

Monitor for ICT integration in Flemish education (MICTIVO): Research set-up and some preliminaries

Introduction

For over 20 years the Flemish government has been investing in the diffusion of information and communication technology (ICT) in Dutch-speaking schools in Belgium. The types of investments are diverse: equipment and applications, project funding, professional development programs and coordinating activities and expert staff. In 2007, a formal ICT curriculum was introduced in Flemish education in the form of attainment targets. Ever since, schools subsidized by the government are expected to integrate ICT as a part of their education. Schools should use the possibilities of ICT for the benefit of their educational practice, to support and enhance teaching and learning. However, the financial and supportive policy of the government imposes questions on the effectiveness of this educational model of ICT implementation and ICT integration. How do schools implement and integrate ICT in their education? To answer this question, a monitor for ICT integration in Flemish education (MICTIVO) was developed.

The goal of MICTIVO is to gain a representative snapshot of ICT integration in Flemish education. The main research objectives in that respect are:

1. Development and validation of a monitoring instrument based on important evolutions in ICT and education, and based on a number of (new) policy priorities;
2. A large scale and representative measurement of ICT integration in primary, secondary and basic education on the basis of a web survey, and the reporting of results at system level;
3. Comparative analyses based on 5-year results gathered since its first round in 2007-2008.

Within the European Union, a couple of monitoring instruments are employed for mapping the adoption and diffusion of technology for teaching and learning purposes. These efforts provide opportunities for policy preparation, evaluation, quality improvement and benchmarking (Goeman, Elen, Pynoo, van Braak, 2013). MICTIVO was developed in 2007 for similar reasons, to assess the impact of ICT at all levels of formal education in the Dutch part of Belgium.

The starting point for MICTIVO is a scientific model of factors that determine ICT integration. This model includes four components: infrastructure and policy, perceptions, competencies and integration at micro-level. These components relate to three actors: principals, teachers and students with all of these actors having their own background, ICT competences and perceptions on ICT (See Figure 1). The original model from 2007 is maintained to facilitate a comparison at different measurement moments. MICTIVO is conducted every 5 years with opportunities for extra indicators every time to stay up to date with the evolutions of ICT (e.g. use of social media in the classroom or BYOD).

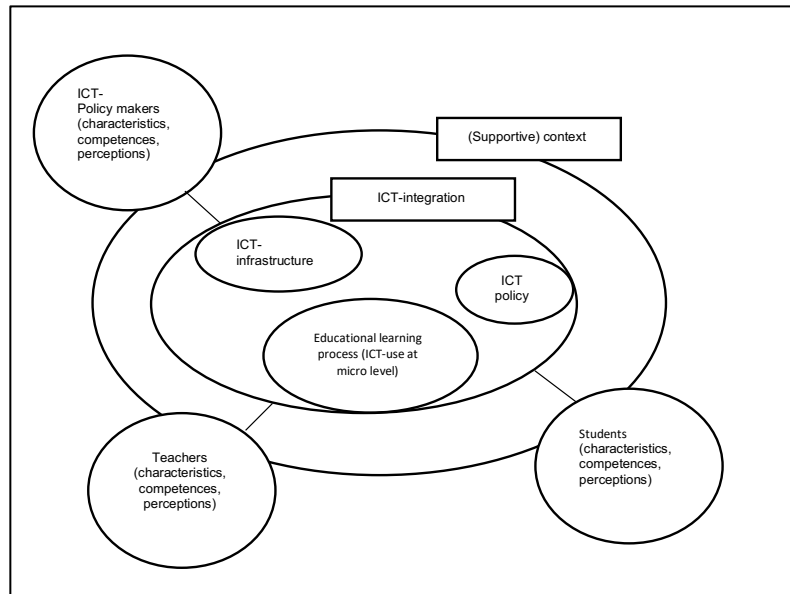


Figure 1. MICTIVO model (Evers, Sinnaeve, Clarebout, van Braak, & Elen, 2009b)

In 2007-2008 (MICTIVO1) the monitor was developed, the scales were validated and empirically tested (Evers, Sinnaeve, Clarebout, van Braak, & Elen, 2009a, 2009b). In 2012-2013 a follow-up study took place (MICTIVO2), while in September 2017 the third and present study was started (MICTIVO3). These follow-up studies are conducted to measure the evolution of ICT integration over the years. MICTIVO2 (Pynoo, Kerckaert, Goeman, Elen, van Braak, 2013) and MICTIVO3 are very much alike and have the purpose to deliver policy relevant data concerning ICT integration to the government and schools. Another part compares the current results with previous studies (MICTIVO1 and 2) and examines the evolution of ICT integration in Flemish education throughout the past 10 years.

The components of MICTIVO

As mentioned above, MICTIVO focuses on multiple components of ICT integration in education, namely ICT policy and infrastructure, integration, competences, and perceptions. Although these components are part of all the questionnaires for the three different actors (principals, teachers, students), the focus for each component and its indicators may differ (Table 1).

