this context, Reilly (1999)

refers to the technology coordinator as a curriculum leader instead of an 'electronic janitor' and Harrison (1998) emphasizes technology coordinators' managerial skills and curriculum expertise, arguing that technology coordinators primarily need to develop skills in areas such as the implementation of change, curriculum planning and evaluation, and school development.

Technology coordinators acting as *curriculum managers* can guide the process of school technology implementation and support the school team in the concrete realization of technology integration. They can advance curricular and professional development activities, as well as they scaffold teacher learning and implementation (Glazer et al. 2005). This broadens the job responsibilities of the technology coordinator who could, for instance, be held responsible for the promotion and coordination of activities using educational technology to support teaching and learning. However, curriculum support must be their main task (Lai and Pratt 2004). Recent research from Britain points out that this extended role of technology coordinators is most under-exposed, and recommends they become equipped with more curriculum and management skills (Somekh et al. 2001). Based on case-study research, Kokay (2004) argues that the focus of a technology coordinator should be on the use of educational technology within teaching and learning programmes and not on technical decisions.

Technology coordinators acting as *change agents* have the responsibility of providing a vision, developing a school culture, and providing a plan for professional development (Lai and Pratt 2004). They also function to persuade and shape teachers' attitudes towards the need for change, the focus of the change, and the process of change itself (Harrison 1998). Marcovitz (2000) argues that technology coordinators with an understanding of the change process can set policies that allow technology to change the school in a positive way. He further argues that such coordinators can make a significant difference in the way the school uses technology to enhance the learning environment.

To fulfill these new roles, coordinators must receive a clear mandate from the school community. Moreover, these new roles imply leadership and management skills from technology coordinators. Harrison (1998) invites technology coordinators to understand how their responsibilities fit into the management structure of the school as a whole. In this regard, Lai and Pratt (2004) found that technology coordinators are well-equipped to take up a significant leadership role in their schools. The authors also found that technology coordinators play a crucial role in the development of the school based technology plan (Lai and Pratt 2004). This plan can act as a second lever for successful technology implementation.

Toward a school based technology policy plan

Based on a review of the research literature, Hew and Brush (2007) identify strategies fostering the process of integrating technology into the curricula for instructional purposes. One such strategy is to have "a shared vision and technology integration plan." This means schools need to develop a shared vision of teaching and learning as well as a shared vision of technology integration. Furthermore, the schools' vision on technology integration must be related to particular curriculum content and to the enhancement of student learning (Staples, Pugach, and Himes 2005 in Hew and Brush 2007), and should be reflected in a school based technology policy plan.

A school-based technology policy plan can be defined as a school document containing different elements concerning the integration of educational technology or as a document containing different elements and activities to bring the new technology curriculum into

practice (van Braak 2003). Such a technology plan acts as a blueprint for the sequence of events the school hopes to achieve; it describes the overall philosophy of technology use and explores how technology will improve teaching and learning (Baylor and Ritchie 2002). In a technology plan a school describes its expectations, goals, contents, and actions concerning the integration of technology in education. This includes elements such as vision building, professional development, technology-curricula, technology-planning and evaluation (van Braak 2003). Gülbahar (2007) argues that technology planning is a way of solving existing problems faced during the integration process of educational technology. In his view, a technology plan is not about hardware or internet connections, but about how technology is integrated within the instructional program.

Moreover, a school based technology plan can act as a lever for successful technology implementation. Bryderup and Kowalski (2002) argue that creating a technology plan is a crucial step toward the practical implementation of the integrated use of educational technology. In addition, Baylor and Ritchie (2002) found that schools that are successful in integrating educational technology are often guided by a technology plan. Similarly, Tondeur et al. (2008) found that teachers in schools which have an explicit technology plan that emphasizes shared goals tend to use educational technology more regularly in their classrooms. In this context, Fishman and Pinkard (2001) make an interesting distinction between 'Technology Planning' and 'Planning for Technology.' 'Technology Planning' refers to an administrative task as the focus is on the hardware, software, and support issues that arise as technology is introduced into schools. In the context of 'Planning for Technology', the focus becomes more on instructional and curricular concerns. 'Planning for Technology' emphasizes that the starting point for a school is a shared vision on teaching and learning enabled by technology rather that the administrative tasks mentioned above (see also Jones 2003). With respect to successful 'Planning for Technology', Fishman and Zhang (2003) describe four main characteristics: (1) a technology plan is first and foremost a policy document, (2) technology plans exist at multiple levels for multiple purposes, (3) technology planning is an ongoing process that needs multiple iterations, and (4) technology planning requires collaboration. Indeed, school improvement literature teaches us that the process of creating a school policy plan is more important than the actual product or plan (Stoll et al. 2003).

