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ABSTRACT

The selection of courseware is a difficult problem in the use of computers in education. A dissemination procedure for a courseware selection instrument involving workshops for computer coordinators is described. Computer coordinators of 267 Dutch secondary schools were asked how they used certain sources of information in selecting courseware. Many used results of evaluations by the Soft- and Courseware Evaluation Centre for the Netherlands, but expressed the need for additional information. Six secondary schools participated in a workshop for computer coordinators who were taught to use an instrument called "The Courseware Selector" to evaluate courseware. The coordinators were expected to disseminate the information in their schools through further workshops. A multiple case study design was used to compare developments in the six schools involved in this cascade approach. In general, effects on the overall selection of courseware were not large, but promising effects did appear related to teachers becoming better acquainted with courseware and reducing their computer phobia. A critical variable in implementation was the level of experience in computers at the school initially. (Contains 7 references.) (SLD)

A PROCEDURE FOR SUPPORTING THE SELECTION OF COURSEWARE BY SECONDARY SCHOOL TEACHERS

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ABSTRACT

One of the main problems regarding the use of computers in education is the selection of courseware. For several reasons, courseware that may be eventually bought is difficult to access. In addition, there are difficulties relating to the support of the computer coordinator as the conduit through which preliminary information about courseware must flow as it arrives in the school. This study describes a dissemination procedure for a courseware selection instrument involving a workshop for computer coordinators and similar workshops (offered by the thus-trained coordinators) for their fellow-teachers. Results from six secondary schools and the implications of these results for the overall development of a framework and an instrument for courseware selection are described.

Introduction to the Problem

The value of the use of computers in the classroom is influenced by the quality of the courseware that is being used. By 'courseware' is meant educational software accompanied by other materials such as work sheets for the students or a guide for the teacher. However, for teachers it is not a simple task to make an accountable choice of courseware that may be eventually bought. Difficulties confronting the selection of courseware occur at various levels.

Preceding the present study, in the autumn of 1989 the computer coordinators of 267 Dutch secondary schools were asked in which measure they used certain sources of information while selecting courseware, which characteristics of a courseware package were thought important, and which problems they experienced regarding the selection of courseware. Although 220 computer coordinators in this pre-study claimed to use the results of evaluation studies published by the Soft- and Courseware Evaluation Centre for the Netherlands (SCEN) and 247 said they used descriptions in magazines of packages by persons experienced with the packages always or incidentally, 92 computer coordinators had been confronted with the problem that courseware packages that had been selected did not answer expectations when used in the classroom. Apparently, information about a package is not always sufficient to make the right choice. As was noted, these experiences were had by computer coordinators, teachers who are usually more informed about computers and courseware than most of their fellow-teachers. It may be further supposed that teachers do not always have at their disposal all the information that is available to the computer coordinator

in the school. Besides, this information is often too broad and insufficiently aimed at the needs of the teachers who want to know whether a package is specifically useful for their pupils.

The conclusion is that there is an important need for strategies to provide teachers with better information about courseware and with some sort of aid to help them form a better perspective on the usefulness of different courseware alternatives. During the present research and implementation study such a strategy was developed of which an aid called the 'Courseware Selector' (Carleer, in the press) formed a part.

Method

Theoretical framework

A theoretical framework based on the work of Fullan (1982) and of Fullan, Miles, and Anderson (1988) supported the selection of relevant variables affecting the effectiveness of courseware selection strategies and the possible relations between these variables. For this purpose it was necessary to distinguish between what was called the 'large innovation', that is, the use of computers in the school, which was already in process during the years preceding our study, and the 'small innovation', the strategy for the selection of courseware that was the focus of the project. Fullan (1982) mentions 15 factors influencing the implementation of innovations in general. Fullan, Miles and Anderson mention 10 factors that are especially important in the implementation of the use of computers in schools. Not every factor mentioned by these authors was expected to be relevant to our study or to the Dutch situation, respectively. Thus, some factors mentioned by Fullan or by Fullan, Miles and Anderson have been combined, other factors have in a certain sense been translated to suit the situation. In all, nine factors of which some were thus adapted, were expected to influence the implementation of the 'large innovation'. These factors are:

