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A New ICT Curriculum for Primary Education in Flanders: Defining and Predicting Teachers' Perceptions of Innovation Attributes

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ABSTRACT

Teachers play a pivotal role in implementing educational innovations and realising curriculum change. Consequently, their perceptions of innovations and curricula content are of crucial importance. In this study, teachers' perceptions of the new ICT curriculum in Flanders are examined. This curriculum reflects Flemish society's underlying vision of the role of technology and ICT in teaching and learning. The curriculum is compulsory for all primary schools and focuses on the cross-curricular integrated use of ICT. Teachers' perceptions of the curriculum are operationalised using Rogers' innovation diffusion theory, and are specified as innovation attributes. These are defined as the perceived characteristics of the ICT-curriculum. Factors explaining these attributes are investigated. A questionnaire is administered to a representative sample of Flemish teachers (N = 471). Factor analysis and hierarchical regression analysis are conducted. The results indicate that teachers have moderate opinions about the new ICT curriculum and that both teacher and school level conditions explain teachers' perceived characteristics of the new ICT curriculum. 'ICT competences of teachers' and the 'schools' ICT vision and policy' were found to be the strongest predictors. These results are of particular importance to policy makers and school leaders and shed light on the complex process of ICT curriculum implementation.

Keywords

ICT curriculum, Teacher perceptions, Innovation attributes

Introduction

In response to economic and social change, countries all over the world are formulating policies that incorporate the use of ICT or educational technology in education. Most of these countries have set national guidelines that outline the role that ICT should play in improving the system of education as a whole (Kozma, 2003). In this respect, the use of ICT in education is becoming an important part of educational policy making and reform (Wong, Li, Choi, & Lee, 2008) and has already brought about substantial expenditure (Mulkeen, 2003). The primary function of most educational policies is to provide schools with funding and resources for equipment, network infrastructure, and to a lesser extent, the professional development of teachers (Jones, 2003; Owston, 2007). Recently, however, some national governments have broadened their scope by administering formal and compulsory ICT curricula to schools. These curricula reflect society's underlying vision and philosophy of the future role of ICT in education; they have a clear pedagogical foundation and focus on the use of ICT as a tool for teaching and learning, rather than the sole development of technical skills. Vanderlinde, van Braak, and Hermans (2009) argue that the formulation of such ICT curricula causes a shift in the policy actions of ICT support, i.e., from a technical rationale that focuses on funding and resources to a pedagogical rationale stressing student competences emphasizing the integrated use of ICT within the teaching and learning process.

The Flemish Educational Technology Curriculum

One region that has been administered an ICT curriculum to schools is Flanders, the Dutch-speaking part of Belgium. This curriculum was launched in September 2007 by the Flemish Government and is structured in terms of attainment targets. These are defined as minimum objectives regarding the ICT knowledge, skills, and attitudes viewed by the government as necessary for students in compulsory education. The ICT attainment targets do not focus on technical skills, but emphasise the integrated use of ICT within the teaching and learning process. The Flemish Government proposes that the implementation of ICT attainment targets should foster students' ability to use educational technology to support and reinforce their learning (Vandenbroucke, 2007). With this development the Flemish Government clearly outlines its vision of ICT to schools and expects them to put this formal curriculum into practice. From now on, schools and teachers should have a clear understanding of what the government expects when it comes to ICT integration (Vanderlinde et al., 2009). In a decentralised educational policy system like

Flanders, schools are autonomous and have the responsibility of translating the broadly formulated ICT attainment targets into concrete teaching and learning activities.

The main policy goal behind the Flemish ICT curriculum is to cope with social inequity in education. The Flemish Government expects every child to be digitally literate when leaving compulsory education. As such, the Flemish ICT attainment targets are designed to meet societal expectations about the role of ICT in education. In this context, Vanderlinde et al. (2009) argue that the implementation of the ICT curriculum will affect the whole educational system (e.g., students' learning processes and pre-service teacher training programs) and is linked to other policy initiatives (e.g., update of school technology infrastructure, professionalisation of the teaching staff), Flanders is going through a process of systemic change. Indeed, research has shown that a holistic and systematic approach to facilitating ICT change is needed (Fox & Henri, 2005).

