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How to implement an e-learning system: Moodle

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1. Kick-off

From dozens of e-learning consulting assignments of which about ten had to do with implementations of Virtual Learning Environments in educational institutes, the author derived two fundamentally different approaches for implementing e-learning systems: bottom-up initiatives by teachers and top-down initiatives by management, each with its own strengths and weaknesses.

Educational innovation with information technology often starts as a bottom-up process initiated by some teachers, ICT professionals or even students. At some moment, institutional management gets involved. Innovation converts from a bottom-up into a top-down process orchestrated by management. When observing the implementation of e-learning systems we see the same patterns.

As a consequence, how to implement an e-learning system heavily depends on the stage of educational innovation at an institute: bottom-up or top-down. Both situations require their own approach and both will be dealt with during our presentation. Although our experiences are based on Moodle implementations, our lessons learned may be relevant for other e-learning systems as well.

2. Bottom-up

Although educational institutes vary greatly, individual teachers always have certain degrees of freedom. Even when formal procedures have to be followed for implementing new systems, they can be neglected when the investment costs are (or at least seem to be) about zero. This is the case when implementing a free and open source Virtual Learning Environment like Moodle. But even in the case of commercial systems, suppliers may be so eager to penetrate an institute for business that they are inclined to offer their services for free (for a limited time) to whoever lets them in.

When I was lecturing at a university of professional education without Virtual Learning Environment, one of my students constructed a website to distribute my materials. As I found it a bit messy, I replaced it with my own site, one year later. The third year, I wanted more interaction on my site. That's why I downloaded Moodle for free. I uploaded it to a website I hired personally from a cheap provider. Then, I could facilitate my part-time students not only by distributing handouts and other materials, but also by offering them a forum for regulated contact with me, and, as they discovered soon, with their fellow-students. To stimulate their continuous learning, I gave them weekly assignments to be submitted and graded through the system. This all worked great (initially).

My personal history is not different from the experiences of many colleagues at other institutes and even at Human Resource Departments of commercial firms. The fact that systems like Moodle are free, that a provider is cheap (eventually you pay it yourself) and that installation on a server is straightforward, has given us the opportunity to acquire and implement a Virtual Learning

Environment within hours. As your own system administrator, you could realise great benefits at minimal costs and create a great learning opportunity (at least for yourself).

When my provider, without prior notice, decided to move my VLE to another server, performance went down with about 90%. When I went temporarily to a third world country where Internet bandwidth was less than 1% of what I used in The Netherlands, I could hardly access my own VLE at home any more. Grading my weekly assignments was no longer possible. Students started complaining to the management and it became clear I had bitten off more than I could chew.

My personal experiences show in a nutshell the strengths and weaknesses of the bottom-up approach. Realising quick and cheap solutions and being able to learn a lot from them are unmistakably strengths. Crossing the border of an experimental playground and offering professional services while not being able to run them adequately are evident weaknesses. In fact implementing a Virtual Learning Environment requires expertise in the fields of management, education/training and ICTs. A motivated teacher can show the way, but not complete the whole expedition alone.

The same is true for an ambitious ICT department, also often an initiator of bottom-up innovation. In one case they installed the software and created more-or-less empty courses for all their institute's courses. The whole was standardised and good looking. They failed, however, to involve the teaching staff in this process. When some teachers got interested, they were not very welcome, as they had their own ideas on how to use the system. In another case, the ICT department installed the software on their own initiative and thought that was all they needed to do. After a year they complained that teaching staff was not interested in their new stuff.

In general we would recommend to the bottom-up initiators to be aware of their limitations, to learn from others and to communicate about their successes and failures. Their managers should welcome these innovative initiatives, stress their experimental character, support them where possible and organise the dissemination of positive and/or negative experiences throughout the organisation.

3. The matrix

In four different countries we could organise workshops for teachers, ICT professionals and management/staff from institutes that all were in their bottom-up stage of innovation. During these workshops our participants contributed a wide range of issues that had to be solved when implementing a Virtual Learning Environment. They classified these issues as educational, technical or content/data related. Some were operational in nature, others tactical or even strategical. This resulted in a 3x3 System Management Matrix (see Figure-1).

