

Web Coherence Learning

Web Support to Create Context and Continuity in Learning

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Abstract—This article describes a learning system constructed to facilitate teaching and learning by creating a functional web-based contact between schools and organisations which in cooperation with the school contribute to pupils'/students' cognitive development. Examples of such organisations include science centres, museums, art and music workshops and teacher education internships. With the support of the “Web Coherence Learning” IT application (abbreviated in Swedish to *Webbhang*) developed by the University of Kalmar, the aim is to reinforce learning processes in the encounter with organisations outside school. In close cooperation with potential users a system was developed which can be described as consisting of three modules, “the organisation page”, “the activity page” and “the participant page”. System development and testing have been performed in a small pilot study. The result shows that the service is easy to distribute and establish. The functions that are combined form a whole, which is perceived by the users as functional.

Index Terms—learning systems, education, pupils', cognitive development.

I. INTRODUCTION

The interaction between teachers/educators and pupils [1], including the educators' understanding of the pupil, is a most important quality factor of learning. The teacher's task is to capture the pupils' previous knowledge and life situation and make room for their own choices and tasks [2]. What is right and obvious to one individual may for another individual seem totally unintelligible, and to understand what other people mean we must try to see the world from their perspective [3]. To create context and continuity in teaching and learning the educators involved in the pupils' learning also have to cooperate [4]. Pupils differ in their learning strategies [5, 6], and making room for expressing oneself in alternative ways, for example through pictures, films and simulation, is something that benefits the individual learning environment. It is important that the pupils are faced with problems and tasks that feel meaningful to solve and which are neither too easy nor too difficult [7]. For this reason it is necessary for educators to obtain a clear picture of the pupils they meet in their pedagogical work.

One pedagogical method that may promote learning is to create a cognitive conflict where pupils are supposed to predict what will happen, in an experiment, for example, and then later on compare the actual event with their own prediction [8, 9]. Using metaphors and analogies is another strategy that may reinforce learning [10, 11, 12]. This becomes possible in the system developed here, since before visiting an organisation like a science centre the

pupils are enabled to encounter a problem with the support of different presentations. That collegial cooperation may increase the quality of the educational situation is something that has been asserted [13, 14]. This is why good conditions for cooperation between the actors surrounding the pupils' learning have to be created.

A great many researchers are convinced that elements of IT support will play an even more prominent role in future education. Traditional communication will be complemented with and in many cases replaced by new communication [15, 16]. The young generation is growing up with a new kind of knowledge building, where sounds, pictures and texts are conveyed via modern information technology. There are several studies indicating that the interaction offered by this kind of communication is at least as qualitative as traditional encounters [17, 18, 19]. One of the advantages of using IT support is that it makes it easier to adapt the education to the students' preconditions and situations in a model that is often referred to as flexible learning [20]. In the work with the learning system described in this article the basic principles of flexible learning have been the guiding lines. Learning may be flexible from a number of points of view, such as study forms, tempo, examination forms, different learning styles, geographical independence and variation in communication forms between student – teacher and student – student. Flexible learning may be regarded from the student's as well as the teacher's perspective (*ibid.*).

II. PROBLEMS AND GOALS

Internship is a very important part of the teacher education programme. In the experience of the University of Kalmar there is usually little contact between teacher students and the internship class before and after the internship period. It seldom happens that the internship period is prepared in close contact with the school unit. The follow-up of this period proceeds along the same pattern and the contact is often interrupted after its completion. Similar problems affect independent organisations working with children and young people from preschools and schools. This may include operations like science centres, museums or operations involving creative elements. The visits easily turn into an isolated “happening”, as the educators in the independent organisation seldom establish any contact with the pupils before and after the visit. The planning of the visits often follows a similar pattern without any stable foundation in the children's experiences. In cases where a continuous qualitative contact between teachers, pupils and educators in the independent activity is established before and after the visit there is a chance that its aims are better fulfilled.

With an early dialogue the tasks may be linked to the children's own life situation, making use of their questions and their own histories and experiences. After the visit a better established contact should make it easier to document, follow up and plan new visits. This largely applies to the teacher students' internship as well. A functional web system creating more favourable conditions for communication and follow-up should increase the chances of continuity and progression in the contacts created. By facilitating introduction and planning through the experiences and needs of the group in question and by introducing the knowledge area in a dialogue with the participants [21] such a system can be an efficient way of creating context and continuity.

