ONLINE LEARNING PLATFORMS AND E-GOVERNMENT

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Abstract: *E-Learning with a topic of E-Government is very new and still rare. One of the reasons for this are special circumstances by which it differs from "conventional" E-Learning in the scope of universities, like an emphasis on learning on demand, wide geographic distribution of participants and very frequent change of contents. These differences are identified and the proposed solution, using online learning platforms, is discussed and compared to alternatives. An example of such a platform is presented briefly at the end.*

Keywords: *E-Government, Online learning platform, E-Learning, Agents*

1. Introduction

E-Government faces many problems, one of which is lacking awareness and education in its use. To be useful for e. g. both companies/citizens and administration (in the case of E-Administration) or affected parties (in the case of E-Courts), a minimum number of users is required. While most prospective users already know how to use their own computer and perhaps also their internal electronic communication system (mostly E-Mail), they do not know about important elements of E-Government like electronic signatures, servers for official serving, special software for record handling and workflow, etc.

Therefore a great need for education, especially for people already employed in companies or in administration itself, is needed. At the same time students at universities should be educated in this area. Programs for the latter have already started[1], but they are not always suited for enrolling learners from the first group too. Similarly, other issues exist where E-Government differs from "ordinary" E-Learning like virtual courses at universities or courses supplemented by electronic material. These differences should be reflected in systems used for teaching to achieve best results and highest user acceptance.

An example for such a system is the online learning platform called WeLearn (Web Environment for Learning, [WeLearn]). It enables learners to learn both on- and offline. It is handled in an easy-to-understand way. In the future it will also include agents to reduce work for both coaches and learners; an especially important part for teaching E-Government.

2. Special E-Learning issues of E-Government

E-Learning can of course be used also in the area of E-Government. However, several issues are very different in this area than e. g. at the university or other more permanent institutions of learning. These differences must be reflected in the design of both systems as well as materials used for teaching this topic.

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[1] Usually programs on legal informatics (master studies) with the main view on E-Commerce, but also containing parts on E-Government; see [LI Masters]

2.1. Target groups

Teaching at institutions for which this is their main task (universities, schools, …) is rather homogeneous. The target group is predefined and all participants can be expected to be of roughly the same level of knowledge. In the area of E-Government it is not that easy: There are several topic areas which are similar for all students (e. g. electronic delivery), but also many specialised subparts (e. g. different content areas; technical, legal or organisational aspects; …). The groups of participants also differ fundamentally:

- Persons working in companies and needing E-Government for cooperation with administration. They are solely interested in their special area and the (to them probably unknown) prerequisites for it. Education should be done accompanying the work, in the form of continuous education, and mainly on demand.
- Some persons of the general public might also be interested in a subset of the courses to also be able to use electronic communication and other elements of E-Government concerning citizens. They will participate only in very short courses on certain topics they will (probably) need in the near future. Coaching will be reduced to a minimum for this group.

The same platform should be used for education at universities or special schools. This ensures a smooth transition from focused learning to continuous learning later. Through this also content is kept up to date and students are introduced to real-life systems early.

A unified method of teaching or a single portal for all groups is desirable because of economies of scale and the risk of inconsistencies[2]. Administration must however be easy and quick, similar as customising which material is accessible to each group, to reduce costs.

2.2. Electronic platform necessary

All kinds of E-Government require using computers. It therefore would seem strange to teach it without using them at all. Similarly, an important part for most sub-areas is electronic communication, the use of which should therefore also be trained in education. This has important consequences: Learners can at least partly use the production systems (or very similar ones; see the part on agents later), resulting in actual and useful practice by learning through doing. But they can also access more material like online law repositories (which are rather expensive on paper and frequently outdated), their current tasks (for investigating how to apply the new methods to their daily work) or communicate with their teachers/coaches as well as other learners. The necessary equipment would otherwise be a problem, but here companies (or administration itself) wanting their employees to learn about E-Government will have to provide the hardware and access in any case[3].

