

ICT IN SCHOOLS: TRENDS, INNOVATIONS AND ISSUES IN 2006-2007

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An overview of ICT in schools 2006-2007.
Produced for EUN's Steering Committee and stakeholders.



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Contents

1. Purpose	4
2. State and progress of ICT infrastructure and use	5
3. The impact of ICT in schools.....	6
4. Examples of national policies for and towards invisible ICT	8
5. Examples of innovations.....	10
6. Issues for schools.....	13
7. Conclusions.....	14

1. Purpose

This paper aims to provide an overview of the situation of ICT in schools in the years 2006 and 2007 for use of EUN's Steering Committee and its main stakeholders.

EUN regularly carries out extensive monitoring and research activities in various fields related to ICT integration in schools, such as describing and analysing ICT policies within the Insight observatory, gathering of innovative practices of schools involved in EU funded projects, leading the Internet safety network and EUN content related projects, which promote the learning resource exchange (LRE) for schools.

This paper aims to highlight key results from some of this research to give an overview on the developments in this field, on trends and examples of innovations and point to emerging issues. More specifically it brings together key findings from:

- Studies and surveys carried out by EUN in the last two years;¹
- PIC surveys and thematic dossiers;
- Analysis of country reports;
- Other relevant studies in the field.

This **first version** of the paper (also submitted for the Helios report 2007)² concentrates on the following areas:

- **State and progress of ICT infrastructure and use;**
- **Results of the impact of ICT in schools;**
- **Examples of national policies and innovations;**
- **Issues for schools.**

It is planned to provide a more comprehensive trend and issue paper covering more extensively other areas (e.g. content, science education, teacher development) drawing also extensively from the updated Insight country reports in the second half of 2007 around September/October 2007. The aim is to provide a trend and issue paper as a key Insight service to EUN consortium members on a regular basis.

¹ EUN's annual report 2006 provides an overview of all studies and reports published in Strand 1, 2 and 3.

² <http://www.education-observatories.org/helios/observatory>

2. State and progress of ICT infrastructure and use

The use of ICT in education and training has been a priority in most European countries during the last decade, but progress has been uneven. There are considerable differences of 'e-maturity' within and between countries, and between schools within countries. A small percentage of schools in some countries have embedded ICT into the curriculum, and demonstrate high levels of effective and appropriate ICT use to support and transform teaching and learning across a wide range of subject areas. Most schools in most countries, however, are in the early phase of ICT adoption, characterised by patchy uncoordinated provision and use, some enhancement of the learning process, some development of e-learning, but little transformed learning and teaching.

In the past year the picture of ICT in schools in Europe has been improved significantly thanks to a number of key studies. However, with 282 512³ schools in the EU27, it is not easy to give an accurate view of ICT in the 'average' school (if such a school exists).

The i2010 2007 report ⁴ provides a 'dashboard view' of progress towards the i2010 targets on a country by country basis. As far as schools are concerned it takes three key indicators:

- **Broadband penetration.** "Computers and the internet have arrived in European schools and are widely used in class in most countries these days. A strong increase in ICT use has taken place over the past five years and schools have moved over to broadband. Highest shares of broadband connection in schools can be found in the Nordic countries, the Netherlands, Estonia and Malta where about 90% of the schools have a broadband Internet connection. Whereas Greece, Poland, Cyprus, and Lithuania, have the lowest broadband penetration rates at schools in the EU25, (less than half of the EU25 average of 70%).
- **Numbers of computers per 100 students.** On average, today 9 pupils share a computer in schools in the EU. This means there are some 7.2M computers in schools for the 63 839 555 pupils in Europe. The situation looks less positive for the 10 new EU member states. While in the frontrunner countries such as Denmark, the Netherlands, the United Kingdom, and Luxembourg there are only between 4 and 5 pupils per computer, computer availability is half the EU average in countries such as in Latvia, Lithuania, Poland, Portugal, and Greece, where 17 pupils share a computer.
- **Use by teachers of ICT in class in the past 12 months.** 74% of Europe's 4 475 301 teachers report that they have used ICT in class in the last year. Huge variations between countries exist, however, with for example 35% of teachers in Latvia and 36% in Greece, compared to 96%