Within the context of putting the technology attainment targets into practice, Flemish school teams can use an on-line tool for technology plan development. This tool is called PICTOS (Planning for ICT on School) and has been developed by order of the Flemish Government. For a detailed description of the tool and the underlying design principles, see Vanderlinde et al. (2008). The tool is used by schools in the context of staff development and supports schools in the establishment of their own context specific technology plan. Based on the work of McKenney et al. (2002), this tool can be regarded as a computer supported curriculum development tool at the meso or school level. The main characteristic of the on-line tool is the cyclic process of technology plan development. This means that writing a technology plan is a process of going through different steps: gaining insight into teachers' vision on education, making an inventory of the actual use of technology, setting priorities, considering new activities to realize the curriculum and drawing up an action plan. Every step is supported by specific software and lead to school output (e.g., graphs and inventory tables) based on information provided by teachers. The output of every step is the basis for a team discussion and all steps are the responsibility of the whole school team. 'Planning for Technology' is thus seen as team based, strategic and forward-looking process. This strategy of technology plan development truly implies the encouragement of teacher participation in decision making. This is not only a crucial condition

fostering the implementation of large innovation programs in schools (Geijsel et al. 2001), it has also been identified as an important factor when adopting educational technology (Bowman et al. 2001). Another central characteristic of the Flemish on-line tool is its jumping-off point in teachers' and schools' vision on the nature of good education and the processes of learning and instruction. For example, in the first step, all teachers have to complete an on-line survey to 'map' the participating teachers' beliefs about good education. The survey makes a distinction between two different orientations toward the nature and content of good education (Hermans et al. 2008; Woolley and Woolley 2004): transmissive (teacher-centered) and developmental (student-centered) beliefs. After filling in the survey in pICTos, teachers' beliefs on education are plotted in a graph representing the combination of the two types of educational beliefs at the school level. This graph serves as a basis for debating and delineating about a shared vision on education in general and more specifically on the role of technology in education.

The on-line tool for technology plan development helps schools in the establishment of their own context specific technology plan in order to realize the intended technology curriculum proposed by the Flemish Government. By seeing technology planning as a context-specific, team-based, strategic and forward-looking process, the potential gap between the intended curriculum and the implemented and attained curriculum will be as minimal as possible. This will reinforce the realization of the educational technology attainment targets into practice. Instead of quick-fix solutions or short-term responses by schools (see Hopkins 2001), long-term and sustainable responses and initiatives are strived for. Obviously, further research is needed on the role of technology plan development in general, and the role of on-line supporting tools like pICTos in particular. Further research can focus on the effectiveness of such tools by investigating, for example, to what extend such tools back up the cyclic process of creating a technology plan. This is not only relevant for Flanders, other countries as well have developed on-line supporting tools schools can use to shape local educational technology policy and practice (e.g., the 'Four in Balance' tool and the 'ICT-assessment' tool in The Netherlands and Becta's 'Self-review framework' in the United Kingdom). Moreover, research on this topic should take into account the role of the school as an organization in integrating technology into the curricula, a major challenge for educational technology researchers (Hew and Brush 2007).

In conclusion, in this essay, we have argued that educational technology has reached a turning-point since national governments have established formal and compulsory educational technology curricula to schools. We have stated that these technology curricula causes a shift in the policy actions of educational technology support: from a technological rationale with a main focus on funding and resources to a pedagogical rationale with a main focus on student competencies. We have also described the Flemish educational technology curriculum and have argued that within the decentralized policy context, schools are given great autonomy in the process of putting the technology curriculum into practice. Two specific levers have been outlined that could facilitate the integration process of educational technology in general and the realization of the Flemish technology curriculum in particular. In our opinion, technology coordinators should act as curriculum managers and change agents, and schools should jointly establish a technology policy plan. The combination of leadership and strategic planning make these levers worthwhile and could ensure sustained changes in practice. The levers are also acknowledged by the Flemish Minister of Education and are seen as important for a successful implementation of the Flemish educational technology curriculum (Vandenbroucke 2007). In our discussion of both levers, we stressed the importance of instructional and curricular aspects rather

than technical and administrative aspects. The focus of technology coordinators should be primarily on how educational technology can foster teaching and learning processes, not on hardware or software issues. Similarly, the focus of the technology plan should be on how educational technology can be implemented to foster teaching and learning processes. The heart of a technology plan is then on the school curriculum, not on the schools' technical infrastructure. Besides, the underlying process of reflecting upon the school's vision for the future, as well as the shared beliefs about the goals of learning and technology, make the creation of a school based technology plan a fruitful journey.