2.3. Online connection

Different from other areas it is very important in legal studies to discuss ideas and results, as the exact reasons for a decision are often more difficult and important than the actual result. When teaching E-Government we must therefore also cater to this need. This can be either done through physical meetings or electronic means (telephone is probably not ideally suited). Sharing documents to synchronously communicate about is also very important here. Within the area of electronic means it must be distinguished between synchronous (e. g. chat), asyn-

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[2] The frequent changes of the content in case of E-Government require updating the content as well as its structure very often.

[3] No special hardware is needed and an Internet connection of reasonable speed should be sufficient. All of these will be already in place if a company thinks about E-Government.

chronous (e. g. E-Mail) communication. On the software side however this might lead to problems, as specialised tools (e. g. voice chat concerning a shared document) require installing additional software, and partly other changes. Ideally communication should require no additional software or configuration (e. g. similar to webbrowsers) and be easy to use, so learners can focus on employing the tools for the work instead of learning how to use them.

Another advantage of at least intermittent online connections is that the course material can easily (and especially automatically) be updated, which is an important aspect because of fast development and frequent changes in this area.

2.4. Geographic distribution

Another difference to more conventional learning is the wide geographic distribution of participants. At a university students are always available locally and personal meetings can easily supplement virtual courses. In E-Government participants will probably be dispersed rather uniformly across the whole country, requiring accessibility through many different forms, including low-bandwidth connections. Although participants are widely distributed, in sum the total number of participants can be much larger than for any university course. E. g. if one or two persons of each company (probably the main targets for the successful introduction of E-Government on a wider basis) takes part only in an introductory course and participates only occasionally, still many thousands of learners must be accommodated.

This geographic distribution is also one reason for the need for using E-Learning, as most of these companies (which are rather small) will not be able or willing to send their employees to a presence course, because of costs and work time lost (especially for SME's).

2.5. No set curriculum

Because of many individual needs, a set curriculum will often not be desirable for teaching E-Government. Especially companies and administration might often opt only for a small introduction and a score of individual small parts for learning. This requires a highly structured environment, where small parts are accessible and can be used independently, but are still integrated into longer courses. This ties in with the next topic of modularization, which makes this "free curriculum" possible. Also connected with this is automatic creation of curriculum (see also chapter on integration of agents below).

2.6. Modularization of content

Teaching technical content usually results in a very homogeneous course in the sense that a complete "book" or "online content" is written, which then remains unchanged (excluding corrections and extensions) for a longer time. This is because the actual content is rather static and only few parts become so obsolete to be removed. Even in computer science in basic and intermediate courses this is the case. E-Government on the other hand is highly dynamic from the start on. Even basic rules of procedure for this area or material law change frequently and with far-reaching consequences, especially in the area of E-Government[4]. As electronic content can be much more easily reorganised (and parts of it removed or exchanged) it is better suited than offline teaching material. Also, electronic content lends itself better to a multitude of schemes of organisation: Content can be at the same time presented according to learning phases, sources of law, complexity, areas of application, etc., allowing reuse for different target groups. So while modularization of content and enhancing it with metadata is good for other content, it is absolutely essential in the case of E-Government.

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[4] E. g. rules for official delivery, signature requirements, or acceptable document formats.

3. Comparisons

Online learning platforms possess several differences to more conventional methods of distance teaching or learning. We will therefore take a look at the specific advantages and disadvantages in the light of applying them to E-Government and compare them to alternatives.

3.1. Advantages of online learning platforms

A specific advantage of an online learning platform for E-Government is, that the way of learning is also one of the goals: Using electronic communication for work. In this way learners not accustomed to this, both in ways of software and methods/customs (e. g. netiquette), can get real practice in a safe environment where mistakes are less of a problem.