1. The state of affairs regarding the large innovation: this factor was composed of Fullan's factors 'clarity and complexity', 'quality and practicability', 'process for implementation and institutionalization', and 'the adoption process' of the large innovation,;
2. Consensus/conflict about the change in connection with the large innovation;
3. Professional development and assistance in connection with the large innovation;
4. Implementation monitoring and problem solving in connection with the large innovation;
5. Principal's leadership (partially delegated to a steering committee for the large innovation or the computer coordinator);
6. Environmental stability;
7. Teacher-teacher relations in connection with the large innovation;
8. Teacher characteristics and orientations;
9. The history of former innovative attempts.

Ten factors were expected to influence the implementation of the 'small innovation', namely:

1. Clarity and complexity of the small innovation;
2. Consensus/conflict about the change in connection with the small innovation;
3. Quality and practicality of the change in connection with the small innovation;
4. The planning of the process for the implementation and the institutionalization of the small innovation;
5. Professional development and assistance in connection with the small innovation;

6. Implementation monitoring and problem solving in connection with the small innovation;
7. Teacher-teacher relations in connection with the small innovation;
8. Teacher characteristics and orientations;
9. The adoption process of the small innovation;
10. Expectations with respect to the project as a whole.

The implementation of the small innovation was in turn expected to influence some of the 19 abovementioned factors. Thus, besides being influencing factors, these were in turn transformed into output variables. The phenomena at hand are:

1. Consensus/conflict about the change in connection with the large innovation;
2. Professional development and assistance in connection with the large innovation;
3. Principal's leadership (partially delegated to a steering committee for the large innovation or to the computer coordinator);
4. Teacher-teacher relations in connection with the large innovation.
5. Teacher characteristics and orientations;
6. Clarity and complexity of the small innovation;
7. Consensus/conflict about the change in connection with the small innovation;
8. Quality and practicality of the change in connection with the small innovation;
9. Professional development and assistance in connection with the small innovation;
10. Implementation monitoring and problem solving in connection with the small innovation;
11. Teacher-teacher relations in connection with the small innovation.

To evaluate the implementation of the small innovation, criterion variables were regarded to be:

1. Feelings of competency and satisfaction of the computer coordinators regarding the process of courseware selection;
2. Feelings of competency and satisfaction of the teachers regarding the process of courseware selection;
3. The evaluation of the courseware selection project by the computer coordinators;
4. The evaluation of the courseware selection project by the teachers.

Selection of participating schools

Out of a group of about 1000 secondary schools which had participated in a national project supplying them with hard- and software (the NIVO-project), some 320 schools were sent a questionnaire regarding the use they made of courseware and asking whether they were willing to participate in the present project on courseware selection. Out of these 320 schools 85 returned the questionnaire, and among these 85, 26 were willing to participate.

Three criteria had been formulated for the participation of the schools in the project:

1. They belonged to the first, second or third group of schools which took part in the abovementioned NIVO-project. This implied that they had had computers at their disposal for several years.
2. There was a computer coordinator in the school; this implied that there was someone who already served as an intermediary between the information about courseware that is given in magazines and official publications and the teachers who are supposed to use the courseware.
3. At least two teachers out of two different sections each were willing to participate in the project.

Of the 26 schools which were ready to participate, only 8 met criteria numbers 2 and 3.

Out of these 8 schools, 6 were selected on the practical basis of being within easy reach of the research team.

Workshop for computer coordinators

Based on the analysis described under 'Theoretical framework' an inservice workshop for computer coordinators was developed as the central component of a dissemination procedure for better courseware selection.

The first half of the workshop was spent on information to the computer coordinators about different ways of organizing computer use in schools. This was done by two experienced computer coordinators who were taking part in a separate longitudinal experiment on the implementation of computer use in secondary schools. They gave information about the way in which the implementation of computer use was organized within their schools, about the problems they had met and the solutions they had found.

