A TRIPLE INNOVATION IN THE NETHERLANDS

SUPPORTING A NEW CURRICULUM WITH NEW TECHNOLOGIES THROUGH A NEW KIND OF STRATEGY FOR TEACHER SUPPORT AND STIMULATION

ABSTRACT
This article is about how one country, The Netherlands, is attempting to reform school curriculum, integrate information technology into the new curriculum, and implement new approaches to teacher support and inservice, all at the same time. The article overviews the triple innovation in The Netherlands and then looks more closely at the some of the innovative approaches to teacher support and inservice that are occurring.

A TRIPLE INNOVATION IN THE NETHERLANDS
Innovation is difficult for schools; this has been widely established around the world. We know that implementing school renewal and curriculum change is difficult, we know that integrating information technology use into the curriculum is difficult, and we know that implementing new approaches to teacher support and in-service is difficult. What happens when an entire country decides to do all these things at one time? This is happening, and happening with success, in The Netherlands.

INNOVATION 1: SCHOOL AND CURRICULUM REFORM
After many years of debate, The Netherlands has recently decided to radically change its curriculum for the first two years of secondary school. Previously, students could be taking many different types of programs and levels of instruction during this time. Starting September 1993, all students are to follow a common curriculum in 15 subject areas during the first two years of secondary school. The eight subject areas involved in computer innovation are: mathematics, physics & chemistry (treated as one subject), biology, Dutch, French, German, English, and a new subject called “techniek.” Core objectives have been established for each of these areas, new textbooks and instructional materials developed, a stress on methods of teaching such as interdisciplinary projects and more group work for students is in place, and teachers are confronted with a call for enormous changes in their established practice. This massive overhaul began in one big step, in September 1993. It is called, in Dutch, the “basisvorming,” which means something like a common period of basic formation for all students regardless of ability level or future educational plans. Teachers have accepted the challenge with good spirit and with commitment.

INNOVATION 2: INTEGRATION OF INFORMATION TECHNOLOGY WITHIN THE NEW CURRICULUM
The Ministry of Education decided to imbed the use of information technology solidly within the new curriculum. A relatively short introductory course in topics related to information technology (20 hours) is part of the curriculum for lower secondary school. The major thrust, however, of the national project “Information Technology in the Basisvorming” is to establish a core set of objectives for students concerning skills, concepts, and applications of information technology, and to require that these objectives be met through the integration of information technology into all eight new curricula. Extensive curriculum-preparation work has been carried out by groups such as the National Curriculum Institute to develop these core IT objectives; make them concrete through integrated applications in the eight new subject-area curricula; and to develop teaching and learning materials in which IT use is a meaningful, natural, and imbedded aspect of the new curricula.

The result is impressive instructional materials—paper based, software, multimedia, television broadcasts, on-line discussions, and many other sorts of activities.

INNOVATION 3: NEW STRATEGIES FOR TEACHER SUPPORT AND INSERVICE
The Ministry decided to support a nation-wide innovative plan for new types of teacher support and in-service, focused on the first two innovations—the new curriculum and the new approach to integrating IT within the new curriculum—and adding a stress on teacher networking. This new approach to teacher support and inservice is being managed by a steering committee representing the national institutions for teacher support in The Netherlands. The project group, called PRINT-VO (acronym for the Dutch words for Project to Support the Implementation of New Technologies in Secondary Education) has launched the plan “PRINT-Basisvorming,” a two-year initiative that began in September 1993. This two-year initiative has as its task the innovative support and stimulation of teachers as they integrate IT in new ways into the new curriculum of the lower secondary school. The initiative has two main components—one aimed at all schools involved in the curriculum change (the “broad scale activities” component) and one aimed at a selected group of approximately 125 secondary schools, where more intensive and in-depth strategies are taking place for teacher support and stimulation. The broad-scale activities component includes 10 different categories of activities, ranging from regional demonstrations of new software, innovative in-service sessions based on teachers’ requests, video and television broadcasts for teachers and students, many different publications, and a new area on a national educational BBS (bulletin board system) where teachers have free access to a wide range of information and files to download related to IT and the new curriculum as well as software evaluations and the opportunity to try out software packages online.