Another advantage is the enhancement of learning through communication. Experience showed, that e. g. partitioning students in two groups and "playing" them against each other (one group must find questions for the others to answer, later the roles are reversed) improves results ("distributed co-operative learning"; [Jechle 2002]). Communication between learners (resulting in a multidirectional pattern instead of a single direction from a lecturer to the learners; see [Tella 1998]) also reduces the work for coaches a bit. Easier questions are answered by more advanced learners, bringing benefit to both the asking (by the answer) and the answering (repeating and explaining the knowledge helps internalising it) person.

If a learning platform also supports online communication, additional methods of teaching are then accessible: Not only asynchronous but also synchronous methods can be used. This allows the teacher selecting those methods he/she deems appropriate for this special topic, and similarly opens up to the learners chances for developing and pursuing their own personal preferences.

Online learning platforms not only allow learning on demand and learning in small timeslots, but also continuous education. If the course is over, difficult parts or additional areas can be looked at again. Additionally, if the content is enlarged, it becomes available immediately to all without problems. So even if initially a presence course is chosen, an online learning platform allows coaching the learners after leaving the course. This also can be used as a very small and first approach to knowledge management (KM): The expertise is made explicit and gathered in a single store. Comments of each person on the content are kept and available to the author at any time. If powerful search methods and anonymisation were introduced, they could also serve as a knowledge repository for all employees.

A rather practical reason is the ease of change of course material and information: Teachers and coaches are also not bound to a single location but can be geographically and organisationally distributed.

3.2. Disadvantages of online learning platforms

At least a potential problem of such platforms is, that the initial effort required for producing material is much higher than for offline material. A simple textbook requires least effort, multimedia content needs more, but if communication shall also be included, the necessary work is most. This can be partially (for the content; communication is still very product specific because of a lack of standardisation; this is a rather new area for online courses) balanced by the durability. Changing the content, adapting it to other systems or reusing it (only possible if modularised!) is much easier if it is available electronically.

Even if work for teachers is reduced through communication (see above) and some parts can be done autonomously (see integration of agents below) and the part of teachers is less important than that of the material ([Dittler 2002]), continuous education still requires con-

tinuous supervision, guidance and administration of the system even after the course is finished. Either this is done by appointed persons (additional costs), or through a community. The last is probably more desirable, but not an easy thing to achieve.

A kind of bootstrapping problem is, that initial teaching is required to familiarise learners both with computers generally and the platform used specifically. Therefore a basic understanding of computers is required (often already existing when teaching E-Government) or must be taught in a different way (e. g. in a presence course). Learning to use the platform itself can be done within the platform: Gradually enlarging both the accessible areas and virtual guides (perhaps in the form of agents).

Another issue is, that an online platform is complicated and consists of many parts, e. g. the network connection. It is therefore more prone to problems and difficulties than standalone courses (like on a CD-ROM). As participants are probably not experts, this must be especially taken care of through design and testing and perhaps also a help-hotline.

3.3. Alternatives

Three main alternatives to online learning platforms exist for teaching E-Government: Conventional learning using paper or CD-ROMS (self-directed), presence courses, or offline learning platforms.

3.3.1. Conventional Learning (Paper/CD-ROM)

Creating paper material for teaching is much more complicated when considering E-Government. Electronic communication is hard to describe, but much easier to show or experience. Therefore at least CD-ROMs must be used for teaching. The biggest advantage compared to online learning platforms is, that many people are already accustomed to them: CD-ROMs might be multimedia, but this is often still similar to a book in the sense of mostly linear navigation through the content. Compared to this, platforms usually employ hierarchical or network models for the presentation of their content. An online platform can on the other hand easily remember the path taken, time spent, and, if tests are included, identify the areas needing revisiting. The backside is that unless CDs are used the content is restricted: videos and audio files often take too long to download. As these serve only a comparatively smaller role in E-Government, this is not a serious problem.