³ Database in numbers of schools, teachers and students in 27 European countries, European Schoolnet, June 2007 <http://spreadsheets.google.com/pub?key=pxiBZaRyBh-P2LdSm8O16Sg>

⁴ European Commission (2006): Communication "i2010 - Annual Information Society Report 2007" http://ec.europa.eu/information_society/eeurope/i2010/annual_report/index_en.htm

in the UK and 95% in Denmark belonging to the group of recent computer users in class. Two thirds are very confident in using word processors, while one third have the necessary skills to develop electronic presentations. 24% of teachers claim their subject is not suited for the use of ICT. In the UK and Denmark, almost all teachers use ICT as a teaching aid as supposed to countries such as Greece or Latvia where only 36% and 35% of teachers report doing so (Korte)⁵. It is clear is that there is not a direct relationship between the first two indicators and the third. In France, for example, the generally high level of broadband and computers in schools is not reflected in the use of ICT by teachers in lessons, which is one of the lowest in the EU⁶.

School data in the i2010 report come from the Benchmarking exercise (Empirica 2006⁷). It enables us to see at a glance, more or less for the first time, how schools are progressing with ICT. The study provides baseline data covering the infrastructure and use of ICT in schools.

3. The impact of ICT in schools

The Benchmarking study did not attempt to assess the impact of ICT on teaching and learning in schools. The ICT Impact Report (Balanskat et al, 2006),⁸ undertaken on behalf of the DGEAC ICT Cluster, examined 17 qualitative and quantitative studies of the impact of ICT in schools. Key findings that emerge from these studies are as follows:

1. ICT impacts positively on educational performance in primary schools, particularly in the home language and to a lesser extent science.
2. There is a positive association between the length of time of ICT use and students' performance in mathematics tests.
3. Schools with higher levels of e-maturity demonstrate a more rapid increase in performance scores than those with lower levels.
4. Schools with good ICT resources achieve better results than those that are poorly equipped.
5. ICT investment impacts on educational standards most when there is fertile ground in schools for making efficient use of it.
6. Broadband access in classrooms results in significant improvements in pupils' performance in national tests taken at age 16.

⁵ Korte, W., Hüsing, T., Benchmarking Access and Use of ICT in European Schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in 27 European Countries. Accessed at http://www.empirica.biz/empirica/publikationen/documents/Learnind_paper_Korte_Huesing_Code_427_final.pdf

⁶ This is explored in, for example, Lesne, J-F., et al, Rapport sur la contribution des nouvelles technologies à la modernisation du système éducatif, Inspection générale des finances, Paris, March 2007. Accessed at http://www.audits.performance-publique.gouv.fr/bib_res/664.pdf.

⁷ Empirica (2006): Benchmarking Access and Use of ICT in European Schools 2006. Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries. Download at: http://europa.eu.int/information_society/eeurope/i2010/docs/studies/final_report_3.pdf

⁸ Balanskat et al (2006): The ICT Impact Report, Download at: http://insight.eun.org/shared/data/pdf/impact_study.pdf

7. Introducing interactive whiteboards results in pupils' performance in national tests in the home language (particularly for low-achieving pupils and for writing), mathematics and science, improving more than that of pupils in schools without interactive whiteboards.
8. 86% of teachers in Europe state that pupils are more motivated and attentive when computers and the Internet are used in class.
9. ICT supports personalisation, independent learning and teamwork. Pupils state that they do assignments more their own way when using a computer and their parents consider that they solve assignments more at their own level. Collaboration between students is greater in project work when they use ICT.
10. Teachers have had some training and an overwhelming majority of teachers in Europe (90%) use ICT to prepare their lessons.
11. However, teachers use ICT to support existing pedagogies. ICT is used most when it fits best with traditional practices.
12. A significant minority of teachers (one in five) consider ICT to have no value in their subject
13. Effective exploitation of Information Management systems leads to increased and formalised cooperative planning between teachers, and this has a positive impact on teaching practices. However, there is not a positive picture of the use of Learning Management Systems or Virtual Learning Environments for pedagogical purposes. They are predominantly used for administrative purposes.

The extracted findings are headlines of course and we do not know if results reported in one country are true for another.

