**Free minds:**

For teachers to learn a new tool, they should be supported by school leadership like principles. Without this support the desire to learn something new can remain own initiative.

**Adaption of PLE within teachers in primarily and secondary schools in Finland**

While new PLE in being developed, it is already clear that the development of it results in innovation and the biggest challenge with a software, and especially with that software which includes something totally new, is to sell it to actual clients. For pupils to be able to get all mentioned above advantages of using a new PLE, it is necessary that schools adapt it in their teaching activities. Thus Almerin clients are actually schools and to be more particular – teachers, who will actually be using the new software and whose opinion has a big weight in schools’ overall decision on whether to take it into the use or not. That’s why I want to study primarily teachers in the context of adoption of a new PLE. As a result of my research I want to find answers on the basic question of ‘why teachers would want to adapt new PLE in their teaching activities?’ in order for Almerin to use these answers as arguments in their selling campaign.

The vision of Almerin is to be in every school in Finland by 2017, in every schools in Nordic by 2020, in every school in Europe by 2025, America by 2030, worldwise by 2040??? (ask this from Teemu)

Since initially Almerin target at Finnish schools, I will do my research in the context of them.

**State of Art**

ICT may help promote educational change only if students and teachers have an access to the new technology and it is intensively used as a tool for learning in various subject domains. The students and teachers need to have sufficient skills in using and working productively with the new technology.

(Hakkarainen et al., 2000)**.**

Thus any adaption of ICT in the context of educational institutions at least two things are necessary:

* ICT environment (laptops etc)
* ICT confidence of teachers who apart of using PLE themselves supposed to give initial teaching on how to use a new PLE to students

The *Survey of schools in Europe* showed that “at least 80% of students in grades 4 and 8 are in highly digitally equipped schools with fast broadband and relatively high connectedness in Denmark, Finland, Norway and Sweden where almost all students in grade 11 are in such highly equipped schools” (Wastiau et al. 2013).

What comes to ICT confidence then situation is different.

Students’ use of ICT for learning during lessons is related to teachers’ confidence

in their own ICT competences, their opinion about the relevance of ICT forT&L

and their access to ICT at school. The *Survey* shows that students ICT most

frequently when they are taught by teachers with great confidence in their own

digital competence (operational and social media skills) and in their ability to use

the Internet safely and responsibly, with positive opinions about ICT use forT&L,

as well as facing few obstacles and having broad access to ICT infrastructure at

school.These teachers are defined in the *Survey* as *digitally confident and supportive*

*teachers*.

On average across the EU countries covered by the *Survey*, between 20–25%

of students are taught by *digitally confident and supportive teachers* having broad

access to ICT and facing few obstacles to their use at school. Here again, there

are great differences between countries. 30 to 50% of students at grade 4 and/or

grade 8 are taught by such teachers in Bulgaria, Estonia, Ireland, Portugal, Slovakia,

Slovenia and Sweden; conversely, less than 10% of students in the same

grades are taught by such teachers in Austria, Belgium, Cyprus, France, Finland,

Greece and Luxembourg.

(Wastiau et al. 2013).

It is possible to conclude that Finnish schools has all necessary equipment to implement the new PLE while digital confidence of staff remains to be quite weak. Even though this might be seen as an obstacle we tend to believe that it is possible to overcome it by training the school staff to use a new PLE should they just wish to adapt it after being demonstrated with outstanding benefits of its usage in comparison to existing teaching tools and methods.

Thus Finland has favorable environment towards adapting new PLE.

One of requirements for Almerin PLE is that it should be applicable to any mobile device what theoretically can create appropriate ICT environment constructed by student and teachers own devices. The service should be provided for any pupils equally despite of whether he/she has own mobile device or not that is why it is necessary that school initialy provide everything necessary for pupils to be able to use new PLE.