Against this background the goals of the "webbhang" learning system were formulated. The system is supposed to:

- be able to simply introduce the parties that are going to cooperate, such as creative operations – school class, or teacher student – internship class.
- provide a unique place where the parties keep up a dialogue discussing, asking questions, introducing ideas, making suggestions and planning continued cooperation.
- offer possibilities for documentation, reflexion, communication and follow-up.
- offer a possibility to publicly present the result of the completed process.

The imagined target group of the system consists of educators from independent organisations, teachers, pupils and teacher students.

III. PROTOTYPING AND USER ADAPTATION

Several prototypes contain nothing but screen shots that open up for a dialogue between system planners and presumptive users [22]. Experimental system development commonly produces a prototype, an example close to reality of the external qualities a system is intended to contain. In this project the development has taken place in a functioning program environment. According as the users gave their views, the programme was modified. It is important that the communication programs utilised are adapted to the target group, there being at least four different factors determining the usability of an application (ibid.). The four factors are adaptation, user-friendliness, user acceptance and user competence. Adaptation entails that a program is designed to optimally follow the structure of the task that the user tries to solve. User friendliness involves several different aspects, one of which is accessibility. It should be possible to combine these programs with others as well as provide support for user activities. Individualisation is another important aspect of user friendliness. User acceptance means that the users are positive to the program and its functions. The meaning of user competence is that the user has enough understanding and skills to be able to effectively integrate with the computer and the program (ibid.). In the work with Webbhang the above-mentioned factors have been in focus.

When a new service or system is going to be introduced one frequently runs into both motivational and practical problems. Introducing IT-based tools into operations is neither simple nor self-evident. The process may often be

both complicated and time-consuming [23]. According to Dalin [24], these problems may be divided into practical, psychological, power and value barriers. If the transformation is going to be radical, these barriers have to be forced. Practical obstacles may include the economy, accessibility, training possibilities etc. One psychological barrier may be that the staff feel threatened in their role and value barriers may exist when values attached to the technology clash with those of the staff. When a power barrier prevails, the staff may feel their entire situation being threatened.

IV. SYSTEM DESCRIPTION AND RECOMMENDED METHODOLOGY

The design of the constructed system and the planned methodology is as follows. An organisation like a science centre or a creative workshop, as in the example below, announces its interest in using the system. When the administrator has registered and given the person responsible for the organisation an account (Fig. 1), information about how to log in is sent to that person together with a link to the log-in page. Here users can log into those pages which give access to building up functions and the network around their own organisation. A system manual is attached to the link.

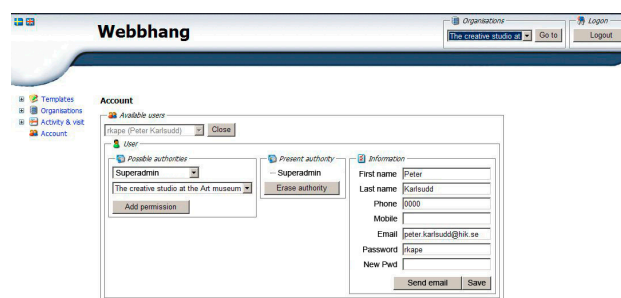


Figure 1. Registering a new activity

The system contains four different user levels: administrator, the person responsible for the organisation, teacher and pupil. The principal rule is that the registration of who is responsible for the organisation is made by the administrator. The person responsible is empowered to register teachers and teachers to register pupils (Fig. 2).