Table 1. Components and indicators per actor

Component	Principal	Teacher	Student
<i>indicators</i>			
ICT policy and infrastructure			
<i>availability of hardware</i>	X	.	.
<i>availability of software</i>	X	.	.
<i>ICT policy</i>	X	X	.
ICT integration			
<i>ICT use by teachers</i>	X	X	.
<i>ICT use by students</i>	.	X	X
ICT competences			
<i>pedagogical-didactical competences</i>	X	X	.
<i>competences of students</i>	.	X	X
<i>computer experience</i>	X	X	X

ICT perceptions regarding:			
<i>importance of ICT for education</i>	x	x	.
<i>effects of ICT use</i>	x	x	x
<i>infrastructure</i>	x	x	.
<i>professional development</i>	x	x	.

Each of the components consists of different indicators that were previously validated using exploratory and confirmatory factor analysis. For the component on ICT policy and infrastructure, the indicators of available hardware (e.g. number of devices, origin, age), software (e.g. website, electronic learning environment) and policy (e.g. origin of policy, support for teachers, security) were measured. The second component, ICT integration, assesses the use of ICT by teachers and students in- and outside of the classroom context (e.g. use of ICT to prepare lessons, didactical use of ICT in the classroom, use of ICT for homework). The ICT competences component consists of the indicators concerning pedagogical-didactical competences of teachers (e.g. class management, evaluation), competences of students (e.g. ability of making a presentation, finding relevant information on the internet) and computer experience (e.g. years of computer experience, amount of time spent on a ICT device for leisure). The fourth component, ICT perceptions, consists of the following indicators: perceptions on the importance of ICT use in and for education (e.g. importance from an educational and economical rational), digital literacy (e.g. attitudes and knowledge on responsible use of ICT), use of social media (e.g. using social media for communication with students), use of educational games (e.g. supporting students with a disability through educational games) and professional development (e.g. amount of trainings on ICT use in education).

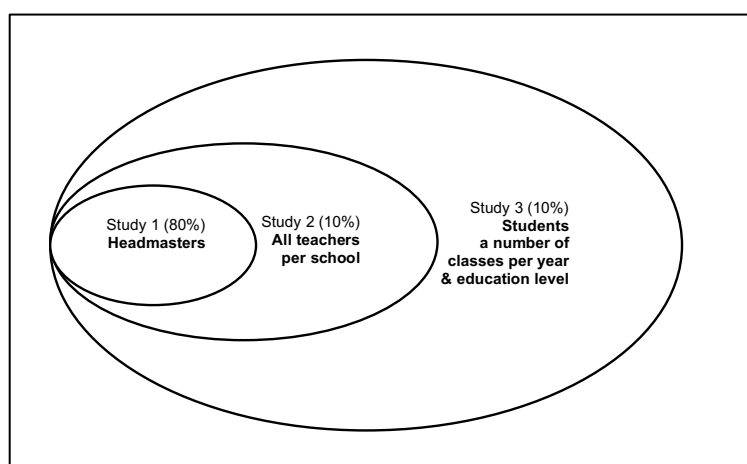


Figure 2. Substudies in MICTIVO

MICTIVO3: Sampling and selection of schools

MICTIVO3 maps ICT integration in a representative sample of one fifth of all Flemish primary and secondary schools (regular and special needs education) and all centers for basic adult education. MICTIVO3 uses a stratified sample frame with the schools as units. Schools are selected based on three parameters: school size (small, middle, large), province and educational network (three different types of subsidizing body). Table 2 shows the sample framework. For financial and practical reasons, it is impossible to include all three actors (principals, teachers and students) of every school in the research. The research is subdivided in three different studies (see Figure 2). In substudy 1 (80% of the schools in the sample) only the principal is asked to participate and fill out the questionnaire. In substudy 2 (10% of the sampled schools) selected schools are invited to let their principal and all the teachers participate. In the last substudy (also 10% of the sampled schools) the principals, teachers and students are asked to participate. This kind of funnel model was used in the previous studies as well and is used to maximize the number of participating schools, while keeping the organization of

subsets manageable (Goeman, Elen, Pynoo, van Braak, 2013). To account for non-response and refusal, three equivalent sample lists per substudy were drawn prior to data collection. If a school does not agree to participate, another with an equivalent profile is contacted. Selected students were on average between 10 and 18 years old (fifth grade of primary education until sixth grade of secondary education).