The second component of the initiative, relates to the special sample of 125 schools (called “PIT Schools,” or “Schools with Spirit”). My colleagues and I at the University of Twente are involved in this component through an on-going evaluation project.
The PIT School Project

What is the PIT School Project?
The PIT School Project involves setting up teacher networks around 24 different themes, three per curriculum area involved in the curriculum change. Some of the themes have rather broad focuses, such as "Study Skills for the New Curriculum in English" or "Learning Problems and the New Curriculum in the Dutch Language." Other themes are more specific, for example, "Demonstrations and Simulations in the New Curriculum in Physics and Chemistry." Each theme was carefully described by a team of curriculum specialists, in consultation with teachers, and a plan for the activities that would be carried out within the theme for the school year 1993-1994 was established before the summer of 1993. There is a general coordinator for each of the eight subject areas, and Theme Leaders for each of the 24 theme groups. All are curriculum and teacher education specialists. Each theme group consists of 25-30 teachers, from a wide variety of schools, who would be stimulated to form a network for mutual support, exchange of experiences and lesson ideas, and interaction through a number of PIT-Project strategies.

How did schools get involved?
Schools were invited in the late spring of 1993 to compete for a place in the PIT School Project. To do so, the school principal had to express a commitment to the Project and the school had to submit a letter explaining why it wanted to be part of the Project. Although there was a very short timeline for the letters to be prepared, 461 schools responded enthusiastically. Of these schools, 125 were selected to be PIT Schools for the 1993-1994 school year, balancing types of schools, regions of the country, and preference for different themes. Each school could choose to be involved in themes from three subject areas.

The University of Twente analyzed the letters submitted by the schools to study their motivations for participation, and to study the phenomenon of schools responding to a triple innovation. The selected schools indicated a rich and diverse range of reasons for wishing to commit themselves to the Project; for example, "To heighten the efficiency of our education," "to make our teachers more motivated," "to give a new boost to the use of our computer equipment," "to support the new common curriculum," "to support remedial language learning for foreign students," and so on. We intend to see if different initial motivations are associated with different sorts of developments in the schools over the two years of the Project, based on our analyses of the application letters.

What do PIT schools commit themselves to do?
Each PIT school can be involved in themes in three different curriculum areas, but makes a commitment to try to stimulate IT use in the other revised curriculum areas within the school as well as in the curriculum areas through which they are involved in the PIT Project. Also, the teachers chosen as PIT teachers (about six per PIT school, 725 in all) would try to stimulate and support IT use among their subject-area colleagues in the school who are not PIT teachers. Thus a double-multiplier effect within the PIT Schools is a goal. There is a teacher chosen as "PIT Coordinator" within each PIT school, whose task is to support the PIT teachers, and stimulate not only them but the double-multiplier effect. The school principal must sign a contract agreeing to support the PIT teachers in their networking activities, to make it possible for them to attend approximately six face-to-face meetings of their theme group per year, and to support the work of the PIT Coordinator. The school principals and PIT Coordinators also receive special inservice and support through the Project. In return, the PIT schools receive some financial support and opportunities to be involved firsthand in the development and nurturing of new teacher-networks throughout the country.

What is going on in the first year of the PIT Schools?
Much is happening in the PIT Schools during the first year of the Project. To begin with, many of the face-to-face meetings of the Theme Groups have already occurred (approximately four per Theme Group have taken place, as of March 1994), the PIT teachers are trying out many new software packages with their classes and sharing their experiences with each other in their Theme Groups. In addition, the theme groups have generated ideas for many new lesson-support materials that are now being developed and tried out by teams of teachers and curriculum specialists within the Theme Groups. It is not the intention of the Project to stimulate the production of new software products, but instead the development of teacher and student support materials or the adaptation of existing software packages to stimulate the rapid integration of IT in the new curriculum.

How are we approaching the on-going evaluation?
With such a wide range of activities going on, (including many others that have not been mentioned here, such as, for example, a special project to stimulate more female teachers to become active users of IT in the new curriculum), it is difficult to select among many possible focuses for the on-going evaluation. We have chosen to use the framework of the CBAM Model (Hall, Loucke, & Rutherford, 1977; Norris, 1993) and, to use its conceptualization (see our adaptation of it in Table 1; see also Collis, Veen, & De Vries, 1993, and Collis & De Vries, 1993, for applications of this to teacher use of telecommunications) to study the degree to which:

1. PIT teachers move to higher levels of the CBAM Model (such as what we are calling Levels 5, 6, and 7—"Extended Impact," "Contributor," and "Leadership" Levels, respectively) during their participation in the Project.
2. Other teachers in PIT schools not directly participating in the PIT Project move to at least Level 4 of our adaptation of the CBAM Model ("Routine Use").
3. To look for interrelationships among variables such as curriculum area, types and characteristics of the software, different approaches to Theme Group activities, use of on-line networking, and different school environments, relative to teacher adoption of IT use in the new curriculum and to teacher-development according to the levels identified by the CBAM Model.