Also, experiences of other learners can be integrated: An example is tracing the “footsteps” of the learners, identifying common ways (or e. g. backward steps for looking up something) through the material. These can be provided then as examples and hints to all users, through this generating a new way of navigation based on practical evaluation and without human intervention.

3.3.2. Presence Courses or live E-Learning

In the area of E-Government companies will very often only use learning on demand: If a certain type of interaction with administration is needed or new employees require initial education, some kind of “course” will be used. In this way, rather short, rare and randomly distributed periods of learning will take place, which does not go well with a conventional course organisation, which is a longer block and requires predefined times of attendance. The geographic distribution is of importance too, as either long travels are needed, or many different locations for courses must be used. In the case of live E-Learning ([Schweizer 2002]) all participants must agree on time and topic (difficult for large and unorganised groups). This also results in an extensive infrastructure (special course rooms equipped with computers or specialised software needed). Another problem is scaling: Presence courses either require rather

small groups or are reduced to a lecture, which is not appropriate for learning to employ certain tools or methods. Therefore the ratio of learners per teachers is rather low, compared to online platforms, where a single person can coach many more students at the same time. Additionally, presence courses are over when their allotted time expires: no further advice is possible. Online learning platforms do not necessarily possess such sharp distinctions: Even if the course is over, students can still participate in discussions and perhaps ask some questions. This lower ratio is very important, as such teachers are currently scarce and have yet to be trained in a larger number. Employing the few experts for creating material used by a large number of learners instead of personal teaching therefore could accelerate adoption and spread of E-Government.

3.3.3. Offline Learning Platforms

Compared to online platforms, offline ones do not allow synchronous or co-operative learning: Each learner is on his own and can communicate only with the teacher (if at all; or only at set times; long response times; etc.). This is a good choice for persons on the move or for learning at home. It also reduces costs for communication connections. Another issue here is the high amount of self-direction and motivation required ([Sonntag 1999]). The personal motivation must be high to start lessons and conclude them, while in online platforms at least some milestones are set and incentives through guidance and feedback are offered.

A good choice is therefore combining offline and online platforms, so both modes are available: Non-interactive learning (e. g. reading materials) should be possible offline, while interactive learning like discussions or presentations can be done in the same way and the same environment online. This also allows quick changes of the mode: When a special problem is encountered, an online connection is established. If a coach is available, the problem can be immediately discussed or (if the system provides for this) the solution shown to the learner in an interactive way (remote control of the users computer).

3.4. Existing Products

Neither for rather popular products like WebCT [WebCT] or Blackboard [Blackboard] currently any E-Government courses are available[5]. However, both are online learning platforms and courses of this type could be introduced if material is created. This lack could also be seen as a hint that they are not perfectly suited for these topics, underlining the differences and special requirements of E-Government as a topic area.

Learning platforms such as these are currently passive, meaning they offer information and allow students and teachers to interact with it in many different ways, but do not usually initiate autonomous action. On the one hand, this adheres to the philosophy of the WWW where web servers just provide a webpage upon request but are otherwise passive. On the other hand, this is an advantage for the learning process neither in general[6] nor in particular[7]. With the high distribution of participants and the fragmented timescale (usually no common time for synchronous communication set in advance; more an ad-hoc style), this is a disadvantage.

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[5] Also in general portals for distance education like www.dlcoursefinder.com or www.distance-educator.com no courses on E-Government could be found.

[6] See e. g. principle 10 in [Ceri et al. 1999]: “Event-based reactive processing could be supported” (a rule that should be implemented in all data-intensive websites)

[7] Additional delays are introduced (e. g. until a further check is made) and important messages (new /changed materials, announcements, …) are disseminated only slowly.