	Functional	Content / Data	Technical
Strategical	decide on educational innovation (many aspects a.o. instructional design, policy for synchronous / asynchronous activities, norms for course development and course delivery, class size, student / teacher ratio)	decide on curricula	decide on norms for technical operations (acceptable risks, required performance, acceptable course size, maximum upload size, etc.)
	decide on use of VLE	decide on standards and recommendations for development of online courses	decide on supporting software (which webserver, which database, which operating system?)
	decide on VLE functions (course components needed plus generic supportive functions like chat, e-mail, e-groups)	decide on development of online courses (which courses? completely online or partially?, make or buy?)	decide on technical infrastructure (server, network, and clients, a.o. availability of computer + Internet connection for students)
	decide on ICT needs (functions, user interface)	decide on standards and recommendations for online course delivery (a.o. adaptation of exams regulations)	decide on enterprise application integration
	select and acquire/build VLE, decide on updates, functional changes, functional tuning	decide on remuneration for course development and course delivery	
	decide on implementation strategy (big bang, shadow processing, function by function, faculty by faculty, pilots, volunteers first)	decide on copy right policy for incoming and outgoing course materials (a.o. intellectual property of course developers)	decide on accounting model
	decide on name and address of the VLE site		decide on updates, technical changes, technical tuning
	decide on user registration policy (a.o. guest access allowed? Google access allowed?)		
	decide on fair use policy		decide on outsourcing or not
	evaluate the effects of above mentioned decisions, make projections, decide on changes or updates	evaluate the effects of above mentioned decisions, make projections, decide on changes or updates	evaluate the effects of above mentioned decisions, make projections, decide on changes or updates
	decide on allocation of responsibilities and authorisations, auditing, evaluation	decide on allocation of responsibilities and authorisations, auditing, evaluation	decide on allocation of responsibilities and authorisations, auditing, evaluation
Tactical	planning, organising and evaluating support (see below), advise on future strategic decisions	planning, organising and evaluating course development, storage, maintenance and delivery (see below), advise on future strategic decisions	planning, organising and evaluating technical operations (security, faults, accounting, configuration, performance), advise on future strategic decisions
	organising user role allocation (course creator, teacher, tutor, administrative staff, enrolled student)		organise user registration (link to student administration system, e-mail authentication, etc.)
Operational	support course developers (training, manuals, helpdesk, advise)	develop course materials and courses	support users (training, manuals, help desk, advise)
	support course deliverers (tutors, administrative staff) (training, manuals, help desk, advise)	deliver courses (tutor, administrative staff)	apply security measures, monitor security, backup / restore system
	support students (training, manuals, help desk, advise)	follow course, learn	install software/ updates, tune system, keep up and running, monitor performance, apply quota, collect use statistics

Figure 1 - System Management Matrix

At later occasions the matrix turned out to be a valuable frame of reference to discuss relevant issues from management, educational and technological perspective. It helped to give all upcoming issues a place in a greater context, to discuss the allocation of responsibilities, to evaluate them and to make improvement plans and define improvement projects for the coming years.

4. Turning point

Only the complexity of our matrix illustrates that the bottom-up approach has its shortcomings. It is simply too much for an individual to cover this all. Sooner or later, a turning point is reached. For positive or negative reasons management gets involved. A positive reason might be that thanks to pilots and experiments and the dissemination of their results, management starts to develop a vision on educational innovation and more specifically a vision on the potential of a certain e-learning system. A negative reason might be that students start complaining about malfunctioning systems, losing assignments, grading failing to occur, teachers not responding anymore, and in general being confused by the patchwork of online solutions invented by different teachers. Time for management to take their position, indicate the desired development trajectory, and align procedures and allocate budgets to accomplish that.

5. Top-down

When implementing an e-learning system in a top-down way, the critical success factors are the sustained commitment of management and the involvement of stakeholders like teachers and students in the process. Expertise in the fields of education, technology and management is required. The average educational institute will not have their rules, regulations, standards and procedures for this type of operations. As far as methods and tools can be found in literature, they are either too fragmented (e.g. only dealing with ICT) or too abstract (e.g. introducing too many new concepts that have no meaning for the stakeholders).

The implementation process cannot be handled as a regular management task. It requires a project organisation with educational, technological and organisational expertise and representatives of the most relevant stakeholders. For this group we developed a dedicated management game, Tactec.

6. Tactec

The management game Tactec initially was developed to explore the complex process of implementing electronic commerce. In its essence, however, it is a frame game that can be loaded with a different content. We use it as an exercise by which groups can develop a global implementation plan for an e-learning system, not a fictitious one, but their own. The game or exercise takes half a day and consists of the following steps:

- Stakeholder inventory - During a Tactec session the participants first generate a long list of stakeholders involved in the process. Once they come to about 25 stakeholders, they are asked to reduce this number to the seven most significant ones. This usually results in a very interesting discussion where a common base of concepts is created and people agree on what is important or not. We focus further on the seven stakeholders.
- Role allocation - The participants will be allocated to seven different roles. Each role takes care of one of the stakeholders. They have to guarantee that the stakeholders' perspective is recognised. Note that they are not "playing" the stakeholder.
- Current situation - Each role summarises the current situation from its stakeholder's perspective. This results in seven short descriptions (a few keywords is enough). The group will review them

for completeness and consistency. Results are written on coloured stickers and stuck to the game board (a large poster).

