

DIVERSIFICATION OF LEARNING PLATFORMS

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CONTEXT AND OUTLINE OF THE PROBLEM

A learning platform is an integrated set of resources, tools, and interactive online services for teachers, learners, and others involved in education to support and enhance educational delivery and management (Wikipedia, 2011). The term 'learning platform' often refers to a number of tools and services available in a range of products known by various names, including learning management system (LMS), virtual learning environment (VLE), course management system (CMS) and learning content management system (LCMS) providing learning experiences and content management. The term 'learning platform' also includes the personal learning environment (PLE) that helps learners to keep control and manage their own learning by personalizing the content and process.

The functionality of a learning platform may vary and it depends on the needs of certain customers, and can be achieved by bringing together a range of features from different software solutions, either commercial product, open source, self-built or available as free web services. The combination of learning platforms and an assortment of additional learning tools may deliver learning via a cohesive user environment with a single entry point, through integration achieved by technical standards (Wikipedia, 2011). It is a goal of many educational organizations around the world to provide seamless learning experience through diverse learning platforms and tools via the Internet.

Over the last 10 years, in particular, the application of the Internet for the support of educational experiences has skyrocketed, and the initial formula of success has emerged in terms of the technologies required which include the following items (Rob Abel, 2007):

- Instructor-developed content, such as syllabi, notes, presentations, etc.
- Pre-packaged digital content, such as publisher produced digital assets
- Online assessments, tests, quizzes, etc.
- Online asynchronous discussion forums for student participation and collaboration
- Launch and exchange of information with separate learning applications and tools, such as assessment systems, adaptive tutors, wikis, etc.
- Authorization to access all of the above based on licensing scheme

This combination and diversification phenomenon, in terms of convergence, will be accelerated with the advent of a variety of mobile devices getting known collectively as Smart Media (e.g. iPhone, Android machine, Tablet PC, network computer, and (3D) Internet TV, etc.).

TYPES OF LEARNING PLATFORMS

In general, learning platforms can be classified as open source and commercial products with respect to software licensing. An **open source platform** is usually free from onerous licensing restrictions. It means that an open source platform can be used, copied, modified, and redistributed with few restrictions. Moodle, SAKAI and OLAT are good examples. Schools and institutions can use these learning platforms to deliver learning experiences, resources and tools without paying license fees and can also customize the software.

On the other hand, a **commercial platform** (based on restricted licensing) is sometimes touted as more secure and stable than open source software. Blackboard, Desire2Learn, and Pearson LearningStudio are representative examples. These commercial platforms may provide, however, open architecture and/or link with the third party software to extend its functionality (in the case of Blackboard it is called 'building blocks').

A learning platform can also be distinguished as a web-based or mobile platform according to its usage environment. A **web-based platform** means that all functions and resources are located on the web and delivered through a web browser. A PLE, in which the learner can compose and control the composition of widgets or software components, often called 'apps', is a kind of web-based platform.

A **mobile platform**, on the other hand, is simpler and has lightweight functions rather than a web-based platform, as devices such as a mobile phone or a tablet PC may not be able to replicate the same user experience. In addition, some of the resources or parts of content have to be saved in a mobile device because of potential disconnecting from the network due to the mobility of the users.

CHANGES IN LEARNING CONTENT

One of the main functions of a learning platform is to deliver content and resources as a part of managed teaching and learning activity. The changes in the types of learning content have, therefore, caused changes in learning platforms. The legacy learning content on the web was produced as a set of very simple web pages that were locked in learning platforms, that ultimately caused rise in the costs of development and conversion of learning content. To resolve the efficiency problem related to development and distribution of the content, many stakeholders including governments, institutions and companies have tried to set up interoperability standards. As a result, Sharable Content Object Reference Model (SCORM) was introduced by ADL, US Department of Defense initiative, about 10 years ago.

Whereas SCORM has been widely adopted in some communities, it has not been, however, adopted in the others, especially among publishers of educational materials for schools and universities or in the context of 'instructor-in-the-loop' educational scenarios. While it may seem like common sense and an obvious idea to have a standard format to describe online course materials, the fact is that it has taken the last decade to prove out a canonical model for a successful web-supported learning experience with an instructor in the loop. The interoperability points supported and captured in Common Cartridge are designed to enable and spread the success of this model, which involves a flexible combination of learning materials and activities complemented by asynchronous collaborative forums, assessment and other ancillary learning tools/applications (Rob Abel, 2007).