References

Baylor, A. L., & Ritchie, D. (2002). What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? *Computers and Education, 39*, 395–414.

Bowman, J., Newman, D., & Masterson, J. (2001). Adopting educational technology: Implications for designing interventions. *Journal of Educational Computing Research, 25*, 81–94.

Bryderup, I. M., & Kowalski, K. (2002). The role of local authorities in the integration of ICT in learning. *Journal of Computer Assisted Learning, 18*, 470–479.

Department of Education. (2002). *Vision paper ICT in education.* Brussels: Ministry of the Flemish Community. Retrieved April 3, 2008, from http://www.ond.vlaanderen.be/ict/english/archives/Vision_text_ICT_in_education.pdf.

Dugger, W. E., Meade, S. D., Delany, L., & Nicols, C. (2003). Advancing excellence in technological literacy. *Phi Delta Kappan, 85*, 316–320.

European Commission. (2005). *A European information society for growth and employment.* Retrieved December 4, 2007, from http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm.

European Commission. (2006). *Key competences for lifelong learning.* Retrieved December 4, 2007, from http://europa.eu/scadplus/leg/en/cha/c11090.htm.

Fishman, B. J., & Pinkard, N. (2001). Bringing urban schools into the information age: Planning for technology vs. technology planning. *Journal of Educational Computing Research, 25*, 63–80.

Fishman, B. J., & Zhang, B. H. (2003). Planning for technology: The link between intentions and use. *Educational Technology, 43*, 14–18.

Frazier, M., & Bailey, G. D. (2004). *The technology coordinator's handbook*. Eugene: International Society for Technology in Education.

Geijsel, F., Sleegers, P., van den Berg, R., & Kelchtermans, G. (2001). Conditions fostering the implementation of large-scale innovation programs in schools: Teachers' perspectives. *Educational Administration Quarterly, 37*, 130–166.

Glazer, E., Hannafin, M., & Song, L. (2005). Promoting technology integration through collaborative apprenticeship. *Educational Technology Research and Development, 53*, 57–67.

Goodlad, J. I., & Su, Z. (1992). Organization of the curriculum. In P. W. Jackson (Ed.), *Handbook of research on curriculum*. New York: Macmillan.

Gülbahar, Y. (2007). Technology planning: A roadmap to successful technology integration in schools. *Computers and Education, 49*, 943–956.

Harrison, M. (1998). *Coordinating information & communications technology across the primary school.* London/Philadelphia: The Falmer Press.

Hermans, R., van Braak, J., & Van Keer, H. (2008). Development of the beliefs about primary education scale: Distinguishing a developmental and transmissive dimension. *Teachers and Teaching Education, 24*, 127–139.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development, 55*, 223–252.

Hewitt, T. W. (2006). *Understanding and shaping curriculum: What we teach and why*. Thousand Oaks: Sage Publications.

Hopkins, D. (2001). *School improvement for real*. London: RoutledgeFalmer.

Jackson, P. W. (1992). Conceptions of curriculum and curriculum specialists. In P. W. Jackson (Ed.), *Handbook of research on curriculum*. New York: Macmillan.

Jones, R. M. (2003). Local and national ICT policies. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective*. Eugene: International Society for Technology in Education.