4. Problems when courses go online

When a course goes online in the sense of being held employing an online platform, several problems may arise. The first problem compared to a presence course is that people can very easily drop out quietly. They just don't communicate any more or rarely visit the online site. In the scope of E-Government this is a smaller problem as most persons are required to complete the courses for their work. However, it is important to distinguish whether learners just do not participate actively, but are still learning passively, e. g. by reading the posts but not posting themselves ("Workers" vs. "Lurkers"; [Taylor 2002]). The second type of learners can achieve the same results (see the empirical study), but must be catered for in a different form. This can be done e. g. by navigational aids, while coaches help the more active group.

A much more important issue is that discussions are rather easy to keep going, but difficult to initiate. E-Government is partly no problem with regards to actual problems someone asks (but finding persons answering), and partly a large problem regarding general discussions on an issue. The last is difficult as these courses are visited only rarely (learning on demand) and from often changing persons, making it hard to build a community. Therefore special incentives (or employees) are needed to initiate, look after and participate in discussions or created more organised courses where discussion is a vital part.

Related to discussions we experienced that a few misbehaving persons can easily spoil any discussion. This also ties in with the next issue, the liability of the provider for the content. According to a recent German court decision ([LG Trier]) the owner of a website is liable for entries in his guestbook. This probably also applies to discussion groups in such learning systems. However, this decision is a bit at difference with the E-Commerce directive ([ECD] Art. 15), where hosting providers liability is limited. Especially no general obligation for monitoring is allowed[8]. A system for occasional checking the posts and removing them on receipt of complaints must be introduced.

In the special situation of E-Government another issue is also very important: Discussions are no reliable source of information as quality assurance is missing. Posts might be correct and helpful, but they can also be (intentionally, accidentally or unknowingly) wrong. As this can have very important consequences if applied to actual problems, the providers of the platform, the course, administrators and other participants should be secured against dangers of repercussions and liability or no discussions will take place at all.

Most E-Government courses will not end with a formal test (and participants might wish to remain anonymous), so several changes from "ordinary" courses are necessary: Features for anonymisation should be included, so seemingly (for the asking or other participants) stupid questions will also be asked without hesitation. Logging the users actions is not needed for assessment, which itself should therefore change to being only a help for the learner and without grading. This probably results in lots of small tests after each unit[9].

If, on the other hand, a final mark is needed, success can also be measured in different ways using online platforms. Statistics like the number of questions/answers can be introduced (but note the "lurkers" mentioned above!) as well as ratings of others of these posts. Both work only within a lively community, however. As they are online, tests can include active parts resembling actual work where not only the result but also the way for reaching it is assessed (see the chapter on agents for an example: agents posing as citizens).

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[8] Differences could stem from the German law being not (or rather not yet) fully compliant.

[9] No complicated measures against cheating; correct answers and links to the appropriate page available immediately (not only at the end after finishing the test); no need for grades, instead identification of problematic areas; proposing a plan for filling the gaps; …

The last issue to mention here is retaining an account on the system, which is independent whether the course must be paid for or not. If a person changes employer, will she still be able to access her materials, even though they were created in work time (therefore "owned" by the employer) and might contain information on her work for him? Or should she change to a new and "fresh" account, loosing learning history, preferences and personal comments?

5. The WeLearn Platform

The WeLearn platform for online distributed learning in the Internet was developed at this institute, based on experience with previous courses held solely using the internet ([Aiken et al. 1998a], [Aiken et al. 1998b], [LVAs]). It has already been used for several courses at the university as well as in other schools (BRG Wagrain, HBLA Steyr) and for a summer school for training teachers of computer science at high schools ([Mühlbacher et al. 2002]). WeLearn is a free and open learning platform for universal use and can therefore also be employed for the topic of E-Government, both in organised courses and in self-directed individual learning. One main aspect is making the platform intuitively usable and enabling interaction between students and coaches in a variety of ways. So not only is 1:1 communication (like E-Mail) is possible, but also forums (similar to newsgroups) have been implemented. WeLearn also encompasses administration of courses, presentation of learning materials, communication and interaction support between students and/or with teachers, as well as self-assessment.