**Personal Learning Environments (PLE)** are systems that help learners take control of and manage their own learning. This includes providing support for learners to:

* set their own learning goals ( with support of their teachers)
* manage their learning, both content and process
* communicate with others in the process of learning

**(IMAILE PORTAL)**

**State of the art**

The goal of this section is to show the importance of PLE

Structure of section:

* Tendency towards Student – centered learning (Shift from teacher centered approach to student centered in education (or WEB 2.0 allowed new ICT solutions to appear which could support student-centered learning))
* Situation with student centered approach within STEM subjects in European schools
* Importance of PLE (X)
* Problems of existing PLEs (X)
* Methods to improve PLE (how perfect PLE could look like)
* There are works about ITC adoption in education but not yet particularly about PLE in the context of primary and secondary schools

**Tendency towards Student – Centered learning**

According to Lang et al. (2012), the field of Education in Europe confronts several mayor challenges such as early drop outs, financial issues, teachers spending less time with the students due to documentation, the shift into 21st century skills both for teachers and students, low interest in STEM subjects (Science, technology and Math) as well as an increased demand of personalized learning. Apart from this there is a **great shift** from the traditional school to e - teaching and learning going onwithin the European Education system and the teaching staff need support from technology to manage this shift. There exists a great amount of different ICT solutions on the market to be used in classrooms but in spite of high investments and a market that offers such a variety of products it is still observed a low use of technology to perform innovative teaching and creative learning in the European classrooms in order to meet the 21st century in full scale. It is believed that European schools’ actual situation and problems have one common origin – the lack of customized ICT products/ services merging from the demand side (European schools) and an effective dialogue between demand and supply side (procurers of ICT and ICT industry/ research).

(IMAILE portal)

**Situation with student centered approach within STEM subjects in European schools**

Research shows that lessons in math and science still is mostly teacher-centered, with few opportunities for the students to have influence on their own learning and using digital tool (IMAILE portal)

European schools at present show a **teacher centric** classroom with teachers using technology, interactive whiteboards and LMS systems. While the actual trend goes to towards **student centred** learning where all students have access to devices, digital content and software in a personalised way. Research indicates that interactive classrooms need the support of ICT personal learning environments in order to provide participatory learning in a student centric way. By marrying the principles of personalised learning with the tools of technology some educators believe that they have the chance to create the kind of customized learning environment that can finally break schools out of industrial age model of education to bring the true 21st century school reform.

(IMAILE portal)

**Importance of PLE**

The quest for learning

to be ‘student centred’, self directed and self regulated has long been a pursuit of

educators, and recent reports from various countries including the UK (see Owen,

Grant, Sayers & Facer, 2006; Bryant, 2007; Minocha, 2009; CLEX, 2009), USA (see New

Media Consortium, 2006, 2007, 2008, 2009; Salaway, Caruso & Nelson, 2008) and

Australia (see Fitzgerald & Steele, 2008) indicate that the integration of social software

into learning design can make a qualitative difference to giving students a sense of

ownership and control over their own learning and career planning. However,

universities and colleges still tend to rely on conservative, established course

management systems (CMSs) and virtual learning environments (VLEs) that do not

fully capitalise on the potential of social media that enable participation in global

learning networks, collaboration and social networking. Of late, the personal learning

environment (PLE) has emerged as a concept associated with the adoption of a raft of

Web 2.0 tools that serves to integrate essential learning outcomes such as lifelong

learning, informal learning and self directed learning.( McGloughlin, C., & Lee, M. J. W. (2010))

Learning on demand is becoming a type of lifestyle in modern society (McLoughlin & Lee, 2007). Learners constantly seek information to address a problem at work, school, or to just satisfy a curiosity. To do so, they take advantage of digital and networked technologies not only to seek information, but also to share information. Thus, learners should not be considered as passive information consumers; rather, they are active co-producers of content. Additionally, learning in the context of social media has become highly self-motivated, autonomous, and informal, as well as an integral part of the college experience (McGloughlin & Lee, 2010; Smith, Salaway, & Caruso, 2009; Solomon & Schrum, 2007). **(Dabbagh & Kitsantas, 2012 )**. Thus young generation of today primarily learn by being interactive. This in its turn requires interactive classrooms in educational institutions with personalized ICT solutions. The present situation in European schools is such that they show a **teacher centric** classroom with teachers using technology, interactive whiteboards and LMS systems. While the actual trend goes to towards **student centred** learning where all students have access to devices, digital content and software in a personalised way. **(IMAILE PORTAL).** Additionally, traditional platforms such as course and learning management systems (CMS/LMS) do not capitalize on the pedagogical affordances of social media for example allowing learners to manage and maintain a learning space that facilitates their own learning activities and connections to peers and social networks across time and place (McGloughlin & Lee, 2010; Selwyn, 2007; Valjataga, Pata, & Tammets, 2011; van Harmelen, 2006) **(Dabbagh & Kitsantas, 2012 )**.