Kennewell, S., Parkinson, J., & Tanner, H. (2000). *Developing the ICT capable school*. London and New York: RoutledgeFalmer.
Kokay, C. M. (2004). *ICT decision-making processes in self-managing secondary schools*. Queensland: Griffith University [Doctoral thesis].
Kozma, R. B. (2003). ICT and educational change: A global phenomenon. In R. B. Kozma (Ed.), *Technology, innovation, and educational change: A global perspective*. Eugene: International Society for Technology in Education.
Krumsvik, R. (2006). The digital challenges of school and teacher education in Norway: Some urgent questions and the search for answers. *Education and Information Technologies, 11*, 239–256.
Kuiper, W., van den Akker, J., Letschert, J., & Hooghoff, H. (2007, September 19–22). *Balancing prescription and professionalism in curriculum policy and practices.* Paper presented at the European Conference on Educational Research (ECER), Belgium, Ghent.
Lai, K. W., & Pratt, K. (2004). Information and communication technology (ICT) in secondary schools: The role of the computer coordinator. *British Journal of Educational Technology, 35*, 461–475.
Lisbon European Council. (2000). *Towards a Europe of innovation and knowledge*. Retrieved December 3, 2007, from http://europa.eu/scadplus/leg/en/cha/c10241.htm.
Marcovitz, D. M. (2000). The roles of computer coordinators in supporting technology in schools. *Journal of Technology and Teacher Education, 8*, 259–273.
McKenney, S., Nieveen, N., & van den Akker, J. (2002). Computer support for curriculum developers: CASCADE. *Educational Technology Research and Development, 50*, 25–35.
Ministry of the Flemish Community. (2005). *Education in Flanders. The Flemish educational landscape in a nutshell.* Brussels: Ministry of the Flemish Community. Educational Information and Documentation Division. Retrieved October 28, 2007, from http://www.ond.vlaanderen.be/publicaties/eDocs/pdf/120.pdf.
Mulkeen, A. (2003). What can policy makers do to encourage integrations of information and communications technology? Evidence from the Irish school system. *Technology, Pedagogy and Education, 12*, 277–293.
Owston, R. (2007). Contextual factors that sustain innovative pedagogical practice using technology: An international study. *Journal of Educational Change, 8*, 61–77.
Qualifications and Curriculum Authority. (2007, November 12). *Information and communication technology.* Retrieved April 21, 2008, from http://www.qca.org.uk/qca_14162.aspx.
Reilly, R. (1999). The technology coordinator: Curriculum leader or electronic janitor? *MultiMedia School Magazine, 6*, 38–41.
Selwyn, N., & Brown, P. (2000). Education, nation states and the globalization of information networks. *Journal of Education Policy, 15*, 661–682.
Somekh, B., Woodrow, D., Barnes, S., Triggs, P., Sutherland, R., Passey, D., et al. (2001). *NGfl Pathfinders: Final report on the roll-out of the NGfl programme in ten Pathfinders LEAs [ICT in Schools Research and Evaluation Series]*. London: BECTA, British Educational Communications and Technology Agency.
Standaert, R. (2001). *Inspectorates of education in Europe: A critical analysis*. Leuven: Acco.
Stoll, L., Fink, D., & Earl, L. (2003). *It's about learning (and it's about time)*. London: RoudlegdeFalmer.
Tondeur, J., van Braak, J., & Valcke, M. (2007a). Curricula and the use of ICT in education? Two worlds apart? *British Journal of Educational Technology, 38*, 962–975.
Tondeur, J., van Braak, J., & Valcke, M. (2007b). Towards a typology of computer use in primary education. *Journal of Computer Assisted Learning, 23*, 197–206.
Tondeur, J., Van Keer, H., van Braak, J., & Valcke, M. (2008). ICT integration in the classroom: Challenging the potential of a school policy. *Computers and Education, 51*, 212–223.
Valcke, M., Schellens, T., Van Keer, H., & Gerarts, M. (2007). Primary school childrens' safe and unsafe use of the Internet at home and at school: An explorative study. *Computers in Human Behavior, 23*, 2838–2850.
van Braak, J. (2003). Opstellen van beleidplannen voor ICT in het onderwijs. [Redacting policy plans for ICT in education]. *ICT en onderwijsvernieuwing, 7*(6), 7–82.
van den Akker, J. (2003). Curriculum perspectives: An introduction. In J. van den Akker, W. Kuiper, & U. Hameyer (Eds.), *Curriculum landscapes and trends*. Dordrecht/Boston/London: Kluwer Academic Publishers.
Van Petegem, P., Devos, G., Warmoes, V., & Dang Kim, D. (2006, April 7–11). *Development of an instrument for measuring policymaking capacities of schools.* Poster presented at the Annual Meeting of the American Educational Research Association (AERA), San Francisco.

Vandenbroucke, F. (2007). *Competenties voor de kennismaatschappij: Beleidsplan ICT in het onderwijs [Competencies for the knowlegde based society: Policy plan for ICT in education]*. Brussels: Flemish Ministry of Education.

Vanderlinde, R., van Braak, J., De Windt, V., Tondeur, J., Hermans, R., & Sinnaeve, I. (2008). Technology curriculum and planning for technology in schools: The Flemish case. *TechTrends, 52*(2), 23–26.

Vanderlinde, R., van Braak, J., & Hermans, R. (2007, October 23rd–27th). *School conditions fostering the implementation of a new technology curriculum: Development of a theoretical framework.* Paper presented at the Association for Educational Communications (AECT), Anaheim, USA.

Voogt, J., & Pelgrum, H. (2005). ICT and curriculum change. *Human Technology, 1*, 157–175.

Woolley, B., & Woolley, A. W. (2004). Construct validity of a self-report measure of teacher beliefs related to constructivist and traditional approaches to teaching and learning. *Educational and Psychological Measurement, 64*, 319–331.

Yelland, N. (2006). Changing worlds and new curricula in the knowledge era. *Educational Media International, 43*, 121–131.

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