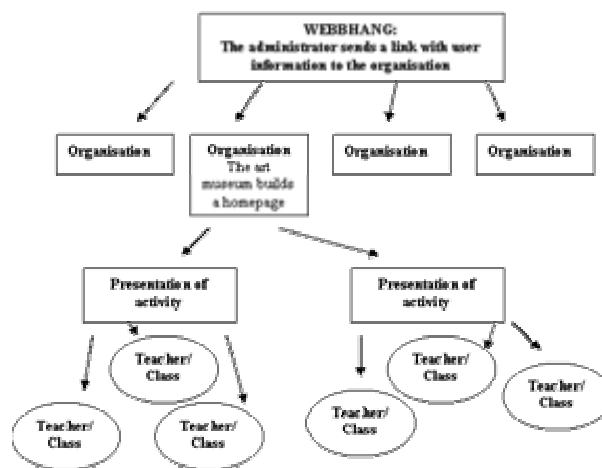


Figure 2. System hierarchy and user levels

A. Organisation pages

On the first page, the organisation page, the person responsible may construct his or her own main page/homepage (Fig 3). To simplify this work there are a number of ready-made templates to choose among, but users can also build their own homepage freely without the support of a template. The basic construction rule is simplicity, but the toolbox accompanying the application allows for relatively advanced editing. When constructing the homepage the user makes his or her changes directly on the page, no knowledge of HTML codes being required. Since those responsible for the organisation may easily change and update the page themselves, the chances are greater that the homepage will remain updated. They can also add functions like calendar, guestbook, member registration and newsletter to the page. This can be done to facilitate planning and contact with those who visit or plan to visit the organisation.

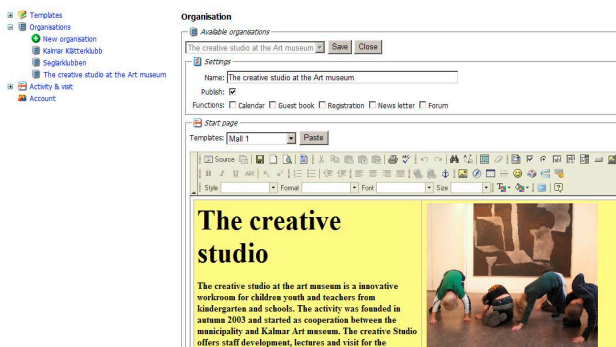


Figure 3. Organisation page in the editing phase

B. Activity pages

As links to the organisation page the person responsible now constructs activity pages, where various activities, tasks and problems can be presented. In the example below the staff at “Ateljén (‘the Studio’)", a creative organisation, are in the editing phase of presenting an exhibition, which will form the basis for their operations for a few weeks ahead (Fig 4). The idea is that the creative organisation should be able to present the area before entering into a dialogue with teachers and pupils in the class. The activity page offers the possibility of showing pictures, links and texts to increase the previous knowledge of the class and its interest in the areas that are in focus during the visit.

The activity page does not offer the same freedom of design and creativity as the organisation page. The thought behind is that it should be easy to set up activity pages, since activities that are offered are quite often subject to adjustment. On the page the activity to be presented may be named, pictures with or without captions and links may be downloaded and the size of pictures and texts determined.

C. Participant pages

To the activity pages the organiser links participant pages. The participants may be a class which is going to visit an organisation or one where a teacher student is

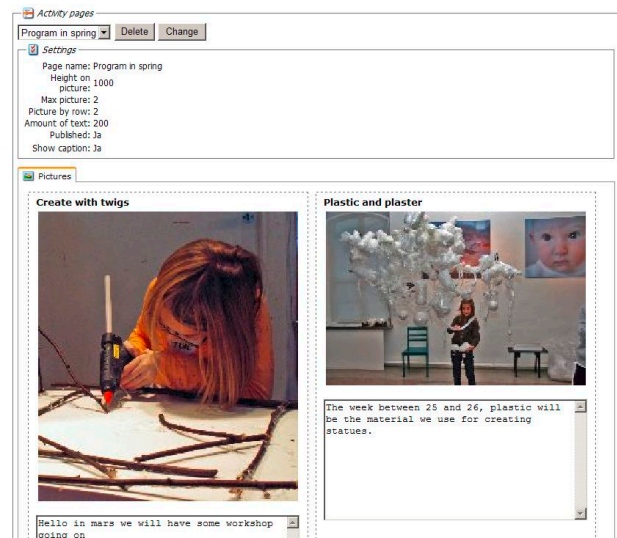


Figure 4. Activity pages in the editing phase

going to present a project in advance of his or her internship and afterwards follow up the work, document it and maintain contacts with the pupils until the next internship period. Consequently, the participant pages give the educators who are to meet the class the chance of acquainting themselves with the pupils' previous work and problems. They also give all the pupils a chance to vent their expectations and questions, something that is seldom possible during visits paid to organisations. This dialogue may be made available other interested parties, if desirable.