By marrying the principles of personalised learning with the tools of technology some educators believe that they have the chance to create the kind of customized learning environment that can finally break schools out of industrial age model of education to bring the true 21st century school reform **(IMAILE PORTAL.**

By developing a new PLE it is believed that it is possible to provide participatory learning in a student centric way.

and that’s what PLEs are supposed to provide because technologies needed for that are already existing.

COMPARISON OF PLE AND LMS

* Dabbagh & Kitsantas, 2012. PLEs, social media... (**page 2**)
* <https://www.youtube.com/watch?v=zDwcCJncyiw>
* A PLE is frequently contrasted with a learning management system in that an LMS tends to be coursecentric, whereas a PLE is learner-centric. At the same time, a PLE may or may not intersect with an institutional LMS, and individuals might integrate components of an LMS into the educational environments that they construct for themselves. (7 thing you should know about PLE)
* <https://www.youtube.com/watch?v=vlJjvqKlQac> (PLE, its pluses and minuses)
* Martindale, T., & Dowdy, M. (2010). Personal learning environments. *Emerging technologies in distance education*, 177-193.

The concept of the PLE has been emerging in recent years via the work of online theorists, researchers, and developers, as the result of the limitations of learning management systems, a recognition of the importance of informal and lifelong learning, and the growth of social software. (Martindale & Dowdy, 2010)

PLE is meant to support LLL, informal learning and different learning styles (Attwell, 2007) (PLE is described as concept). According to Felder & Silverman (1988) learning styles are the following: active/reflective, sensing/intuitive, visual/verbal and sequential/global.

With PLE it could be possible to represent the knowledge and skills got by the person through the demonstration of completed projects and courses. All these competences could be collected in e-Portfolio for further demonstration to potential employer because those wish to see evidence of the ability to apply skills and knowledge in a particular context (Attwell, 2007).

If previously, learning was divided between theory to be acquired in schools and practice which often takes place on the workplace, then with the help of PLE it is possible to bring this two together through facilitating access to learning in different contexts by using different devices and interfaces (Attwell, 2007).

Attwell (2007) believes that by attempting to drily reproduce classical forms of learning, i.e. conforming to a classroom or a lecture hall metaphor, inside of a software like Learning Management Systems (LMS) or Virtual Learning Environment (VLE) can make the whole learning experience quite ineffective and lonely because this approach may have a lack of a social aspect of it and may have a limiting effect on self-directed and self-regulated learning as tasks are pre-selected and resources are prescribed rather than negotiated (Hotrum, 2005; Lee, 2005; Sheely, 2006; Lane, 2008). According to Martindale & Dowdy (2010), learners have always depended on the support of their peers and peer networks to facilitate learning. If in a physical world this usually happens through lunchtime discussions, student organizations, hobby groups and other different communities, then in virtual world this is to be achieved through social media tools. The issue with current LMSs used in institutions, according to McLoughlin &Lee (2010), is that they “do not accommodate the social connectivity tools and personal profile spaces that students might choose, and that would assist them to integrate their experiences”. To change this, apart of just file sharing, inside of systems like PLE should be place for instant messaging, social networking, bloggings. Attwell (2007) continues, that it is not only communication which is drawing young people to these technologies but the ability to create their own identities through the opportunity to create and share ideas, to join groups, to publish.

Learning happens throw-out people’s lives in different contexts and completely everywhere. According to Cross (2007), majority of what person learns occurs outside of formal instruction. Moreover, learning on demand is becoming a type of lifestyle in modern society when people constantly search for information to solve a problem at work, schools or just to satisfy curiosity (McLoughlin & Lee, 2007). Understanding this increase the recognition of importance of informal learning. Attwell (2007) believes that PLE has the potential to bring formal and informal learning together what is at present a major issue in educational sector. This synergy could be achieved via using social media and supporting student self – regulating learning (Dabbagh & Kitsantas, 2012). Learning in the context of social media, apart of being informal, has become also highly self-motivated and autonomous (McGloughlin & Lee, 2010). There are technologies available (like Tin Can API) allowing to track learning activities outside of formal learning in ‘brick and mortal’ premises via any device whether it is online or offline. Data from these activities and from those of formal learning could be then gathered together in one system to represent the full picture of person’s learning.