Major features of SCORM and Common Cartridge are:

SCORM

SCORM has been focused on rather granular learning objects, typically used in a self-paced computer-based learning paradigm. This type of instruction is characterized by a lone individual interacting with an automated programme accessed via a computer interface.

Common Cartridge

Common Cartridge is focused on addressing the full range of online learning content and applications that support a more comprehensive instructor-led learning experience. This type of instruction assumes social interaction in the course of learning with an instructor as a guide, interaction with other students and introduction of learning activities which may or may not be via a computer interface.

Even though standards are very important to manage and/or distribute learning content, coexistence of content format standards has been causing pressure to improve capabilities to take and to deliver diverse learning content on a certain learning platform.

DIVERSIFICATION OF LEARNING SOFTWARE AND RESOURCES

The last fifteen years have been marked by the proliferation of web-based applications of all kinds, which has led to much more distributed learning resources. In the same period, we witnessed expansion of various types of learning applications and platforms, including social networking services (SNS), wikis, blogs, user created content (UCC), personal communication devices, repositories, assessment systems, etc. While content interoperability is still important, the 'content' is more likely taken in the form of a key supporting role within learning activities and consists of resources from a variety of sources across multiple learning platforms and the wider Internet. However, to optimally use these new learning applications and platforms in order to support and enhance learning, access and outcomes must be coordinated through such learning platforms as a centralized learning management platform or PLE.

It implies that a learning platform can be connected to diverse and independent web-based applications, such as Web 2.0 tools (Facebook, Twitter, Flickr, Youtube, etc.), assessment tools, simulation tools and specialized tutoring tools in mathematics. It does not mean, however, that all the connections are provided by a single learning platform. Therefore, learning platforms need to have open architecture which can contain and/or be easily connected to web resources. That is why both commercially available and open source learning platforms have changed their architecture to be fully or partially open to extend their functionalities and to accommodate various forms of learning.

CHANGES IN ICT ENVIRONMENTS

Another factor to cause diversification among learning platforms is changes in ICT environment in terms of media and infrastructure. We need to focus on the appearance of Smart Media in particular, as new media accelerated the adoption of mobile platforms which, in turn, promoted convergence in content. For example, Disney's release of 'Toy Story' on iPad in 2010 introduced a new type of digital book called a motion book. This digital book comprises text, pictures, audio, video, and painting as user-interactions and mixes them in an application. Moreover, many users of Smart Media use SNS, online officeware such as Google docs, and check e-mail on their mobile devices. Particularly, users want to have continuous access to services, as they have multiple communication and computing devices at their disposal.

These examples mean that a mobile media platform can recognize and support many types of mobile devices, as well as legacy computing machines, and should keep user data and service seamlessly accessible in a cloud computing environment. Just as it is with a mobile media platform, a learning platform can serve as seamless delivery of content and resources across the devices. These changes are also described in detail in the IITE Policy Briefs "Cloud computing in education" (September, 2010) and "Mobile learning for quality education and social inclusion" (December, 2010).

OPEN ARCHITECTURE FOR LEARNING PLATFORMS

Due to the diversification of learning content and resources, learning platforms have changed their architecture to be able to interoperate with a diversity of web services and software components. Even though both commercial and open source learning platforms have different licensing policies, these platforms aim at sharing learning tools, e-textbooks and other web resources for a seamless learning experience. For instance, learning platforms use open APIs to connect with other services or components and IMS Global Learning Consortium – non-profit global learning technology standards consortium which has developed the ‘Learning Tools Interoperability’ (LTI) standard for the purpose. The Blackboard building block is another type of open API for the Blackboard LMS. Blackboard will also adopt the LTI standard, as Moodle and SAKAI have already done.

Open learning platforms can gather various functions and resources on the wider web due to their open architecture, and are capable to provide personalized learning interfaces through mash-ups. A lot of educational institutions are now considering lightweight learning platforms to satisfy changed pedagogical requirements and provide more efficient integration of school management functions in both desktop and mobile environments. Due to the increasingly open architecture of learning platforms, the demand for greater personalization and the availability of new web tools, the PLE debate started in which people radically re-conceptualized the notion of the learning environment (MacNeil and Kraan, 2010). Generally, a PLE is characterized by providing support for learners to (Wikipedia, 2011):

- Set their own learning goals
- Manage their learning, both content and process
- Communicate with others in the process of learning

The key part of the PLE debate revolves around the question whether PLE is a loose collection of tools and resources which learner gathers on his or her own device, or it is a personalizable interface to a composite system that is owned and provided by an institution. Composite systems that span the extremes of the entirely personal collection of tools on the one hand, and the classic monolithic LMS on the other, have also been called Distributed Virtual Learning Environments (DVLEs) (MacNeill and Kraan, 2010). More generally, the core competencies of a learning platform have been shifting from providing the widest range of built-in features to providing personalized learning interfaces easily. Again, this development has been caused by the diversification of learning resources and such types of devices as personal media.