Our constraints are to minimize the data-collection load on the schools and teachers, because the triple innovation is already burdening the teachers with an exceptional amount of new organizational activity and paperwork, and also, within the very limited manpower available for the on-going evaluation, to serve more as formative evaluators working with the PRINT management team in support of their own needs of managing the complex Project than as "researchers" focused on more theoretical questions.
What Are We Learning So Far from the On-Going Evaluation?

We have already noted above that one of our evaluation activities was to analyze the beginning motivations of the schools participating in the PIT Project to take on the triple innovation of new teacher-support and in-service commitments during the busy first year of a radical curriculum revision. Coupled with other demographic data about the PIT Schools (see PRINT, 1993), one of our initial tasks was to form a base-line impression about the PIT schools. We also had to become familiar with all the different initiatives and materials being produced by or stimulated by the Project. In addition, we have carried out three analyses, one based on responses from a questionnaire administered to the PIT Teachers; one based on responses from a questionnaire administered to the PIT Coordinators within each of the PIT schools, and one based on a variety of sources of information concerning the 24 Theme Groups and their activities. We summarize some of the highlights of these analyses in the following sections.

The Teachers’ Reactions to the Start-Up of the PIT Project

The 725 PIT teachers were sent a four-page questionnaire after three months of participation in the Project, which approximately 83% (608) completed and returned to us for analysis before the Christmas vacation of 1993. Among the various potentially interesting aspects of the demographic data concerning the teachers was the fact that the modal age group is 41-45 years, (see Figure 1), showing that in The Netherlands, older teachers are not resistant to being involved in triple innovations related to IT and instruction.

CBAM levels, current and future. In order to collect data about teacher change relative to our adaptation of the CBAM Model, we asked the PIT teachers to describe their present level of involvement with the use of IT in instruction and what level of involvement they expected of themselves after the PIT Project was over. Figures 2 and 3 show the teachers’ self-appraisals. (For readability here, we are labeling the graphics using only numbers relating to the CBAM Model adaptation shown in Table 1. Also, we have combined Categories 1 & 2 of the CBAM for these graphic summaries, in that by definition all of the teachers volunteering for participation in the PIT Project and already completing a semester’s worth of activities within it, were above the first CBAM level). We also combined Categories 5 and 7 in these graphics, as our preliminary analysis indicated that the teachers’ did not see a clear distinction in these levels, at least in the way we described them.

We also asked the teachers to make the same sort of categorization of the other teachers in their subject areas in the schools who were not participating in the PIT Project. Figures 4 and 5 show the PIT teachers’ assessment and predictions about their colleagues. Clearly, the PIT teachers expect a multiplier effect to occur in their own divisions, but see themselves as likely to be the ones in leadership positions.

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Table 1.
Adaptation of the CBAM Model; Levels of Involvement with IT as an Innovation in School Practice.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Type of Concern</th>
<th>Action Toward the Innovation</th>
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<tr>
<td>1. Unawareness</td>
<td>None</td>
<td>Total inaction</td>
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<tr>
<td>2. Information Level</td>
<td>“Should I know something about this?”</td>
<td>Casual interest in obtaining some information.</td>
</tr>
<tr>
<td>3. Initial Personal Skills Level</td>
<td>“How does this work? Will I be able to figure it out and handle it?”</td>
<td>Wants to have the chance to try it out and to have enough skills to do so.</td>
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<tr>
<td>4. Level of Routine Use of Some Aspect of the Innovation</td>
<td>“Is there a manageable way that I can come to regularly use this innovation so that some need of mine is met?”</td>
<td>Has found a use for the innovation and a handy way to execute that use, so that it becomes routine.</td>
</tr>
<tr>
<td>5. Extended Impact Level</td>
<td>“Are there other aspects of my educational practice that could benefit from a broader use of this innovation?”</td>
<td>Begins to change aspects of professional routine to incorporate more of the innovation’s potential.</td>
</tr>
<tr>
<td>6. Contributor’s Level</td>
<td>“How can I work together with others to exploit the value of this innovation?”</td>
<td>Becomes involved in collaborative activities associated with the innovation.</td>
</tr>
<tr>
<td>7. Leadership Level</td>
<td>“How might educational practice be changed through exploiting this innovation? How should the innovation itself be altered?”</td>
<td>Develops a leadership role, after reflection, contributes to the evolution of the innovation itself.</td>
</tr>
</tbody>
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Adapted by Collis & De Vries, 1993, from the CBAM Model (Hall, Louckes, & Rutherford, 1977).
Expectations about the impact of the PIT Project on teaching and learning. The PIT teachers were asked to predict the benefits of their participation in the PIT Project on various aspects of their instructional practice and on possible benefits for their students. Of the ten aspects, the following four were chosen by the teachers (significantly, p < .05) to be of most benefit to them (listed in the order of expectation of positive impact):