Innovation Diffusion Research

Due to the compulsory character of these curricula, the administration of ICT curricula as a top-down policy initiative brings ICT to a 'turning point' (Vanderlinde, et al., 2009). Flemish teachers are expected to implement the ICT attainment targets into practice and therefore change their teaching and learning activities. Since teachers play a pivotal role in implementing innovations and curriculum change, their perception of the innovation will strongly influence this process (Fullan, 2001). In other words, the personal willingness of teachers to adopt and integrate innovations into their classroom practice is of crucial importance for the innovation to be successful (Gess-Newsome, Southerland, Johnston, & Woodbury, 2003; Ghaith & Yaghi, 1997). From a curriculum perspective, Van den Akker (2003) speaks of the 'perceived curriculum,' and argues that teachers' perceptions of educational innovations and curriculum reform initiatives are significant factors for researchers when studying implementation processes. Understanding teachers' perceptions is also important for the successful implementation of ICT into education, which Watson (2006) describes as a specific form of educational innovation. Groff and Mouza (2008) argue that teachers act as innovators when integrating ICT into their classrooms. Recent examples of research in this area include Parker, Bianchi, and Cheach (2008), who examined students' perceptions of instructional technology in higher education, Ajayi (2009), who studied the perceptions of pre-service teachers when implementing asynchronous discussion boards, Cope and Ward (2002) who investigated teachers' perceptions of learning technologies, and Martins, Steil, and Todesco (2004) who used perceived attributes of the Internet to predict the adoption of the Internet as a learning tool. These last authors found that observability and trialability (see further) were the two most significant influences. Noticeable in this context, is the study of van Braak and Tearle (2007) who assessed how university students perceive the attributes of computer use for learning, and found that perceptions of computer attributes have a strong impact on computer use for learning. Most of these studies have in common that perceptions were considered as explanatory for the success of technology implementation in education. While the cited studies have a focus on the use of specific technologies (see also Ferster & Bull, 2007), our study will focus on a broader technology curriculum, and more specifically on the Flemish ICT attainment targets.

In this study, we use the innovation diffusion theory of Rogers (2003) to examine and operationalise teachers' perceptions of the Flemish ICT curriculum. In general terms, innovation diffusion research studies the process by which the use of a perceived new idea, practice, or object is adopted within a given social system (Rogers, 2003). It provides a generic model of the process of the adoption of an innovation by acknowledging a strong relationship between perceived attributes of innovations and the rate of adoption of these innovations. Rogers' theory has been widely used in sociology, anthropology and marketing research, but also in educational research. Plank, Villenas and Reese (2008) argue in this context that innovation diffusion research has a long and rich history in educational research.

In terms of research on the diffusion and implementation of educational technology, e-learning, and ICT-applications, Dooley (1999) argues that the work carried out by Rogers (2003) on decision-making and diffusion processes help us better understand the process of integrating ICT into schools. Rogers' theory - and more specifically Rogers' notion of perceived characteristics of innovations - provides a useful framework to study both the implementation of ICT in education (Dooley, 1999; Ellsworth, 2000) and the study of curriculum change (Hewitt, 2006). Perceived characteristics of ICT innovations or ICT curriculum changes help us to understand the diffusion process because of the relationship between perceived characteristics and the implementation success or rate of adoption.

As presented above, Rogers' innovation diffusion theory studies the process by which a new idea, practice, or object is adopted within a given social system (Rogers, 2003), and emphasises the role of innovation characteristics in the process of adoption (Ellsworth, 2000). Rogers (2003) defines diffusion as 'the process by which an innovation is communicated through certain channels over time among members of a social system'. Van Braak and Tearle (2007) argue that innovation diffusion can be considered as the reason why, and as the process by which, an innovation is adopted by people in a specific setting or community. Rogers (2003) argues that the nature of an innovation, as perceived by individuals, helps to determine the rate of its adoption. He emphasises the importance of understanding perceptions of an innovation, as this has significant strength in predicting future adoption of the particular innovation. In other words, an individual's perception of an innovation will significantly affect his/her use intention, acceptance behaviour, and adoption behaviour (Liao & Lu, 2008). Rogers (2003) outlines five attributes of an innovation that influence an individual's perception of the innovation, including: relative advantage, compatibility, complexity, trialability and observability. In this context, Dearing and Meyer (1994) describe 'innovation attributes' as the perceived characteristics of a new idea, process or technology. However, in terms of ICT in education, little attention has been given to the role of perceived innovation attributes (Van Braak & Tearle, 2007).