Among the inhibitors to the greater uptake of ICT identified in the reports were:

- **Teacher-level barriers:** Teachers' poor ICT competence and lack of confidence in using new technologies in teaching are two very significant determinants of their levels of engagement in ICT. These are directly related to the quality and quantity of teacher training programmes.
- **School level barriers:** Limited access to ICT (due to a lack or poor organisation of ICT resources), poor quality and inadequate maintenance of hardware as well as unsuitable educational software are also defining elements in teachers' levels of ICT use. Moreover, the absence of an ICT dimension in the overall schools' strategies and their limited experience with project-oriented activities supported by ICT, are decisive in determining levels of ICT use by teachers.
- **System-level barriers:** In some countries it is the educational system itself and its rigid assessment structures that impede the integration of ICT into everyday learning activities.

The evidence base gives important insight into the process in which teachers adopt new technologies which is has to be taken into account with new decisions being made at policy level. The majority of teachers explore ICT as a tool following a systematic approach using it to:

1. Enhance existing traditional practice;
2. Progressively build it into the curriculum;

3. Transform more profoundly their teaching practice.

According to the evidence, there is a continuum along which teachers adopt new technologies. We can assume schools are only in the beginning of the second stage towards the transition into a new educational paradigm. As widely acknowledged change and transformation in education which result in better learning and teaching are long term processes. Currently ICT has had an effect on some teachers but it has failed to deliver its promise on a larger scale. Better outcomes will be therefore visible only in the years to come much later than expected and hoped for on the basis of the potential of ICT. An important research finding is that ICT impacts most in e-mature schools and with e-confident teachers, suggesting that once the foundations are laid the benefits will be considerable. The challenge is to enable all teachers and schools to reach e-maturity. A recent UK study into ICT test-bed schools⁹ found a 'technology dip' that takes place when ICT is introduced into schools, followed by a significant rise in outcomes. This dip can last as long as four years but once a school is fully e-mature the results take off. This feature implies that patience is needed by politicians and treasuries who may be expecting instant returns on investment, and that those who advise them should be careful not to over-promise, at least in the short-term.

Recommendations for future policy work in The ICT Impact Report include: to plan for transformation and for ICT, to include new competencies in the curricula and in assessment schemes and to implement new forms of continuous professional development in a workplace environment and as part of a culture of lifelong and peer learning. Furthermore, at this stage of ICT in schools it is important to build up and maintain a clear political will and invest in ICT consolidation.

Schools are advised in the report to integrate the ICT strategy into the school's overall strategies and transform positive attitudes towards ICT into efficient widespread practice. This could be achieved by hands on practical training, providing easy to use ICT based materials, peer learning and peer sharing of experiences, securing reliable infrastructure, triggering teachers knowledge in their subject, pupil motivation, and easy access to research findings.

4. Examples of national policies for ICT and towards 'invisible ICT'

Some countries have already developed appropriate actions along those lines as the work of the EUN and its Policy and Innovation Committee (PIC) and the Insight country reports¹⁰ show. Other countries are in the process of catching up.

Norway has been driving forward a major national education reform in the last year with the ultimate aim to raise the quality of its education system. As

⁹ Somekh, B, Lewin, C, Saxon, D, Woodrow, D and Convery, A (2006) Evaluation of the ICT Test Bed Project. Final Report: Section 4 – The Qualitative Report 2006. Becta: Coventry

¹⁰ <http://insight.eun.org/countryreports>

analysed in the recent Insight Country Report on Norway, the reform focuses on several areas: a new national curriculum for primary and secondary schools, the establishment of a national quality assessment system and a political will to promote science education. A major aim is to strengthen basic competencies for Norwegian pupils with ICT as one of the five basic competencies now integrated in the curriculum. The reform, affecting the major educational players, also goes in line with a strong focus on competence development for teachers, head teachers and school administrators and the creation of learning networks as set out in the Programme for Digital Literacy (2004-2008). Recent policies such as the eNorway 2009 and the strategy for competence development (2005-2008) coherently focus on the development of Digital literacy. Norway also strives towards major progress in e assessment using digital portfolios.