During the afternoon, the computer coordinators were instructed in the use of an instrument for the selection of courseware by teachers called the 'Courseware Selector', and in strategies for the organization of a workshop on courseware selection for their fellow-teachers. The Courseware Selector consists of three parts, the first part guiding the search for existing courseware, the second part guiding the examination of the information accompanying a given courseware package, and the third part guiding the examination of the courseware itself. These guides have the form of questionnaires. The first part (regarding the search for existing courseware) consists of a synopsis of sources in which information about courseware can be found (descriptions, evaluations, users' experiences, *etcetera*), such as magazines, publications by institutions like SCEN, NICL (Dutch Information Centre for Educational Equipment), the bulletin board of the SLO (Foundation for Curriculum Development) and on-line data banks. The second and the third part of the Courseware Selector exist of questionnaires that are to be filled out by the teachers, in order to help them focus on the relevant aspects of the packages in their own special situation.

Examples of questions in the second part (regarding the information accompanying a courseware package at hand) are:

- Does the software work on your school's computers?
- What is the target group of students?
- Does the topic fit in your own curricular and instructional practice?
- Is the package related to certain textbooks?

Examples of questions in the third part (regarding the courseware itself) are:

- Is the courseware practical from a didactical and/or classroom-organization perspective?
- For what kinds of student exercise does the courseware allow? (For example, knowledge reproduction, knowledge application, acquisition of new knowledge and comprehension.)
- What prerequisite knowledge or previous experience do students need to work with the program?

After having studied the material and having answered the questions on the topics above, participants in individual subject areas are urged to get together and consult with each other on their findings and on the eventual decision about the purchase of the package.

Multiple case study; data collection

A multiple case study design was developed to compare developments in the six secondary schools involved in this cascade approach. At the start of the study information was gathered by interviewing the computer coordinators and one of the school leaders of each school, and by means of questionnaires from the participating teachers. The information related to the

extent to which computers were used in each school and for what purpose; the attitudes of the teachers towards the use of computers in the classroom (measured by an adapted version of the Concerns Based Adoption Model or CBAM, Hall, George, & Rutherford, 1977); the process of courseware selection by teachers in each school up to that point; the ways in which teachers had been educated for computer use; their satisfaction with courseware that had been purchased up to that time; their feelings of competency in selecting courseware; aspects of courseware that were considered important; and the expectations of the participating teachers and computer coordinators for the courseware selecting project. At the end, information was collected on the effects of the inservice workshop for the computer coordinators, the impact of this on subsequent in-school workshops about courseware selection organized by the computer coordinators for their fellow-teachers, and to the sort of procedures used for courseware selection by teachers at the end of the study. In between, the workshops which were organized by the computer coordinaters for their fellow-teachers were also observed and diaries were collected in which the computer coordinators had registered their activities relating to the use of computers in their schools. Particular consideration was given to changes in the use of computers in the schools in general, and in particular, to the selection of courseware as it took place in the schools.

These data were mostly qualitative in nature, although within each case quantitative data were also gathered, during the interviews at the start and the end of the study and in the questionnaires for the participating teachers.

Data analysis

The sets of data were analyzed by seeking patterns in the material, much in the way Yin (1984) advises with respect to the formulation of 'case study questions'. Such questions were developed for this study, and related to the situation in the schools at the start of the study, the implementation of the use of the Courseware Selector, the effects of the project as a whole, and the conclusions that were to be drawn from the overall experience. Examples of these case study questions include the following.

Concerning the situation at the start of the project:

- How can the use of computers in this school in general be characterized?
- On which information is this characterization based?
- By which further information is this characterization supported?
- Which possible information is at variance with this characterization?

Concerning the conclusions to be drawn from the overall experience:

- To what extent can one connect the positive or negative developments, or the absence of further developments during the project to the factors that have been described at the start of the project?
- To what extent is success or failure a consequence of the strategy for courseware selection that was offered?
- To what extent is success or failure a consequence of the way in which the computer coordinator put into practice the strategy for courseware selection?