Turning the attention to the Flemish ICT-curriculum, teachers' perceptions of innovation attributes are defined as the perceived characteristics of the ICT-curriculum. In this study, the five innovation attributes outlined by Rogers have been translated and contextualised as follows:

1. Relative advantage: the degree to which the ICT-curriculum is perceived as better than the actual situation;
2. Compatibility: the degree to which the ICT-curriculum is perceived as being consistent with existing values, past experiences and the needs of teachers;
3. Complexity: the degree to which the ICT-curriculum is perceived as difficult to understand and use;
4. Trialability: the degree to which the ICT-curriculum may be experimented with on a limited basis;
5. Observability: the degree to which the results of the implementation of the ICT-curriculum are visible to others.

Next to these attributes, Rogers (2003) describes other variables that may determine the rate of innovation adoption, including the type of innovation-decision, the communication channel, the nature of the social system, and the level of promotional effort made by change agents. In the context of ICT-curriculum reform in Flanders, these variables are assumed to be less important than individuals' perceptions, because they are rather equal for all Flemish teachers given the compulsory character of the ICT attainment targets.

Research Purpose

The purpose of the present study is threefold. First, we aim to develop a valid and reliable instrument that measures teachers' perceptions of the innovation attributes of the new Flemish ICT curriculum. Operationalisation of innovation attributes has not been consistently described in either the educational research literature or the ICT integration literature. Because researchers mostly examine perceptions of *specific* innovations, and name the innovation in the item wording, the creation of consistently used and validated measurement scales is absent (Dearing, 2007).

As research suggests that individuals' perceptions of the characteristics of an innovation affect their acceptance behaviour and determines their rate of adoption, the second aim of this study is to examine teachers' perceptions of the innovation attributes of the ICT curriculum. The third aim of this study is to explore which factors predict teachers' innovation attributes. These factors include both ICT related teacher and school conditions and are based on the e-capacity framework of Vanderlinde and van Braak (2010).

Research Method

A review of the educational research literature on innovation diffusion was recently carried out by Plank et al. (2008). They analyzed 93 studies of innovation diffusion in educational settings paying attention to issues like type of innovation (e.g. target or area of innovation, level of K-12 education intended to be affected), data collection and techniques, timeframe of the study, etc. One conclusion put forward by the authors is that most studies on innovation diffusion in education use qualitative data (e.g., case studies, ethnographies). The authors suggest that more quantitative research is needed in the field of innovation diffusion and educational change research. The present

study responds to this challenge with a quantitative investigation of teachers' perceptions of the innovation attributes of the Flemish ICT curriculum.

Participants

Data were collected from a sample of 471 primary school teachers in 62 primary schools in Flanders (the Dutch speaking region of Belgium). All participants teach in grades 1-6 and are evenly distributed across the 62 primary schools. The sample was 78 % female, the age ranges from 22 to 61 years old, with an average age of 38. On average, teachers reported that they have used a computer for approximately 12 years at home and 8 years in the classroom.

Procedure and variables

In terms of our first and second research aims, a questionnaire was developed in order to gather information on teachers' innovation attributes of the new ICT curriculum. This newly constructed measurement scale is our dependent variable and all items for this variable are presented in Table 1.