- **Desired situation** - The previous step is repeated for the desired situation; i.e. the desired outcome of the implementation process from the perspective of the stakeholder.
- **Scenario** - Next, the roles will formulate a plausible way to go from the current situation to the desired situation in a sequence of about four activities. This will result in seven scenarios stuck to the game board (see Figure 2). Again the group will review them for internal horizontal consistency.
- **Cross-check** - Finally, the group will cross-check the whole for consistency and completeness. Maybe activities on one line have to be postponed until certain activities on another line have been completed, i.e. vertical consistency.

#	Role	Initial State	Period-1 S1	Period-2 S2	Period-3 S3	Period-4 S4	Period-5 S5	Period-6 S6	Final State
1	government	BRAIN DRAIN - LOW DEVELOPMENT	PARADIGMS COMPARENS	INVESTMENT	WIDESPREAD TRAINING	PARTICIPATION			IMPROVED RESOURCE BASE
2	university council	Access - Financial Resources, Distance, and...	Policy	Investment	Support	Evaluation Assessment			Quality Assurance Standards - Greater Contribution to National Quality Assurance
3	faculty	Development - Lack of Resources - Lack of Knowledge of the Distance Education Tools/Products	Acquiring the Funds and Resources	Training the Staff and Helping Staff to continue with the system	Ensuring the Quality of the Course Content	Establishing a Committee (to deal with issues) - monitor the course (improve quality)			Quality Assurance - Staff Training - Acquiring the Resources - Setup a special committee to deal with issues in a timely manner
4	Students	Access to support facilities - Lack of support facilities - absence of a single system - poor info literacy	Survey shall be brought - Survey of Competence Requirements	Implement a distance training program - acquire funding	Implement training program - develop systems	Continuity Maintenance of training program - implement quality assurance			Life Update Studies - automated CS system - of our domain
5	ict	Full of potential CHALLENGING	Importance of resources to be offered by Distance Schools	Human support capability	System for Distance Education	Resources and system implementation - lesson - software - maintenance			QA & Accessibility REGIONAL COLLABORATION
6	distance educ. centres	Staff Faculty Resources Salaries	Develop Training Programs	Investment IN IT Resources	Provide Better Student Facilities	Raise Tuition Fees			Available Resources Facilitates Better Reimbursement
7	RoW	Access to Online Courses	Expanding Existing Facilities	Expanding to Partner Areas	Attending To Special Needs	Participating in Projects			Participating in More International Integration

Figure 2 - Impression of a TacTec game board

7. Conclusion

There is nothing wrong with the bottom-up approach. It is a fact of life that in many organisations innovation starts this way. If it is too early to move to a top-down approach management would be wise to foster the bottom-up approach while trying to avoid its pitfalls: tolerate and even stimulate experiments, encourage the exchange of experiences throughout your organisation, offer support and knowledge from an organisational, educational and technical point of view, but let them not convert into business processes.

The main pitfall of the top-down approach is that vision and commitment of management are limited to the first concrete steps. It leaves the organisation confused about what is next. Once again it turns out that participation of the stakeholders is a critical success factor in an implementation process.

8. More information

- Moodle is a free and open source e-learning system that combines an authoring environment with a Learning Management System and a Virtual Learning Environment. For more information:
 - Moodle international community at <http://moodle.org>

- Using Moodle; teaching with the popular open source course management system; 2nd edition; Jason Cole and Helen Foster; O'Reilly Community Press, 2007
- Moodle Administration; an administrator's guide to configuring, securing, customizing, and extending Moodle; Alex Büchner; PACKT Publishing, 2008.
- The TacTec Game; The Tactics of Electronic Commerce; Pieter van der Hijden; in: Proceedings of the ISAGA 2000 Conference; International Simulation and Gaming Association, Tartu, Estonia, 2001; http://www.sofos.nl/LinkedDocuments/00pvdh_tactec.pdf.
- Ned-Moove (www.ned-moove.nl) stands for Nederlandstalige Moodle Vereniging, the Dutch Moodle Association with members and activities in The Netherlands, Belgium/Flandres and Suriname (South America).

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