The UK's e-Strategy for education describes the use of digital and interactive technologies to achieve a more personalised approach within all areas of education and children's services. It has six priorities:

1. an integrated online information service for all citizens
2. online personal support for children and learners.
3. a collaborative approach to transforming teaching and learning
4. a good quality training and support package for practitioners
5. a leadership and development package for organisational capability in ICT
6. a common digital infrastructure to support transformation and reform

Current key activities in implementing the e-strategy are to support personalised learning offers. The e-strategy outlines that by 2008 every school learner in England should have "access to a personalised online learning space with the potential to support e portfolios" and by 2010 all schools will have integrated learning and management systems. Concerning training and support for practitioners and improving organisational capability much has been done in training head teachers in the UK. Head teachers are seen as a key driver for change. Over 10,000 head teachers have completed the Strategic Leadership of ICT professional development course jointly developed by Becta and the National College for School Leadership.

In the New Member States¹¹ a variety of policy approaches can be found for the strategic development of ICT. These range from more coordinated central actions reflected in a long term national strategy for ICT, dispersed programmes initiated by different ministries to various forms of project cooperation and agreements between different institutions. Therefore the degree of importance that is given to a sustainable development of ICT integration in schools varies considerably, with, in the worst case, no continuation of funding for further development of the ICT integration. For all these countries current policy priorities include: information literacy; software and information resources; infrastructure.

¹¹ EUN, MDR emapps project (2006): The use of ICT, games and mobile technology in the New Member States.
http://insight.eun.org/ww/en/pub/insight/policy/policy_briefings/emappsbrief.htm

In order to be able to face the challenges of the the digital age, the promotion of the Information Society represents one of the main policy priorities in Greece in recent years. Whereas other European countries have invested in ICT in the educational sector since the early nineties, the first national large-scale initiative to include ICT in the daily activities of Greek schools took place only in 1996 followed by the Operational Programme "Information Society" (OPIS) (2000-2006). This presents a comprehensive strategy, defines priorities and specific goals for the future, as well as means, initiatives and mechanisms for achieving them. Through setting up the necessary infrastructure, providing training and support for teachers and developing appropriate educational material, the programme aimed at making students and teachers perceive ICT not only as an independent scientific domain, but also as a handy tool to be used every day in teaching, learning and communicating.

In general in recent years, ICT has slipped down the political agenda in a number of European countries, as a thematic dossier prepared by EUN's Policy and Innovation Committee shows¹². Other issues are taking front stage such as the challenge of having fewer children in schools (Estonia), innovation, more autonomy for schools and making them more attractive (The Netherlands), handling educational change (Switzerland) or handling changing circumstances (Catalonia). In the recent strategy paper from the Danish government on Denmark in the global economy, "Progress, innovation and cohesion", ICT in education was not mentioned as a special priority, but in most initiatives ICT is implied. ICT is considered as an important and necessary tool/instrument for the success of any given programme. As a conclusion, in a number of countries, ICT may have shifted out of the spotlight, but not off the stage: It is now implicit and embedded in major policies issues. In general ICT should play a key role in handling these new goals and challenges.

5. Examples of innovations

In 2006 innovation in the UK, The Netherlands, Norway, France, Denmark, Sweden and Catalonia were highlighted in a specific thematic dossier on innovation published in Insight with contributions from the Policy and Innovation Committee.¹³ There appears to be little radical innovation or what could be termed transformation in European schools. Evidence from the UK (Innovation Unit) and The Netherlands (Inspectorate) suggests that it is more the mindset of teachers and school leaders than regulations that prevents rethinking of schooling.

¹² McCluskey, A., (ed.), "The next curve ", Thematic Dossier: Policy and innovation in education, European Schoolnet, Brussels, 2006.
http://insight.eun.org/www/en/pub/insight/thematic_dossiers/next_curve.htm

¹³ McCluskey, A., (ed.), "Innovation ", Thematic Dossier: Policy and innovation in education, European Schoolnet, Brussels, 2006.
http://insight.eun.org/www/en/pub/insight/thematic_dossiers/innovation.htm

In the UK the Mudlarking project is an example where technology is used as a motivator for exploring alternative learning paths. The Mudlarking venture ¹⁴ is a worldwide initiative to research the use of technology in education. This project gives students the opportunity to use mobile technology to discover and explore their environment, in short, a digital version of the traditional guide tour. The challenge for educators and designers is to understand and explore how best they might use these resources to support learning.