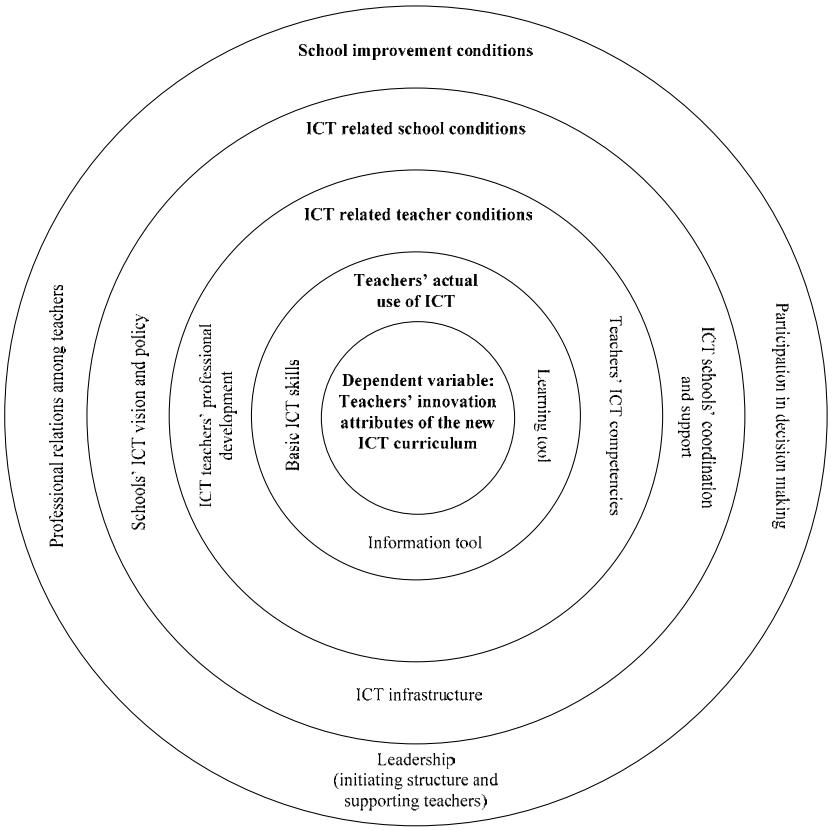

Figure 1 : Research design

In terms of our third research aim, the questionnaire also contains independent variables that assess both ICT related teacher and school conditions. The selection of independent variables is based on the framework of Vanderlinde and van Braak (2010). This framework was developed from a school improvement perspective and consists of conditions fostering the integration of ICT into teaching and learning practices. Central to this framework is the e-capacity of a school, which refers to the schools' ability to create and optimise school and teacher level conditions to bring about effective ICT change. These conditions have been translated into reliable and valid measurement scales (see Vanderlinde and van Braak, 2010) and are clustered into four mediating subsets of variables: teachers' actual use of ICT, ICT related teacher conditions, ICT related school conditions, and school improvement conditions. The subsets

of variables illustrate the multilayered nature of conditions affecting ICT integration. All variables from the e-capacity framework are presented together with the dependent variable of this study in Figure 1.

The first layer of variables refers to teachers' actual use of ICT in their classroom practice. In the e-capacity framework of Vanderlinde and van Braak (2010), teachers' actual use of ICT is not considered as a dependent variable, but as an independent or process variable (see Figure 1). The scales described in the e-capacity framework are based on revised scales of Tondeur, van Braak, and Valcke (2007), where three rather traditional types of ICT use are distinguished:

- The use of basic ICT skills.
- 'ICT as a learning tool', referring to the use of ICT to support pupils' learning.
- 'ICT as an information tool' referring to the use of ICT to select, retrieve, and present information.

The second layer of variables refers to ICT related teacher conditions: In the e-capacity framework, two endogenous conditions are put forward; the relevance of ICT knowledge and skills and ways of acquiring them (see also Granger et al., 2002). More concretely, Vanderlinde and van Braak (2010) present two measurement scales:

- The 'teachers' ICT professional development' scale assesses the extent to which teachers keep up with developments in the field of ICT integration, like taking part in in-service teacher training programmes.
- The 'teachers' ICT competences' scale measures the degree to which teachers find themselves competent in integrating ICT into their classroom practice.

