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Setting up Computer Networks

In Schools

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Co-funded by the
Erasmus+ Programme
of the European Union



FOREWORD

This document aims to alert decision makers and implementers to the main issues to consider when implementing, upgrading or improving school networks. Before taking decisions, it is important to do a good planning and a thorough reflection, once it may prevent later problems which may become very expensive, complex and disruptive for the school's normal functioning.

Network Structures in Schools

School network implementation must be done cautiously, having in mind three main concerns: servers, software and users. If the school structure is a school cluster, there must be a total compatibility and integration of computer equipment and network, systems, IT applications and procedures, in such a way that all users can do their tasks without any problems or constraints.

Let's look at some of the crucial decisions to be taken:

Servers

- A processing capacity which is appropriate to both the present and the predictable future;
- Redundancy of systems, to allow an adequate functioning in case of network failure;
- Physical security (access to processing and storing of information equipment,) foreseeing the creation of specific rooms with restricted access;
- Firewall;
- The implementation of strict rules forbidding access to certain sites, subjects, passwords;
- Setting up and maintenance of professional antivirus software;
- Implementation of VPN (virtual private network) for administrative and management tasks;
- The existence of several non-communicating internal networks (administrative, management, teachers and students' networks) for the common user.

Software

- Intrinsic security against possible attacks of the chosen OS (Operating System);
- The acquisition and implementation of updates;
- Applications available for the chosen OP in each work area in school;
- The acquisition and maintenance cost of the OS and of all the software needed for the normal development of school's activities.

Users

- Network access rules (who, how, what kind of access and privileges, which network, what for);
- Access rules to the type of information – there must be an extreme caution with the strict compliance with the GDPR (General Data Protection Regulation);
- Meticulous rule establishment as far as mobile means (pen disks, external disks) are concerned, once these may be potential sources of network infection with malicious software;
- General or partial permission or interdiction of the school network access from the outside (global internet).

In what concerns schools, an important aspect to be considered is the physical structure of the network implementation for client equipment: fully based in network cables, with easily distinguishable and controllable access points; mixed or fully based on wireless technology. In fact, the availability of the wireless network connection to students has been widely discussed and it is a controversial issue, due to the occurrence of multiple incidents, which has led to the full interdiction to those accesses or, in some cases, to the restriction of taking personal communication equipment into school.



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Potential benefits of Wi-Fi network implementation with students' access

- Students are very proficient in using network webs, which may improve their school performance;
- School doesn't have to pay for the expenses related to the equipment acquisition and maintenance, as it can be done at individual terms or through local and national programs which can provide the students with this equipment;
- Usually, students tend to be more careful with their own equipment, than with those of others;
- Generally, students don't forget about their own equipment at home, which doesn't happen with other school materials;

- The students' equipment (smartphones, tablets) can be used in all school's work;
- The replacement of classic learning materials, such as student handbooks and workbooks, by e-handbooks can be planned and will bring out innumerable advantages, such as: the reduction on costs, resources and even waste management; the extension of materials' duration and their easy upgrading; the impact on students' daily life as their schoolbags will be considerably lighter.
- There is no learning curve on the equipment usage, or it will not be significant, because digital equipment usage is quite natural to students nowadays.

Potential disadvantages of Wi-Fi network implementation with students' access

- Too many pieces of equipment connected simultaneously to the school network may turn it inoperative or may lead to the need of oversizing the initial equipment;
- It is a potential risk to the school network, therefore effective security measures must be implemented, not only as far as antivirus protection is concerned, but also to ensure strict control of the network available information access;
- For some students, hacking school network may become a personal or group technological challenge; so there may be attacks to the implemented structure, due to the simple pleasure of hacking or to the intention of misappropriation, changing or destroying data which can be confidential, vital or both;
- Students from various economic contexts will have access to quite different equipment, which may condition or enhance their school performances;
- Students carrying very expensive equipment may be robbed;
- A large amount of equipment being used in a school requires the existence of a wide number of charging places, both in classrooms and in common spaces;
- Some applications are not available for all platforms (Linux, Windows, Android, iOS);
- The existence of a large amount of technological advanced equipment being used in school may cause serious problems concerning privacy (unauthorized photos of students or other members of the educational community, unauthorized class or activities recording, *Cyberbullying*, etc.);

In conclusion, any new installation or changing of a pre-existent school network takes a meticulous planning and evaluation of all the conditioning factors. Similarly, its maintenance and daily use demands one or more experts, working part or full time according to the installed structure complexity.