Social software has a long history, and can be defined simply as software that supports group interaction (Allen, 2004). Using this software, learners can organize content that has meaning to them and easily share that content and their own interpretation of it. Further, learners can interact with other people with shared learning goals. **(**Martindale & Dowdy, 2010**)**

In peoples’ learning environments there might be various of programs like web-browsers, mail-clients, text / audio / video editors, instant messaging software and many more. All these might require installation, setting up and maintaining what might be beyond of somebody’s skills. According to Attwell (2007), the power of PLE, while being based on open standards and open Application Programming Interfaces (API’s), is to allow users to ‘plug in’ their favorite tools into the system and provide interoperability with other applications.

Second, learners may have experienced limitations with what we call institutionally centered learning environments, embodied by learning management systems (LMS)1. While LMSs have served universities well in tracking students and orchestrating online courses (“learning management”), the learner is left with a less than optimal environment. It may not be in the learner’s best interest to be “managed”, but rather to be guided and encouraged. (Martindale & Dowdy (2010))

The idea is for learners to exercise ownership and control over their experiences, rather than be constrained by centralised, instructor controlled learning based on the delivery of pre-packaged materials.( McLoughlin & Lee, 2010)

As the analysis of existing PLE solutions in the section 1.3 (???) of this theses showed there is no fully functional PLE solutions on the market to be recommended thus table 3, which shows key differences between LMS and PLE, is built upon assumptions and IMAILE vision of how a perfect PLE should look like.

The following is a rather comparison of current LMS systems with PLE which is according to IMAILE vision.

|  |  |  |  |
| --- | --- | --- | --- |
| **Key differences between LMS and PLE** | | | |
| **LMS** | **Source** | **PLE** | **Source** |
| LMSs tend to be more course centric. All resources are loaded and linked within the overall structure of a course | Martindale & Dowdy, 2010 | PLE is a learner centric platform | EDUCAUSE Learning Initiative (ELI), 2009 |
| The learner’s role is one of passive acceptance of content and limited permissions set by the LMS. | Martindale & Dowdy, 2010 | Learner can produce and receive information within the same system. A learner can have an ownership role. | Anderson, 2006 |
| Every learner experiences content exactly the same way. Each learner interacts  with content in identical fashion | Martindale & Dowdy, 2010 |  |  |
| Operation of an LMS is usually restricted to a single institution. Only approved by institution users can access the system. Data stored in LMS doesn’t travel with a learner. | Dabbagh & Kitsantas, 2012. | Support life-long learning |  |
| Changing of the school would sometimes mean re-learning the technologies of access to learning (introduced different LMS) | Wilson, et al., 2006 | Platform stays the same throughout the period of individual’s life |  |
| LMS is not open to activities occurring outside of its realm. | Sclater, 2008 | Being a personal environment a PLE allows to collect learning experiences which are happening outside of PLE (there are technologies available for that like Tin Can API) |  |
| Teaching staff organize the environment for learners and decides which tools are available for them within LMS | Martindale & Dowdy, 2010 | Learners personally organize the environment and decide which tools to use |  |
| Learning in vacuum |  | Peer support through social media integration |  |
| Basic functionality of LMS is a content sharing platform |  |  |  |
| Lack of implementation of those emerging technologies which are nowadays in trend of technology enhanced learning |  | The following technologies are implemented:   * Cloud computing * Wearable technology * OER * BYOD * Blended learning * Gamification * Learning analytics * Automated online assistant | IMAILE portal |
| Teachers create communities (study groups) for learners to join |  | Learners are free to create and join any networks that make sense to them and offer value. | Martindale & Dowdy, 2010 |
| Limited possibilities for learner’s collaboration within LMS |  | Varies of third party collaboration tools are available for integration inside of PLE. |  |

**Possible topics:**

Why students of Finnish primary and secondary schools would want to adapt a new PLE

# LITERATURE REVIEW

Structure:

* + Student – centered learning in European schools
  + With development of WEB 2.0 there appeared a trend of Technology enhanced learning
  + Great shift from e-teaching to e-learning

Some time ago European schools started acknowledging that that teacher centered approach is inefficient. Thus European schools started moving towards student – centered approach.

TODO: pluses and minuses of both

With development of web 2.0 gave an impact to rapid evolution of technology.

and e-learning and teaching became more popular, there appeared the trend of Technology Enhanced Learning.

Accroding to Lang et al (2012), there is a great shift going on in Education system from traditional schools to e-teaching and learning

But this trend gave another challenge – how to apply student-centered approach to e-learning.

This in its turn requires student – centered classroom where “all students have access to devices, digital content and software in a personalised way” (Lang et al, 2012)

While a traditional concept of teacher-centered learning with a teacher playing a key role by lecturing is quite clear for people, then an emerging trend towards student-centered learning might need some explanation.