At the completion of the study, the findings were linked to the theoretical framework.

Results

The results consist of reports about each separate participating school. In these reports the situation of each school with respect to the use of computers in and outside of the classroom is described, as well as the organization of computer use, the organization of courseware

selection, the implementation of the strategy for courseware selection which was offered during the project, what the computer coordinator had learned from the workshop about organizational aspects of computer use and what he had put into practice, to what extent the workshop had been satisfying and had influenced the procedures of courseware selection in the school, and to what extent the expectations of the computer coordinators and the teachers of the project had been met.

The results differ from school to school, but the main effects can be summarized as follows. Although the effects of the overall strategy for improving the selection of courseware varied between schools, these effects were in general rather disappointing. Instead of enhancing the teachers' skills in selecting courseware, the main effect of the workshop that was offered to them by their computer coordinators was increasing their enthusiasm for the use of courseware. Although increased enthusiasm is not an undesirable effect in itself, it was not the effect that was most immediately sought. The main reason for an apparent lack of change in teachers' skill levels may be the fact that the use of computers in Dutch classrooms is generally occurring at such a low level that strategies to improve the selection of courseware do not have an adequate foundation. This seemed to be the case even in the six schools that were selected for the study; schools that were comparatively far in computer-use experience based on national comparisons.

Conclusions

The main conclusions are as follows:

1. The level of experience in the school relevant to computer use at the start of the implementation of a strategy for courseware selection is a critical variable in the success of subsequent implementation strategies. Schools or sections in which teachers have not yet used or selected courseware are not yet prepared for a strategy that focuses on the effective selection of courseware.
2. The information about alternate strategies for the organization of the use of computers in schools that was given to the computer coordinators had different effects on the different coordinators. To those who felt relatively insecure about supporting computer use in their schools at the start of the project, this part of the course offered new insights about how to stimulate the use of computers by their fellow-teachers. In these cases, strengthening the functioning of the computer coordinator appeared to improve the results relating to the implementation of the overall strategy for courseware selection.
3. In general, the effect of the overall strategy for the selection of courseware on teachers' intentions relative to courseware selection and use in the future was not very large. However, promising effects that did appear related to teachers getting better acquainted with courseware, increasing their enthusiasm for using courseware, and lessening their levels of 'computer-phobia'.

Back to the theoretical framework

Linking the conclusions mentioned above to the factors mentioned in the paragraph entitled 'Theoretical framework', leads to the following:

- The state of affairs regarding the large innovation generally was not yet advanced enough for a successful implementation of the small innovation.
- The 'quality' of the small innovation was generally judged positively. However, one aspect of 'practicability' of an innovation is the question of whether it meets important needs of

pupils and (or) teachers. For many teachers the need of a strategy for courseware selection appeared to be not yet under discussion, because they did not have enough experience with the use and the selection of courseware.

- The planning of the 'process for implementation and institutionalization' of the small innovation played a role, too. The extent to which the teachers intended to select courseware in future with the aid of the Courseware Selector appears to be related to the way in which the workshop had been offered to them. This implementation process, however, in turn was dependent upon the state of affairs of the large innovation.
- The factor 'professional development and assistance' regarding the large innovation mainly played a role as an indicator of succes for the extent to which the large innovation had advanced. The same holds for 'principal's leadership'.
- The 'characteristics and orientations' of the teachers played an important role. Their scores on the CBAM at the start of the project show that they were in a relative early stage as far as their experiences with computer use in the classroom. As was said, this was seen as the most important reason why the implementation of the small innovation only partially succeeded.
- Although not mentioned by Fullan, the expectations of the computer coordinators and the teachers had been taken up as a factor in the design. As far as the computer coordinators had positive expectations, these generally were met. In many cases the teachers' expectations were not realistic in the sense that they did correspond with the goals of the project. Some 'real', positive, expectations were met, some negative ones were, too.

Not all factors which were mentioned in the theoretical framework appear to have explicitly played a role in the implementation of the small innovation.