The third layer of variables refers to ICT related school conditions: This includes a range of organisational features or local conditions that affect ICT integration. Vanderlinde and van Braak (2010) constructed three scales measuring these conditions:

- The 'schools' ICT vision and policy' scale assesses (a) the extent to which a school has a clear vision on the place of ICT in education, and (b) the extent to which a school has a policy and policy plan containing different elements concerning the integration of ICT in education.
- The 'ICT infrastructure' scale assesses the availability and appropriateness of the ICT school and classroom equipment (i.e., hardware, software, and peripheral equipment).
- The 'ICT school support and coordination' scale assesses the degree to which ICT integration is coordinated at the school level and the extent to which ICT support is arranged within the school.

The fourth layer of variables refers to conditions described in the school improvement literature as contributing to the implementation and realisation of educational change. Vanderlinde and van Braak (2010) include four of these school improvement conditions in their e-capacity framework:

- The leadership scales of Hoy and Tarter (1991, 1997) contain the 'supportive leadership' and 'initiating structure' scale. The first scale measures efforts to motivate teachers by using constructive criticism and setting an example through hard work. At the same time, the school leader is helpful and genuinely concerned with the personal and professional welfare of teachers. The second scale is related to task and achievement oriented leadership behaviour. The school leader makes his or her attitudes and expectations clear and maintains definite standards of performance (Hoy & Tarter, 1991, 1997).
- The 'professional relations among teachers' scale measures the level of communication and cooperation between teachers (Staessens, 1990; Staessens & Vandenberghe, 1994).
- The 'participation in decision making' scale of Geijsel (2001, 2009) measures the extent to which teachers believe that they participate in processes and outcomes of the schools' decision making around issues of education, innovation, and school improvement.

All items of the independent variables and the dependent variable have a Likert-scale answer format ranging from 0 (totally disagree) to 4 (totally agree). Items of the teachers' actual use of ICT scales have a frequency Likert-scale answer format (i.e., 0 = never, 1 = every term, 2 = monthly, 3 = weekly, and 4 = daily). The items are presented in Vanderlinde and van Braak (2010).

Data Analysis

In constructing the questionnaire that measures teachers' perceptions of the innovation attributes of the ICT curriculum, several steps were taken. First, exploratory factor analysis was conducted to identify the number of

factors in teachers' innovation attributes. Next, summary statistics were calculated for the independent variables and Chronbach's α was calculated to assess their reliability or psychometric properties. Scales are reliable if the Chronbach's α is greater than .70. Third, the influence of school and teacher level conditions on teachers' perceptions of the new ICT curriculum was investigated by conducting a hierarchical regression analysis. This analysis makes it possible to examine the additional contribution of logically connected subsets of variables on the dependent variable, i.e., the four layers from the e-capacity model.

Results

Construction of the dependent variable

The five innovation attributes proposed by Rogers (2003) were not found as five separate dimensions when conducting factor analysis (maximum likelihood with orthogonal rotation) on the total item pool. Conversely, when single exploratory factor analyses were carried out on each of the five innovation attributes separately, the results indicate fair to good factor loadings and internal consistency (see column three in Table 1). Given these results, the dependent variable 'teacher perceptions of the ICT curriculum' was constructed as an overarching and one-dimensional variable with five innovation attributes. Factor analysis on these 20 items confirms the one-factor structure with an eigenvalue of 7.60 and factor loadings ranging between .38 and .75 (see column eight in Table 1). Chronbach's α for this scale is .93 indicating good internal consistency.

Table 1 presents the items of the five innovation attributes, the descriptive statistics, and the factor loadings. The items from the 'teachers' perceptions of the innovation attributes of the new ICT curriculum' scale were summarised into a sum score ranging from a minimum score of 0 to a maximum score of 100. Given the second research aim of this study, descriptive statistics indicate that teachers have a moderate opinion of the new ICT curriculum (M = 59.98, SD = 11.24). They score rather on average on the 'teachers' perceptions of the innovation attributes of the new ICT curriculum' scale. Moreover, teachers specify that they do not know about (7.8 %) or hardly know (46.8 %) the new ICT attainment targets. For these teachers, the questionnaire contained a presentation of the new Flemish ICT attainment targets so they were able to evaluate the content of the ICT curriculum.