In Norway the 'Emigrants' mother tongue project', a language- project, provides evidence that ICT, if properly deployed, can facilitate the process of foreign language learning and promote the integration of immigrant pupils into Norwegian society. What is quite unique is the project's focus on strengthening the mother tongue of immigrants at the same time as the acquisition of Norwegian using a variety of new technologies. Language teachers in Norway tend to embrace technological developments (digital cameras, sound recorders and video projectors) to create the desired learning environment for their students.

The Danish 'Learning Management System and PCs in school' project was initiated in 2004 to support ICT integration in education with a particular focus on primary and lower secondary schools. The aim was to tackle the lack of ICT infrastructure and resources in schools observed in 2002 and 2003 which prevented schools from adopting innovative methods in terms of management and teaching. Within this context, the Danish government decided to subsidise the acquisition of LMS and PC's for third grade for the period 2004-2007. The government covered half of the expenses and the municipality the other half. This project is regarded as a decisive step for the integration of ICT into primary and lower secondary schools. It aims to ensure the daily use of ICT and contribute to school development.

The new French 'orientation law' for the future of schools (Lois d'orientation et de programme pour l'avenir de l'école), lays down the general guidelines for the integration and generalisation of ICT into schools. This initiative, which fits into the overarching national action plan 'RE/SO 2007, aims at the implementation of virtual learning environments in schools, the generalisation of the B2i certificate for students and C2i for prospective teachers as well as the participation of ICT coordinators in the pedagogical committee meetings within the schools. The originality of this initiative lies in the fact that this is the first time that mastering ICT becomes one of the five key competences that pupils need to have at the end of their stay in school. The decision to include ICT skills has a direct impact on the structural organisation of schools and more precisely as regards to pedagogy. This constitutes a new, more global approach, towards the implementation and use of ICT in schools: previously ICT was taken into account through each school programme whereas now there is a more inclusive approach as ICT is considered at national level.

¹⁴ <http://www.futurelab.org.uk/showcase/show.htm>

The examples illustrated above show the differences in the way innovation is defined and perceived in highly diverse national contexts. It has been an underlying goal in the UK and Norwegian projects, that the use of ICT should inspire and motivate pupils, having thus a profound effect on children's learning in terms of enhanced pupil outcome and in the students' views of themselves as learners (e.g. increased self-confidence, self-assurance). All these projects are based on the use of technological developments that have been proven to be attractive to students (e.g. blogs, PDAs, mobile phones). Another common element in these projects is that students play an active role, have control over the process as well as ownership of the result. The activities are also related to student's real life interests and have a strong collaborative and communicative component which is a main motivational driver. Yet, although these innovative environments create favourable conditions for learning they might represent isolated examples. Their implementation and wider roll out depends to a large extent on the willingness and the personality of the teachers to do so as well as on many other factors, such as schools' and national priorities or organisational structures.

Work by European Schoolnet with schools in eTwinning,¹⁵ the e-learning awards, P2P and the new P2V project aims to identify and spread innovation in schools through peer learning and to develop it as an approach to identifying and mainstreaming effective practices. The peer learning methodology and examples of innovation in schools can be seen at the P2P web site¹⁶. For example good practice outlined by Dundonald primary school in Northern Ireland comes from their Finnish partner school Mantymaen Koulu which provides a comfortable learning environment where a variety of different learning styles are applied and a true partnership between pupils and teachers had been established. Jakomäen Yläaste, an upper level Comprehensive School from Helsinki, gives an inspiring description of the development of their school's vision using ICT. The strategy is now systematically implemented at three levels: the school level, the individual level and at team level. St. Cecilia's College in Northern Ireland constitutes another good example of a school with a clear vision of using ICT for management, teaching and learning. Also worth mentioning are the innovative ICT practices followed at Sintermeerten College in the Netherlands: the school has constructed several web-based learning areas the latest of which is industrial heritage. In its partner school, Tikkakosken Koulu, in Finland, students are using ICT to make an online newspaper: they use Internet for collecting information and afterwards they publish their articles at the school website. The French team from the Lycée le Grand Chenois ('Académie' of Besançon) was impressed by the experienced use of ICT by the Finnish teachers of the lower secondary school Kilterin Koulu in Vantaa.