- 'Consensus or conflict' about the large or the small innovation does not seem to have played an important role; maybe because there was no conflict.
- 'Monitoring the implementation' and 'problem solving' regarding the large and the small innovation had not been explicitly observed by the researchers.
- The same holds for the 'stability of the environment', perhaps because the environment of all participating schools was relatively stable.
- Experiences with former innovations do not appear to have played a large (positive or negative) role in the implementation of the small innovation.
- The 'adoption process' of the small innovation was also not under observation. This became clear especially with the question as to what extent teachers were interested in the workshop about courseware selection. In one case, participating in the workshop by the teachers was compulsory. As far as we know, in most cases participating by the teachers was optional, but our insight in the question about how enthusiastic they were was very limited.

Under the paragraph 'Theoretical framework' some factors were mentioned which in turn were expected to be influenced by the implementation of the small innovation. At the end of the courseware selection project it was not yet possible to tell to what measure most of these 'secondary output variables' had been influenced by the implementation. However, three factors arise about which it is possible to speculate.

- 'Professional development and assistance' regarding the small innovation. At some schools this has been reinforced, *e.g.*, by establishing a computer room for teachers, by (plans for) more workshops about courseware selection, or by (plans for) a visit by a section to a 'regional point of support' regarding information technology in schools.
- 'Teacher-teacher relations'. All teachers who participated in one of the workshops about courseware selection and who also filled out the questionnaire at the end of the study

stated that they intended in the future to consult together about the purchase of courseware.
- 'Characteristics and orientations of teachers'. Comparing the mean CBAM-profiles within schools at the start and the conclusion of the study shows that the maximum of the profile had been altered in a way that can be interpreted as showing that the teachers' orientations regarding the use of computers in the classroom had changed during the project in a more positive direction.

Discussion and recommendations

The dissemination strategy for the use of the Courseware Selector that was used in this study is more effective in those cases in which teachers already have used and, preferably, have selected courseware before.

A workshop similar to the one which was offered in this study may be useful in schools which are less advanced in the use of computers, but the contents of this workshop should relate to the use of computers in the classroom instead of the selection of courseware.

The decision to call in the computer coordinators to spread information and to teach skills regarding the selection of courseware appears to be a good one.

In the final report recommendations were given to schools regarding the organization of (aspects of) the use of computers in the school and in the classroom in general, and the organization of a workshop about courseware selection in particular. The main recommendations are as follows:

- Schools are recommended to organize a workshop about courseware selection only for sections in which courseware has been already used and in which some teachers already have selected courseware.
- The person who conducts the workshop must be well instructed about the second and the third parts of the Courseware Selector. The second part (the one guiding the examination of print material accompanying a software package) contains questions that cannot always be answered on the grounds of the available documentation. This is important because it makes clear which information is lacking after reading the manual; however, if the participants are not informed about this possibility, this might provoke irritation.
- Workshops about courseware selection as well as workshops aiming at getting acquainted with courseware are best produced for complete subject area sections. One reason is that consultation within a section plays an important role in the use of the Courseware Selector. A second reason is that joint activity in the field of computer use appears to have a stimulating effect on teachers.
- It is important that a workshop about courseware selection is not 'overcrowded'. A workshop is most effective when every participator has a computer at his or her disposal so that computer packages can be viewed individually and that questions about the program can be answered individually.
- The computer coordinators in this study experienced support and stimuli from the detailed guide which was offered for the workshop and from their fellow-computer coordinators. Therefore, a recommendation to, among others, institutions for support and in-service training is to provide computer coordinators with means and instruments to enhance the use of computers and courseware, and to create possibilities for contact among computer coordinators.
- Other conditions and stimuli for enhancing the use of computers (in the classroom) are:
  - enough released time for the computer coordinator;

- a computer room for teachers where they can use a computer without students observing them;
- a well-working circulation system for information about courseware that might be purchased or that has recently been purchased;
- the presence of a 'technical educational assistent' who can assist with the use of computers in the classroom.

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