Table 1. Summary statistics for the innovation attributes

Innovation attribute	Item	Factor loadings (5 factors)	Mean	SD	Alpha	R^2	Factor loadings (1 factor)
Advantage	Implementation of the ICT attainment targets will bring about change and improvement.	.66	61.66	13.03	.73	55.47	.55
	Education needs ICT attainment targets.	.66					.54
	The establishment of the ICT attainment targets is a real improvement for our educational system.	.64					.59
	My current classroom ICT activities will improve by the ICT attainment targets.	.58					.55
Compatibility	The ICT attainment targets are consistent with my ideas about learning and instruction.	.83	61.43	13.61	.79	61.66	.76
	My personal vision on the use of ICT in education is in line with the content of the ICT attainment targets.	.80					.74
	The ICT attainment targets correspond with my vision about the nature of 'good' education.	.64					.65
	My current classroom ICT activities fit within the philosophy of the ICT attainment targets.	.53					.59
Complexity	The ICT attainment targets are formulated in a straightforward way.	.79	60.11	14.05	.74	56.40	.65
	The ICT attainment targets are difficult to grasp.*	.67					.40

	It is clear what the ICT attainment targets mean for me as a teacher.	.67					.70
	The ICT attainment targets are aimed too high for primary education.*	.65					.38
Trialability	I get enough opportunities to work with the different ICT attainment targets.	.76	59.29	15.72	.83	66.64	.58
	I have enough room to experiment with the ICT attainment targets.	.75					.61
	I can implement the ICT attainment targets in my own pace.	.75					.64
	I get enough time and space to familiarise myself with the ICT attainment targets.	.73					.58
Observability	Implementation of the ICT attainment targets will lead to clearly observable changes in teaching and learning activities.	.75	55.94	13.19	.66	49.83	.56
	Implementation of the ICT attainment targets will lead to clearly observable changes in student learning.	.71					.54
	Realisation of the ICT attainment targets into classroom practice will be visible for the inspectorate.	.40					.66
	Realisation of the ICT attainment targets into classroom practice will be visible for my colleagues.	.35					.56

* Reversed item

Psychometric properties of the independent variables

Summary statistics for the independent variables are presented in Table 2. To facilitate interpretation of the results, all items were summarised into a sum scores ranging from a minimum score of 0 to a maximum score of 100.

Table 2. Summary statistics of the independent variables (n = 471)

Scale	**Number of items**	**α**	**Mean**	**SD**
Teachers' actual use of ICT				
Basic ICT skills	4	.88	47.34	25.22
Information tool	7	.87	22.64	19.77
Learning tool	5	.88	42.45	25.50
ICT related teacher conditions				
ICT professional development	4	.82	43.04	19.64
ICT teachers' competences	5	.85	58.09	19.51
ICT related school conditions				
ICT infrastructure	4	.83	58.65	23.11
Schools' ICT vision and policy	9	.93	51.69	18.92
ICT schools support and coordination	7	.91	64.40	20.12
School improvement conditions				
Initiating structure (leadership scale)	5	.88	73.50	16.96
Supportive leadership	7	.94	71.02	19.93
Professional relations among teachers	7	.85	68.36	14.24
Participative decision making	5	.81	51.37	11.43

Furthermore, Chronbach's alphas were calculated for the independent variables (see Table 2). All measurement scales show good internal consistency scores (from .81 to .94) and, therefore, are reliable instruments.

Predicting conditions

Table 3 presents the results of a hierarchical regression analysis conducted to investigate which variables from the e-capacity model predict teachers' perceptions of the innovation attributes of the new ICT curriculum. The regression model consists of five steps which successively examine the contribution of the different variables from the layers of the e-capacity model on the dependent variable.