According to Lang et al (2012), apart from this there is a great shift from the traditional school to e - teaching and learning going onwithin the European Education system and the teaching staff need support from technology to manage this shift.

While the actual trend goes to towards **student centred** learning where all students have access to devices, digital content and software in a personalised way. (IMAILE)

TEMP:

The rapid co-evolution of technology and learning is offering new ways to represent knowledge, new educational practices, and new global communities of learners. Yet the contribution of these changes to formal education is largely unexplored, along with possibilities for deepening our understanding of what and how to learn. Similarly, the convergence of personal technologies offers new opportunities for informal, conversational and situated learning. But this is widening the gulf between everyday learning and formal education, which is struggling to adapt pedagogies and curricula that were established in a pre-digital age. Goodyear, P., & Retalis, S. (2010).

The concept of student-centered learning is to bring the classroom and students to life. The

teacher is considered a “guide on the side”, assisting and guiding students to meet the goals that have

been made by the students and the teacher. (Overby, 2011)

Intro

The premise "one teaching style fits all," which is attributed to a teacher-centered instructional approach, is not working for a growing number of diverse, student populations. New challenges facing classroom teachers: legislative mandates for school renewal, diverse student needs, technological advances, and school violence prompted this researcher to look for an alternative. Examination of the literature detailed the assets of teacher- and learner-centered approaches for meeting the challenges of 21st century teachers (Brown, 2003)

With teacher educators, problems occur when teaching styles conflict with student learning styles, often resulting in limited learning or no learning (Brown, 2003)

Learner-centered classrooms place students at the center of classroom organization and respect their learning needs, strategies, and styles (Brown, 2003)

In learner-centered classrooms, students can be observed working individually or in pairs and small groups on distinct tasks and projects (Brown, 2003)

Learner-centered approach

An essential factor for a learner-centered approach is placing the learning characteristics of all learners under the microscope with specific emphasis on low-performing learners (Brown, 2003)

McCombs (1997) explained that the locus in a learner-centered approach is on individual learners' heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs.

Teacher-centered approach

The teacher-centered approach is associated chiefly with the transmission of knowledge. McDonald (2002) clarified the definition by saying that the work of teachers depends upon the abilities, skills and efforts of their students. Student achievement is at the forefront of teacher-centered curriculum, but teachers are driven to meet accountability standards and often sacrifice the needs of the students to ensure exposure to the standards. (Brown, 2003)

Teachers in a teacher-centered environment focus on making relationships with students that are anchored in intellectual explorations of selected materials. They focus more on content than on student processing. (Brown, 2003)

Semi conclusion:

Both approaches recognize the student as a key factor in improving student achievement. The teacher-centered approach places control for learning in the hands of the teacher. The teacher uses her expertise in content knowledge to help learners make connections. The effort to get to know the learner and how he processes information is secondary. The learner-centered approach, however, places more of the responsibility for knowing individual learner capabilities and creating an environment where learners can make learning connections. Similarly the onus for achieving is shifted to the student. Teachers provide a variety of instructional methods and techniques for helping learners construct their learning and develop a system for applying knowledge and theory.

Teaching-Centered Environments

Direct instruction is the predominant instructional practice used in the teacher-centered approach. Instructional schedules and urgency to comply with legislation do not allocate time for teachers to pose open-ended questions or to work on problem-based projects. Boyer (as cited in Perkins, 1993) reported that one percent of instructional time is devoted to questions that invite thoughtful responses. However, the expertise that teachers bring to the learning context cannot be underestimated. They see the big picture and have a command of the content. Traditionally, teachers decided what students would learn and how. Orchestration in traditional classrooms is limited because student interaction is basically responding to teacher-directed questions. Rarely do students construct their own learning; achievement is measured on objective tests. (Brown, 2003)

Learning-centered

Tomlinson (2000) adds that the differences in students are significant enough to make a major impact on what students need to learn, the pace at which they need to learn it, and the support they need from teachers and others to learn it. (Brown, 2003)

 With the learner-centered approach, teachers bring command of content knowledge but design flexibility for learners to construct their learning. Learner needs and characteristics take precedence over knowledge of facts and skills; the emphasis is on engaging learners in learning for understanding and thinking, to help them build their own interpretations. Teacher narratives and the emphasis on learner characteristics make the learner-centered approach a viable alternative for matching teaching practices with learner needs. (Brown, 2003)