BENEFITS OF INNOVATIVE LEARNING PLATFORMS

In the past, learning platforms were focused on simple delivery of legacy content as well as on managing class activities, such as assignments, discussion forums and bulletin boards. Current learning platforms, however, use distributed learning resources and tools as competitive advantages in which teachers and learners can compose and control their learning activities with diverse learning devices in the unrestricted physical environment. Benefits from adopting innovative learning platforms comprise:

- Improvement of organizational learning in using ICT skills

A learning platform can easier provide creation, aggregation and exchange of information among teachers, learners, administrators and parents. For instance, some teachers might want to share their teaching and learning outcomes through their learning platforms with colleagues and parents. The latter could be notified of a sharing event and provide feedback via their own devices. This type of ICT and learning platforms integration is expected to promote the wider use of other kinds of information sharing, such as social connections, as well as teaching and learning activities among members of the organization.

- Expanding learning opportunities and participation at home

Learning platforms usually contain functions for both delivery of self-directed learning content and support for instructor-led learning activities. It implies that teachers and students can overcome time and place restrictions using digital content and learning platforms. In the case of the Republic of Korea, it has been made available on the national scale since 2007 through the development of e-learning service called 'The Cyber Home Learning System'. The Cyber Home Learning System is composed of LMS which is connected to other supportive systems, such as assessment system, subject based counselling system, cyber community, etc. Usually, learners themselves study on this learning platform, use self-testing or ask cyber-teachers for help on specific subject expertise. This scenario represents the expansion of learning at home, and it will be more easily distributed through diverse devices, such as smart phones, tablets and Internet TV. Furthermore, parents can assist their children in learning by coaching them with assignments, monitoring children's progress at school, ensuring school attendance and being deeply involved in day-to-day school activities.

- Increasing opportunities for a personalized learning environment

The effective usage of learning platforms provides a number of methods of encouraging and developing opportunities for learners' independent and personalized learning. Schools and teachers are increasingly expected to raise learner independence in young people. It is widely recognized, that there is no 'one-size-fits-all' curriculum, so learners need support for working at their own pace and in their own style while building shared skills, such as team work and collaboration. Crucially, independent learning can take place in school, as well as be extended to home activities (London Knowledge Lab, 2010). An innovative learning platform can be composed of distributed learning services and tools and can allow users to design their own interface on a learning platform.

- Enhancing accessibility for learners and learning resources

Accessibility can be understood in terms of resources and learners in the educational domain. The work on the standardization related to the accessibility was started in the IMS Global Learning Consortium in the late 1990s, and the international standard was issued by ISO in 2008. The idea of such an accessibility standard is to match the resource metadata with learners' preferences. For instance, resources can have metadata including pointers to alternative audio and text formats, while learners can declare their preferred media types. Then a learning platform analyzes both resource metadata and learners' preferences to deliver the appropriate resource type to a certain learner. This kind of accessibility is very helpful for learners with special needs. As the most important feature of innovative learning platforms is to support diverse devices and environments of teachers and learners, the accessibility issues have to be resolved on the learning platform side.

- Increasing opportunities for collaboration and interaction

Learning platforms can support collaboration and interaction between teachers and learners. The opportunities to collaborate and work on shared resources and ideas help learners and/or teachers to work together to solve the problems. Collaboration tools provided by learning platforms, such as discussion forums, wikis and social media can be combined with tools and services from the wider web and re-organized (mashed-up) in each class by a teacher depending on the intended learning outcome. Provision of an easy way to integrate diverse learning services and tools has become a core competence of a learning platform, and opportunities for collaboration and interaction between teachers and learners can be significantly increased through such easy connections to the third party service and tools.