On the participant page organisers, teachers and pupils may load down pictures, write in texts and communicate with one another in a discussion conference. The pictures are easily downloaded and adjusted automatically. Here pictures from the visit are downloaded and the pupils can communicate their impressions and reflexions (Figures 5-6). (Some further adjustment may be required in the “media height” box to improve disposition and layout).

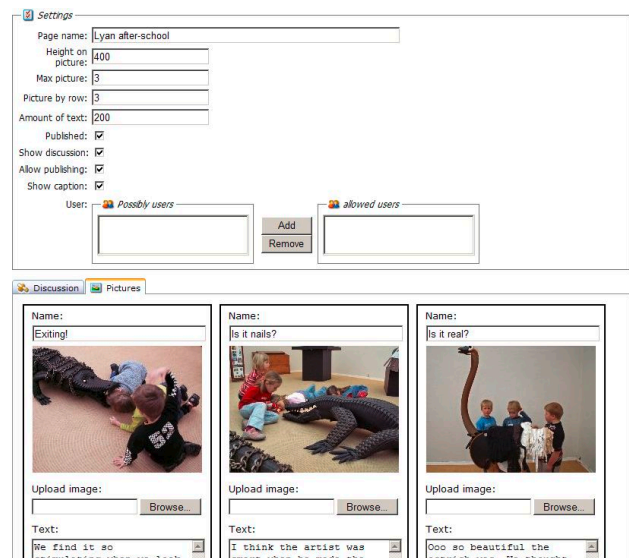


Figure 5. Participation pages in the editing phase.

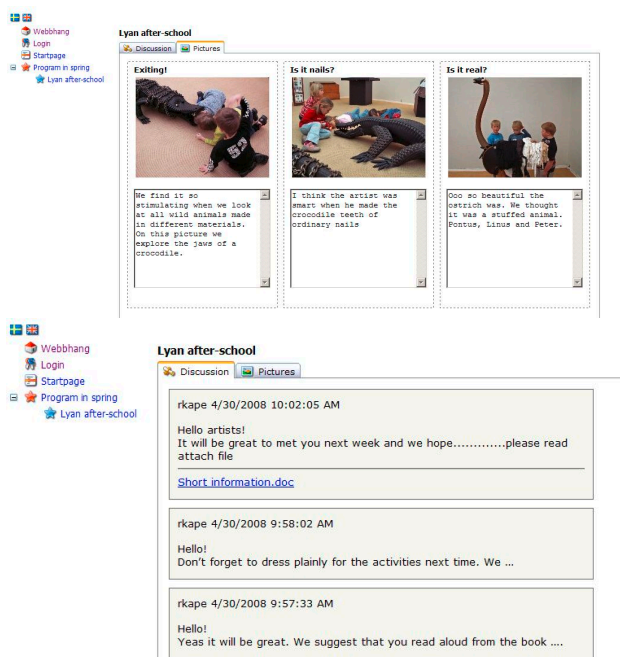


Figure 6. Participation page with the discussion forum in the public status

V. CASE STUDIES AS A METHOD FOR SYSTEM DEVELOPMENT

The method used for system development, implementation and pilot study can be defined as action research. The attitude has been characterised by critical thinking and problem-solving. The action research method is not uniformly stated, different researchers emphasising different aspects. Different terms appear in attempts to define the approach. Argyries [25] refers to action science for that part of action research that is more theoretically oriented and action research for the practically oriented part. The most common type of action research is when “the respondents” work together with researchers [26] in an endeavour to enhance critical thinking and create new questions [27, 28]. There is a clear difference between the participant’s and the researcher’s role in the action research process. Tiller [28] problematises this relation by calling the participant role action learning, while reserving action research to mark the work of the researcher. In the first phase of the study, as emphasised in this article, the research is more practically oriented and can thus be defined as system development and action research, whereas in the final part it turns into a more theoretical direction, action science [25, 28].