¹⁵ <http://etwinning.net>

¹⁶ <http://p2p.eun.org>

6. Issues for schools

In the end of 2006 EUN conducted a school survey¹⁷ in order to provide a quick snapshot of the views of schools in Europe concerning schools and technology now and in the future. Results are not representative with 427 schools in 15 countries participating in the survey, but they illustrate and give an important insight in how teachers view the current elearning situation of their schools.

Issues mentioned by primary and secondary school teachers related to learning platforms, international collaboration, wider education challenges, teacher training, and infrastructure as the main areas of concern for schools. Educational resources, pedagogy and organisational/ management issues were likewise mentioned, but to a lesser extent. The answers show that there are still some hurdles to overcome for schools to truly integrate, develop and benefit from ICT in various ways. Learning how to use and exploit new technologies (learning platforms or new equipment) for their own purposes came up as the major concern for schools. The managing of virtual classes, the use of a learning management system (LMS), and the implementation of elearning solutions are seen as a real challenge for schools. Solutions such as Moodle, which are seen as efficient and free for schools, seem to work and are favoured, and teachers were positive about sharing, using and reusing digital resources from colleagues in other countries.

Teachers are still hesitant to work with digital learning platforms. New tools, such as blogs are only slowly being explored and integrated. Teacher support is an ongoing need as more than half of respondents do not think that teachers in their school use ICT confidently. Moreover, the educational value of new personal devices such as ipods and MP3 players is not clear to them.

E-safety issues are only marginally mentioned, ICT is seen overall positively by the teachers responding to the survey. In this respect the results of the Insafe survey¹⁸ on the online behaviour of 21,872 young people in Europe are very revealing. The use of social networks such as MySpace and Bebo are some of most popular websites among young people. The Insafe survey suggests that more needs to be done to raise awareness of privacy issues. 57% of young people make their online social network profiles public and disclose a great deal of personal information. Almost a third of youngsters responding indicated that they didn't know what to do about making information public or private. Schools next to parents and providers of social platforms all have their role in helping students to deal with these critical issues in the future.

Among the top priorities for schools in the coming years are teacher training, infrastructure and European co-operation. As for policy priorities, ICT is only one part of the education picture. Schools mentioned challenges not directly related to ICT. To broaden the perspective, we have to acknowledge that there are wider

¹⁷ <http://blog.eun.org/roundtable/>

¹⁸ European Schoolnet is the coordinator of the European Insafe network. Results of the survey can be found at: [http:// www.saferinternet.org](http://www.saferinternet.org)

serious problems schools currently face all over Europe, but ICT can be a key driver in solving these.

7. Conclusions

To conclude, ICT in Europe's schools can be said to be progressing, albeit slowly. Use in classrooms of readily integrated equipment, content and services is increasing but there is little use of social networking tools.

Issues related to ICT use in teaching and learning are coming to the forefront. They are more complex than providing hardware and connectivity and there is evidence that ICT is becoming less of a political priority in many countries, and so funding for replacement and upgrading of hardware, professional development of teachers and development of content is likely to be in short supply, just when schools may need it most in order to reap the benefits of technology. Teachers are in general open to use and share digital resources, but more work has to be done to show, for example, the impact of exchanging digital learning resources on current school practices or how they can make best use of emerging technologies.

There is also no clear picture in how far innovations pointed out can be useful for wider take up at national level, let alone for other countries in different contexts. The focus in the future might not be to work towards transferability, but rather on identifying favourable factors that make efficient classroom, teacher and organisational practices in schools happen.

How far national policies have decisively and effectively shaped existing classroom practice remains likewise to be proven. Evaluations of national policies and projects, if they exist, are certainly one approach to enlighten the picture of how policy relates to practice. However, there are many other factors that determine ICT practices in schools. The challenge for the future is the exchange, description and analysis of educational practices across Europe and the interrelationship between various factors that shape them as a means to make students, teachers, head teachers and policy makers more aware of existing possibilities with ICT in their own but also in other European countries, the role ICT can play in solving educational challenges and how to make appropriate choices about ICT use. Mechanisms to foster peer learning between schools (both e-mature and those in the early stages of ICT adoption) to stimulate the exchange of practices need to be developed. European Schoolnet's developing work with schools and education ministries to study the connection between policy and practice, how practices connect to policies and vice versa, is expected to throw more light on this subject.