Table 2. Sampling frame of MICTIVO3

	Primary Education		Secondary Education		Adult Basic Education
	Regular	Special needs	Regular	Special needs	
Population (number of schools)	2410	193	949	119	13
MICTIVO3 (participating schools)	483	39	190	25	13
Substudy 1	385	31	152	18	
Substudy 2	49	8	19	7	13
Substudy 3	49		19		

MICTIVO3: Procedure and data collection

All questionnaires were developed and delivered online using the Qualtrics software. Depending upon the particular substudy and the actor concerned, the data collection procedure differ. Principals receive a letter from the Flemish Minister of Education, together with a letter from the researchers. Principals in studies 2 and 3 are subsequently contacted by phone to confirm their participation and once confirmed, to collect the email addresses of all staff members with a teaching assignment in their school. If the school was selected for substudy 3, it was contacted by phone to collect teachers' email addresses and to arrange a date for the researchers' visit to the school to collect data among the students. Principals and teachers were invited by e-mail to answer to the questions of the web survey. In case of non-response, two reminders are sent by e-mail after two weeks. Students filled out the questionnaires in a classroom under supervision of a researcher.

The field study took six months in total, from September 2017 to March 2018. A considerable amount of schools refused to participate or did not respond to the researchers' invitation. As a consequence, all three sampling lists were used during the different phases of data collection. Some reasons for their refusal are: the lack of ICT infrastructure or devices at school to be able to participate, ongoing ICT projects in schools, and the lack of direct feedback to the school in terms of ICT integration level. Quite often schools indicated their refusal to participate was related to the fact that no other than general results about ICT integration in Flemish education will be reported (publicly). Another critical point of the MICTIVO3 study was the average completion time of the web survey. Due to a lack of ICT devices some schools had to alter their timetable considerably, in some cases for multiple hours. In order to overcome this practical barrier the researchers brought along additional devices and/or paper versions to fill out the questionnaire. Ultimately, after six months of data collection 5078 questionnaires are completed (Table 3).

Table 3. Number of respondents MICTIVO3

Principals		Teachers		Students	
Primary education	493	Primary education	632	Primary education	2019
Secondary education	173	Secondary education	424	Secondary education	939
Basic adult education	9	Basic adult education	389		

Besides the absolute number of principals, teachers and students that participated (Table 3), it was important to get a representative set of schools. A school is included in the research if the principals and/or the teachers filled out a questionnaire. Table 4 shows the number of schools that participated in the study.

Primary education		Secondary education		Basic adult education	
Normal	474	Normal	167	12	
Special needs	38	Special needs	27		

Table 4. Number of participating schools (March 2018)

Results and discussion

Between March and August, the team of researchers consisting of 5 people from two different universities will further collaborate in order to scrutinize several aspects of the monitoring study, namely:

- background analysis and profiling of the selected schools, based on the biographical information of the respondent and information provided by the government (type of school, actor, school size, ...);
- representativity study to assess to what extent the number and the profile of the participating schools were representative in terms of school size, province, school net, school level and type of school, using the chi-squared test;
- non-response study concerning school size, province, school net, school level and type of school, using chi-squared tests;
- (re)validation of the sum scales, by applying exploratory and confirmatory factor analyses;
- reliability assessment of the complete set of indicators;
- descriptive analyses for each of the different MICTIVO components, indicators, related to each of the actors;
- reporting of the results for each of the educational levels per component (primary, secondary, basic adult education);
- comparative (trend) analyses MICTIVO1-MICTIVO2-MICTIVO3.

At the end of July 2018, all results of the MICTIVO3 study will be available. It will give us insight into the 'return on investment' of ICT integration in Flemish education. These insights will include information on the available infrastructure in schools, the policy concerning ICT, the use of ICT by teachers and students, the competences of principals, teachers and students, etc. The MICTIVO model used for the monitor allows us to gather information on many different components of ICT integration, the sample size and sample frame ensure relevant conclusions for the whole Dutch-speaking part of education in Belgium. Both the size and breadth of the monitor and the choice of the indicators are crucial to gather relevant data on which solid, independent advice to policy makers can be based. Furthermore, the monitor consists of the same basic components throughout the different field studies since 2007-2008 which makes it possible to evaluate the evolution and trends of ICT integration in education. Also, the original wordings of the questionnaire items allow the researchers' team to draw conclusions without being forced to focus on specific technologies, applications or devices. By means of a few minor adjustments and additions they can map ICT integration at different points in time while still being up to date with new (uses of) ICT in education, among others BYOD. These evolutions can be compared with other international trends on technology in education and with other countries. The scientific contribution by Goeman, Elen, Pynoo and van Braak (2013) on the results of MICTIVO2 reported on some trends, like the increasing numbers of computers per 100 students, the important role of the ICT coordinator, the fact that the infrastructure is becoming more outdated and the differences in ICT use by teachers for preparing their courses compared to ICT use during the courses (more trends are discussed in the article). At the end of MICTIVO3 we will be able to see if these trends are continued during the past five years, or if others emerged. Besides the importance of the results, MICTIVO contributes to knowledge building in a methodological way. The indicators are validated and the reliability is measured after each field study, which makes them robust. Because of the representativity study, the non-response study and the collection of information on explicit refusal of schools, it is possible to look for reasons why schools did not participate in this large-scale research.

References

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