Step 1 of the model accounted for only 0.2% of the variance in teachers' perceptions of the innovation attributes of the new ICT curriculum, entering background variables: teachers' age and gender. Teachers' demographics were thus not significant. In the second model, the first 'layer' of variables from the e-capacity model was added, which refer to teachers' actual ICT use. The addition of these three variables produced significant multiple R^2 (R^2 = .184 and ΔR^2 = .182). The significant predictors were 'ICT basic skills' (β = .257, $p < .001$) and 'ICT as an information tool' (β = .203, $p < .001$). Almost 18% of the variance in teachers' perceptions of the innovation attributes of the new ICT curriculum was accounted for when adding ICT related teacher conditions (Model 3). ICT professional development activities and teachers' ICT competences were strong predictors of teachers' perceptions of the innovation attributes. In the next model (Model 4), ICT related school conditions were added leading to an increase of R^2 (R^2 = .408 and ΔR^2 = .047). In this fourth model, the effect of ICT related teacher and school conditions was significant. Especially schools' ICT vision and policy was a significant school level predictor. Furthermore, in this fourth model, the effect of teachers' actual ICT use was no longer significant. The positive effect in Model 2 was mediated by ICT related teacher and school conditions. In the final model (Model 5), school improvement conditions from the last 'layer' of the e-capacity model were added. In this final model (R^2 = .408), teachers' ICT competence was the strongest predictor (β = .257, $p < .001$). Other significant predictors were the schools' ICT vision and policy (β = .199, $p < .001$) and teachers' ICT professional development activities (β = .181, $p<.001$). School improvement variables, including leadership, collegiality and participative decision making, did not lead to a significant increase in explained variance in the dependent variable.

Table 3. Hierarchical regression analysis

Standardised regression coefficients (β) (N=471)					
Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
Teachers' demographics					
Gender	.021	-.004	-.042	-.016	-.021
Age	.080	.064	.028	.029	.020
Teachers' actual use of ICT					
Basic skills		.257**	.191**	.118	.116
Information tool		.203**	.077	.068	.070
Learning tool		.048	.036	.048	.043
ICT related teacher conditions					
ICT professional development			.204**	.181**	.181**
ICT teacher competence			.308**	.252**	.257**
ICT related school conditions					
ICT school infrastructure				.064	.061
Schools' ICT vision and policy				.209**	.199**
ICT school support/coordination				.016	.023
School improvement conditions					
Initiating structure (leadership)					.067
Supportive leadership					-.003
Professional relations					-.047
Participation decision making					.006
R^2 (proportion of variance explained)	.002	.184	.361	.408	.408
ΔR^2		.182	.177	.047	.000

a Dependent variable: Teacher perceptions regarding the new ICT curriculum
*p≤.01, **p≤.001

Conclusion and discussion

The current study examined teachers' perceptions of the innovation attributes of the ICT curriculum administered by the Flemish government and sheds light on the complex process of ICT curriculum implementation. Although the study is limited in some respects, like that measurement scales are based on self-reported data or that the study doesn't explore the relation between perceived innovation attributes and rates of adoption, the results are of particular importance for educational policy makers and researchers. Moreover, because of the rapidly changing society and the rapidly changing nature of educational technology, it is important for educational developers to understand the diffusion of educational technology in education. A better understanding of perceived innovation attributes advances a better understanding of the adoption and diffusion process.

The results of this study indicate that teachers have rather moderate perceptions about the new ICT curriculum. Some teachers report that they have never heard about the ICT attainment targets. This result highlights the need for better communication between educational policy makers, schools, and teachers. This is an essential condition for ICT policy implementation to be successful. Jones (2003) argues that the information that schools and teachers receive must be consistent in order to link national ICT policy to local school level ICT policy. This is particularly important for decentralised educational systems, like the Flemish system, because in such systems schools have greater autonomy and are responsible for putting curricula into practice (Jones, 2003; Vanderlinde, et al., 2009).