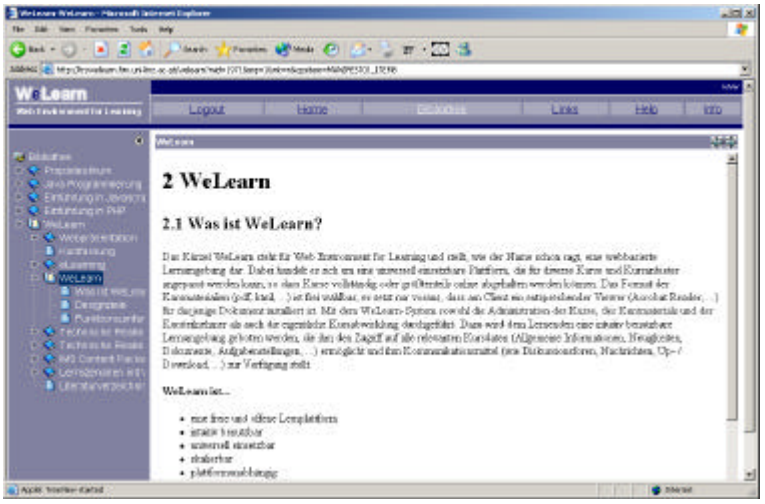

Figure 1: The WeLearn system (course view)

The four main parts of the system (see figure 1; top) are the users home folder, the library containing course materials, discussion forums (see figure 2) and a link collection. Material itself is not defined by the system and can be webpages or documents in any format a viewer is available for. It is included in the system through its description in the content packaging specification ([CPS]) of the IMS Global Learning Consortium.

Figure 2: Forum and message view

An offline viewer for the material is also available, which has been used for distributing several courses to students on CD-ROMs. It allows different methods of navigation (DHTML, Java applet, or pure HTML) to be usable on any platform and browser at least in some way.

6. Advantages of integrating agents to OLPs

Not included in the current version of WeLearn, but in development for the next one is the integration of autonomous agents. Especially in the case of E-Government, where regular attendance (see above) cannot be guaranteed, active elements like notifications (obviating the need to check the system regularly) and personalization (focusing on the important elements) are of special importance[10].

In the next version the WeLearn system is to be extended so newsgroups, libraries, link lists etc. are accessible to agents. These will be able to monitor events (adding, changing, removing messages and content, etc.) there in order to notify the coaches concerned and/or the learners affected by or possibly interested in them. Employing agents allows using larger rule sets and more diverse actions compared to doing it directly within the system: users can define or configure rules by themselves and old parts can be easily replaced or new ones introduced. This can especially be seen in the sense of "ubiquity" as described in [Jennings/Wooldridge 1998]: autonomy through non-exact determination of parameters (the agent decides for itself which messages are passed on at which time: setting priorities), proactivity (e. g. combined passing on of messages and regular checks), reaction (responsiveness) by automatic adaptation to new hierarchies (e. g. new learners, groups, or newsgroups; comparison with the past configuration as a suggestion for new elements), as well as the capability to adapt to the user by observing his actions.

On the practical side, the following elements will be included:

- Simulating contact with citizens: Both agents and citizens (at least usually) are non-experts in the topics when contacting administration. Agents can therefore pose as citizens visiting administration with certain requests. If the agent does not quite get the meaning of the answer of the learner (a result of the its limited intelligence) or does not formulate its issues quite exactly, this is similar to citizens. As no perfect result is expected and mistakes are allowed, this is a very realistic task for agents[11]. In this way agents can be used in training public servants with immediate contact to companies or citizens.
- Generally, agents can be a large part of learning platforms for E-Government as procedures and processes are usually well defined and electronically available (through existing workflow software). This explicit structure is perfectly suited for agents to explain, guide through and simulate, as no large intelligence is required and still a complex topic can be automatically (no adaptation to the individual processed required) used for teaching. If not only the structure but also the content (e. g. prerequisites for decisions) are available electronically, tasks for learners can be generated automatically and the answers/results also verified without human intervention for at least limited feedback.
- Arranging a curriculum: Another, however much more complicated and dependent on extensive metadata, task for agents is creating a whole course given a few points of interests or topics needing refreshing. From the metadata dependencies and related topics can be

[10] See [Sonntag et al. 2002] for how personalisation can be achieved in E-Government portals. Learning portals on this topic are very similar in this respect.