A. Group studied

In the case study, which may also be regarded as a pilot study, the participants were two creativity educators from Kalmar Art Museum and one compulsory school teacher with 10 pupils between nine and twelve years old. The study also included a control group with teachers and pupils who as far as possible resembled the group testing the system. As it is difficult to set up a control group which is in all respects similar to the active project group, the comparison between them has been made with the greatest caution. To this end a reference group was linked to the study, including six educators from other organisations, who had expressed an interest in the project

and who continuously shared their views of how they thought the system could be adapted and developed.

B. Implementation and evaluation

The pilot study was conducted over a three-month period. First, an organisation page was set up by creativity educators and then activities for future visits were presented. Thereafter the project class was invited to participate and a participant page was constructed. The evaluation was made with the support of interviews and observations. One observer studied the preparatory and follow-up work of the class on four occasions of about one hour each. Continuous interviews were made with the creativity educators and the class teacher, and the project was concluded by interviews with five pupils. In the project class and the control group a final evaluation was made.

VI. RESULTS AND DISCUSSION

The result of the case study shows that the staff of the creative organisation quickly and simply established an organisation page (Fig. 3). This page was formatted with the help of a few formatting tools in one of the application templates. Continuous updating was felt to be easy to perform and the educators expressed their appreciation of designing a homepage which they could easily change and update themselves. The extra functions, like almanac, guestbook and newsletter, did not function quite satisfactorily but after program adjustments they are expected to facilitate work with booking times, for instance. The member registration function has worked well and is viewed as an added value in the application. The reference group had no complaints or further wishes as regards the organisation page.

The activity pages (Fig. 4) set up by the staff to introduce their activities consisted of pictures and captions. On the page texts and pictures of various works of art were presented to arouse curiosity and give the pupils time for search, dialogue and reflexion prior to the forthcoming visit. Using pictures and texts to introduce works of art and activities was considered quite sufficient by the art educators. The reference group expressed the wish to be able to present films in the picture trays, since some organisations benefit from showing moving pictures to present various courses of events. Three people in the reference group wished that the school classes linked to the activity pages in the future should get the chance of discussing with each other in a joint forum.

To the activity page was almost immediately linked a participant page (Figures 5, 6) for the class that was going to visit the organisation. The teacher gave the pupils access to the page and the first task was for all the pupils to introduce themselves to the creativity educators. This also made room for a dialogue between educators, pupils and class teacher. The teacher chose to log in all the pupils jointly, since logging in individually was considered unnecessary.

With the support of the dialogue conducted on the participant page the staff have experienced the possibility of establishing a deeper contact during the visit and giving the pupils more challenging assignments. At the pupils’ first physical visit the educators felt that, in comparison with earlier methodology, they obtained a much better picture of the group of children and that the pupils found it

easier to relate to the activities. Since the assignment was well known from the activity page, less time was needed for the introduction and the work on the assignment was more in focus than at traditional visits. The creativity educators felt that, in comparison with the control group, it was easier to make the pupils enthusiastic, since they had now got a better picture of the children's earlier experiences and thoughts. Of the pupils interviewed the majority found it stimulating to discuss before and after the physical encounter with the organisation. Demonstrating their work on the web to parents and relatives was especially appreciated by the pupils, but also by educators and the teacher.

Of the obstacles [24] that may arise in connection with the implementation of new IT applications only practical ones have come to light. These obstacles have been fairly easy to remedy, since there was a great deal of help available during this case study. The reason why psychological, power and value barriers have not been noticed is probably that the user acceptance was high, since everybody took part of their own free will and interest. If the same type of project had been tested on a group that had not been interested in the system, it is very likely that further obstacles would have emerged.

The presentations and discussions conducted on the web before and after the visit were felt by everybody to be fun and interesting. To maintain a good dialogue, however, it is necessary that everyone using the system sets aside time for it. The class teacher does not experience that more time has been spent, since it is only a matter of re-scheduling the time available. The art educators have had to use more time, with the result that in future projects the number of visits must be cut down for the benefit of preparatory and follow-up work. The art educators are of the opinion that this re-scheduling will improve the quality of the visit.

A more comprehensive follow-up study is now being planned, where before beginning their internship a number of teacher students will become acquainted with pupils and internship teachers, as well as being able to present the assignment that is to be carried out during the internship period.

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