The hierarchical regression analysis focused on the relationship between school level and teacher level conditions and teachers' perceptions of the innovation attributes of the new ICT curriculum. The results indicate that teachers' ICT competence has the strongest influence on teachers' perceived characteristics of the ICT curriculum. In other words, teachers must believe that they are competent in order to successfully integrate ICT into their classroom practice (see also Hew & Brush, 2007; Mumtaz, 2000). This study reveals that teachers' assessment of their ICT competence is more important than their ICT behaviour (i.e., actual use of ICT). ICT competence refers to more than basic ICT skills (e.g., how to handle a computer or how to use a spreadsheet). Following Hew and Brush (2007), it also refers to the pedagogical use of ICT in the classroom (e.g., having insight into the effects of ICT on students' motivation and learning) and classroom management (e.g., how to organise the class effectively so that students have equal opportunities to use ICT). Educational system developers and educational policy makers must become aware of this multifaceted concept so that teachers can be given opportunities to develop their ICT competences. In this context, the 'Technological Pedagogical Content Knowledge (TPCK)' concept recently introduced by Mishra and Koehler (2008) can be very useful. TPCK emphasises a comprehensive set of competences teachers need to successfully integrate ICT in their educational practice, stressing an integrative knowledge base of technological knowledge and skill, knowledge of learners, subject matter content and pedagogy. The results of this study also identify teachers' ICT professional development activities as a significant predictor of teachers' perceptions. ICT professional development activities and ICT teacher competence are strongly interwoven conditions (BECTA, 2004; Vanderlinde & van Braak, 2010). Galanouli, Murphy, and Gardner (2004) argue that ICT professional development should reflect the level of ICT competence of the teachers involved. In this context, Cope and Ward (2002) argue that teachers not only need instruction in terms of ICT use, but also need professional development in terms of how educational technology can be used to enhance learning outcomes in students. ICT training activities always need a focus on both pedagogical aspects and teachers' ICT skills (BECTA, 2004), and need to be imbedded in a supportive professional school culture (Dexter, Anderson, & Becker, 1999). Educators must be aware of these conditions in order to develop effective ICT trainings.

Next to individual teacher characteristics, this study identifies variables at the school level as predictors of teachers' perceptions of the innovation attributes of the ICT curriculum. In this context, the schools' ICT vision and policy was significant. This finding is useful for school leaders as it underlines the importance of having a shared vision on the place of ICT in education and having a school based ICT policy plan. Such a plan acts as a blueprint for the sequence of goals a school hopes to achieve. It also outlines the overall philosophy of technology use and indicates how ICT will improve teaching and learning (Baylor & Ritchie, 2002). In order to be successful, an ICT policy plan should focus on teaching and learning processes, not on hardware and internet connections (Gülbahar, 2007). Moreover, teachers should participate in the process of ICT policy plan development (Vanderlinde, et al., 2009), and educational system developers could facilitate this process by providing schools with online supporting tools (see Vanderlinde, van Braak, & Tondeur, 2010).

Besides, the results of the hierarchical regression analysis indicate that the role of the ICT coordinator does not have any impact on teachers' perceived characteristics of the ICT curriculum. Although the Flemish government expects ICT coordinators to guide teachers and schools in the process of putting the ICT attainment targets into practice, our findings suggest that teachers do not perceive ICT coordinators in this way. Indeed, recent research indicates that in Flanders and other countries, the role of ICT coordinators is often restricted to technical support with little time dedicated to pedagogical or management tasks (e.g., Tondeur, Van Keer, van Braak, & Valcke, 2008). In the context of ICT curriculum implementation, ICT coordinators need to act as change agents, responsible for translating the broadly formulated ICT attainment targets into concrete learning and teaching activities. ICT coordinators can then support teachers in the process of implementing the ICT attainment targets into their daily classroom practice. Furthermore, ICT coordinators acting as change agents should be responsible for providing a vision of ICT integration, developing a school based ICT policy, and providing professional development activities. In order to meet the demands of this role, ICT coordinators should receive a clear mandate from the school community (Vanderlinde et al., 2009), and receive training in leadership skills and change strategies (Hsu & Sharma, 2008).

Our finding that school improvement variables did not lead to a significant increase in explained variance in the dependent variable is rather surprising. This quantitative research reveals that for the case of ICT integration, it appears that content specific conditions are more significant than generic school improvement conditions. This is in contrast to earlier qualitative research (e.g., Wong, et al., 2008) which suggests that leadership approaches and collaboration between teachers are factors that influence ICT integration. More research is needed to outline the role of generic school improvement conditions when implementing and realising an ICT curriculum. To further explore how the new ICT curriculum is realised in practice, we intend to study the relation between perceived innovation attributes and different levels of ICT integration.

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