[11] Complex tasks are often not ideally suited without introducing an expert system into the agents. This is one of the reasons many systems of agents fail: lack of intelligence. In this special area this can however be seen even as a slight advantage!

gathered and a complete course arranged, starting from the (known by the agent through observing the user and personalisation) pre-knowledge and leading to the desired parts. This can be dynamically restructured according to results in tests by including additional packages or moving others to an optional path.

- Keeping of tables of points and updating them on events (handing in homework, modifications, …). At the same time a tutor (if assigned) is to be notified. A summary is provided at regular intervals (e. g. daily) and only the learners assigned to the tutor in question are included. This will also support preconfigured lists, so only actual points or comments must be filled in.
- Personalised notifications. One or more mobile agents will be implemented which are created locally on the user's computer or remotely on the WeLearn server. These agents's job is evaluating messages in newsgroups according to user-defined rules, followed by additional handling like summarising, replying or creating copies, and returning with the results. Here too the agent should be able to adapt the configuration automatically in some cases. Changes made or not made will be presented to the user for approbation at the next opportunity, but are already used before then (except dangerous rules like deleting data).
- Integrating some degree of intelligence into agents allows employing them for assessing the course material: Parts often visited (or re-visited) can be identified and compared to results in test for finding out difficult areas or where the material should be enlarged or reworked. Through this quality management (an important but rarely implemented part of E-Learning: [Wessner 2002]) can be automated to some degree.
- As an important part of the WeLearn system is its ability to be used offline as well as online, support for working with online elements during offline use will be included. Examples are accepting posts for newsgroups which will actually be posted on the next connection, or downloading new posts (selected by agents; see above), for offline reading. Other applications are searching through the website taking note of the users interests for filtering or adding private comments to materials (synchronised with those added online).

7. Conclusions

When teaching E-Government in virtual form, different target groups and wide geographic distribution necessitate different methods of E-Learning than usually. These needs can be fulfilled best with an online learning platform, which can be adapted easily to changing needs, users and modularised materials.

These online platforms need to be available offline too, at least for some parts of it, as in E-Government offline learning will be a more important part than in other topics. Synchronising these two views with each other is a very important step for user acceptance. Agents can help here and with the general problem of reducing work for the teachers (which are currently scarce and must be educated first to be available for teaching a wider audience). The WeLearn platform seems to be especially suited for this because of its ease of use and the developing integration of agents. E-Government is a good example for their use because of explicitly and exactly defined tasks and results, through which agents can support learning by guidance, generating tasks and verifying results. The usual shortcoming of agents, their relatively low intelligence, is of smaller concern here than in other areas, making this a prime area of implementation for them.

Teaching E-Government in the way of E-Learning is still in its infancy, but the tools are already available. They just must be used in the appropriate way. The main hindrance is the lack of material: Which is there is partly not suited for teaching (more in the style of manuals)

and partly not available in a format suitable for learning platforms. In E-Government it is necessary to remember not to create singular large teaching units, but rather a large score of smaller units extensively described by metadata as well as flexible interconnections, allowing easy rearrangement, change and extensions for this dynamic topic. Still, this is only a temporary situation and E-Government will surely by taught also in an electronic way in the future.

8. Acknowledgment

This paper is a result of the project "Integrating Agents into Teleteaching-Webportals", which is sponsored by the FWF (Fund for the support of scientific research; P15947-N04).

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