GUIDE TO USING LEARNING PLATFORMS

Guide to learning

- Use technologies provided on a learning platform to improve digital literacy
- Use the whole learning platform with school activities such as lessons, assessments and discussions
- Improve collaboration and interaction within learning, and trace progress on the curriculum
- Use diverse devices to find the best personalized learning interface and improve effectiveness of learning

Guide to teaching

- Prepare interesting resources beyond those commonly used in class through providing access to additional content on the distributed learning platforms
- Save time for immediate feedback to learners' questions and ask on learning experience using multiple devices
- Revitalize curriculum and change teaching methods
- Spread context and activities beyond the class via a learning platform

Guide to managing

- Support effective learning in a variety of ways through providing a wider range of resources which can support individual learning needs
- Build open architecture for a learning platform to enable convenient connections with other distributed learning platforms, web services and the third party tools
- Connect a learning platform to school management system to carry out analysis of learning outcomes
- Adopt standards related to content and tools to gather resources automatically and at low cost

KEY CHALLENGES AND LIMITATIONS

Financial challenges

A learning platform normally needs to be built and maintained continuously. Therefore, decision makers have to elaborate a long-term strategy related to the maintenance of a learning platform, creation and aggregation of its content within their financial budgets. If a school has a very limited budget, it needs to consider application of open source platforms and the adoption of interoperability standards to connect to other web resources and tools. A school can try to find a partner in building such open source software.

Internal resistance

Schools and educational institutions face the challenge of internal resistance from their members unfamiliar with new ICT systems. On the other hand, recent students can lose interest in lessons of respected educators, as they prefer to use new ICT devices and services. To maintain teaching and learning progress, educational institutions should attempt to reach consensus on ICT application in order to reduce the gap between expectations and provision.

Competence challenges

Educators often lack competences required to deliver learning experience on web-based software systems. Nevertheless, they should be enabled to enhance their ICT competences in order to properly teach students to use ICT. Students also need to acquire ICT competences and be engaged in instructed and curriculum-based learning process.

Privacy and data security challenges

The security of data is one of the major issues related to using flexible and extensible learning platforms. Educational institutions may consider their data to be more secure if their learning platform is connected to other distributed web services and tools. It is necessary to minimize the transfer of private data, and if it is needed, it must be conducted according to the state law and institutional policy.

Standards challenges

Due to Web 2.0 technologies, hundreds of technologies and standards have been introduced over the last five years. The selection of the right set of interoperability points from a huge pool of standards has become an important issue. For flexible learning content, connection with distributed web services and tools, and convergence between e-textbook and learning services, learning technologists need now more than ever before make the standards more focused.

RECOMMENDATIONS AND CONCLUSIONS

Diversification of learning platforms has not been a controversial topic so far. Today we see many changes in media and ICT. For that reason, let us consider some major trends in the learning technology industry that may help the debate along. The analysis was based on the interviews with the representatives of the IMS Global Learning Consortium in 2007 and updated in 2011.

Integrated access to teaching and learning resources

This trend is being driven by three compelling needs: convenience, productivity and strategic inclusion of new learning tools. While it has often been noted that digital natives have no problem switching between different interfaces and applications, the real trend in education today is that convenience and productivity – that is time saving – is one of the most important potential added values from technology. Therefore, education provider's value can be greatly enhanced by providing integrated access to a variety of resources which fit seamlessly to the teaching and learning process.

Evolving form of collaborative learning

Online discussion forums have become a mainstay of instructor-led online courses or seminars. This is because of the ample evidence that they can be utilized in pedagogically successful ways making the level of interactivity higher than that of achievable in many classroom settings. The 'Web 2.0' phenomenon of social networking, blogging, video sites, wikis, texting, instant messaging and e-mailing allows educators to find out if this energy and collaboration can be harnessed towards instructional goals.

Convergence of digital publishing and learning content

The future of educational publishing, including textbooks, may evolve into online and/or digital environments which are the most effective for specific educational purposes. There is a compelling pressure to address the cost of textbooks while providing alternative approaches that fit the way departments, programmes and individual instructors create and deliver courses. Books and printed materials will not be replaced completely, but the production will be got optimized to help reduce costs to learners. In the case of the Republic of Korea, the Smart Education policy intends to replace legacy textbooks with digital textbooks hosted in a cloud computing environment by 2015.

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The Policy Brief reviews the functionalities of learning platforms and analyzes reasons to cause and accelerate diversification of learning platforms in terms of changes in learning content, variety of learning software, and transformation of ICT environment. Whereas in the past learning platforms used to be focused on simple delivery of content, current learning platforms utilize distributed learning resources and tools as competitive advantages in which teachers and learners can compose and control their learning activities on diverse learning devices in an unrestricted physical environment. The Policy Brief describes key challenges and limitations for adopting learning platforms, and recommends to consider changes in learning platforms and technologies as a continuous phenomenon.

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