Reflecive inquiry

In teacher-centered environments, reflection is manifested as limited discussion of content knowledge with a mentor or a small number of teachers. Thinking is basically the responsibility of the teacher; students memorize and recite information given by the teacher. McDonald (2002) explains that teachers make a crucial decision: they decide what they want their student to understand. Students' performances show lingering misunderstandings and a need for further coaxing. Assessment points out deficiencies but does not offer processes for application in other situations. (Brown, 2003)

Thinking-centered learning

The goal of a learner-centered approach is to get students focused on thinking about the content they are learning (Perkins, 1994). Orchestration in the learner-centered classroom reflects a variety of ways for learners to acquire content. Students construct their learning by working collaboratively in study groups to solve authentic problems and to critique, defend, or explore alternative points of view. Students are encouraged to make meaning by producing projects that become the basis for teaching others what they have learned. Although students are active learners, the teacher's expertise is still a powerful part of the learning equation. (Brown, 2003)

Controlling how instruction is provided distinguishes teacher-centered from the learner-centered approach. Content and methods are handed down to teachers in the teacher-centered approach. Teachers do not participate in the crafting or implementation of curriculum. Usually, they are given directions by people who are not involved in instructing children and who often never knew or have lost sight of the dynamics that diverse populations place on classroom practice. (Brown, 2003)

In both approaches, teachers provide background data and content, and pose questions that students can use to create meaning. However, the diversity of teaching methodology, assessing the quality of the programs and learning that is an integral part of the learner-centered approach are ignored in the teacher-centered approach. Similarly, students' characteristics become the data that teachers use to match learning. Conversely, in the learner-centered approach the curriculum, although often commercially developed, is endorsed by the faculty; they make decisions about what is appropriate for their learners and select strategies that will work for their learners. Developers of learner-centered curricula are committed to seeing that teachers help students achieve and that teachers are provided experiences to help them grow professionally. (Brown, 2003)

 To support a learner-centered approach, stakeholders must support the ideology. Issues of societal change, alternative pathways to teaching, and the historical context of educational practices cannot be automatic (Brown, 2003)

REFERENCES:

Anderson, T. (2006, June 8). PLEs versus LMS: are PLEs ready for prime time? http://terrya.edublogs.org/2006/01/09/ples-versus-LMS-are-ples-ready-for-prime-time/.

Attwell, G. (2007). Personal Learning Environments-the future of eLearning?.*Elearning papers*, *2*(1), 1-8.

Cross, J. (2007). Informal learning : rediscovering the natural pathways that inspire innovation and performance. San Francisco: Pfeiffer/Wiley.

Dabbagh, N., & Kitsantas, A. (2012). Personal Learning Environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. ***The Internet and higher education*,** *15*(1), 3-8.

Goodyear, P., & Retalis, S. (2010). *Technology-enhanced learning*. Sense Publishers.

Felder, R. M., & Silverman, L. K. (1988). Learning and teaching styles in engineering education. *Engineering education*, *78*(7), 674-681.

McLoughlin, C., & Lee, M. J. W. (2007). Listen and learn: A systematic review of the evidence that podcasting supports learning in higher education. In C. Montgomerie, & J. Seale (Eds.), Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications (pp. 1669–1677). Chesapeake, VA: AAC.

McGloughlin, C., & Lee, M. J. W. (2010). Personalised and self regulated learning in the Web 2.0 era: International exemplars of innovative pedagogy using social software. Australasian Journal of Educational Technology, 26(1), 28–43.

Martindale, T., & Dowdy, M. (2010). Personal learning environments. *Emerging technologies in distance education*, 177-193

Sclater, N. (2008). *Web 2.0, Personal learning environments, and the Future of Learning management systems* (Research Bulletin, Issue 13). Boulder, CO: EDUCAUSE Centerfor Applied Research.

Wastiau, P., Blamire, R., Kearney, C., Quittre, V., Van de Gaer, E., & Monseur, C. (2013). The use of ICT in education: a survey of schools in Europe. *European Journal of Education*, *48*(1), 11-27.

Wilson, S., Liber, O., Johnson, M., Beauvoir, P., Sharples, P., & Milligan, C. (2006). Personal learning environments: Challenging the Dominant Design of Educational Systems. In E. Tomadaki & P. Scott (Eds.), *Innovative Approaches for Learning and Knowledge* *Sharing, EC-TEL 2006* (pp. 173-182).