- Enrichment of the learning material for the new curricula
- Better remedial support for students failing to keep up with the new common curriculum
- Better stimulation of students' metacognitive skills
- Being able to better provide a differentiated variety of learning activities to heterogeneous classes of students within the common curriculum

In contrast, the following options were not seen by the teachers as likely to result from their in-service and support experiences in the PIT Project (arranged in order of least likely):

- To get help in how to use IT during the presentation and demonstration of lessons
- To help students produce reports and graphics on the computer
- To help students access to new sources of information outside their textbooks and workbooks
- To better able to put into practice the new curriculum methods
- To better able to explain concepts and ideas to the students

These opinions will need careful review during the project, as a number of them involve instructional approaches felt to be central to the new curriculum and to the new approach for integrating IT into the curriculum. Either the teachers have not fully accepted the likelihood of these new objectives actually happening in practice (i.e., more group and project work, students making on-going use of IT for their own work support and information needs, and, most fundamentally, teachers using IT as an integrated part of the new methodology for their subject areas) or they are not, at this point, optimistic about being able to get support from inservice activities adequate to these sorts of challenges. It will be interesting to see how their opinions on these issues change during the PIT Project.

Professional development. An important intention of the PIT Project strategy is to stimulate teacher networking as a means of on-going professional development outside of the structured theme group meetings and activities. We asked the teachers a number of questions about the perceived value of informal networking with teachers in their subject area interested in similar theme topics but from a wide range of schools and areas of the country. The teachers were clearly interested in using such opportunities to get information about new software, but were divided in terms of how useful they felt networking would be in a more general sense, for example, to exchange experiences of classroom practice, to participate in reflective discussions, or to be able to make informal individual contacts with subject-area specialists. On one point teachers were largely negative—they did not see much potential value in the use of an on-line BBS for support of informal networking.

These opinions, expressed at the beginning of the PIT Project, suggest to us that these teachers are highly motivated to get information about IT materials for the direct use and benefit of their students, but have less awareness of the potential benefit of focusing on themselves as reflective practitioners and members of a professional community.

Finally, the teachers were asked to predict the effectiveness for themselves of the various types of support and stimulation strategies being planned by the PIT Project: traditional inservice sessions, written reports from other PIT schools about their experiences, materials written by curriculum specialists, magazines and special publications, television and radio broadcasts, availability of the free BBS, and opportunities for informal exchanges with teachers within and outside of their own schools. Perhaps reflecting their experiences to date with in-service methods in The Netherlands with respect to IT, which have been largely

![Figure 1. Age range of teachers involved in the PIT Project.](image-url)
of more traditional nature (Thijssen, Sijpde, Collis, Plamb & Abbinx, 1990), the PIT teachers have begun the project expecting the most from traditional sorts of in-service support. If the third level of the triple-innovation involves an emphasis on teacher networking as an important dimension of teacher professional development will become highly valued relative to more traditional, structured face-to-face in-service sessions and materials written by specialists, remains to be seen.

The PIT School Coordinators' Reactions to the Start-Up of the PIT Project. A detailed questionnaire was completed by the teacher serving as PIT coordinator in each PIT School at the end of the first four months of the project. Responses were received by 116 of the coordinators in time to be included in the analysis. Because we wanted to allow the coordinators themselves to generate the themes and issues most relevant to themselves, the questionnaire was largely of a free-answer format. Our first task of analysis was to classify all the free responses into a series of categories and then to subsequently code all responses according to these categories. The categories will be used in subsequent questionnaires. Highlights of the responses include:

Impressions of the most important aspects of their task as coordinators. Approximately half of the coordinators gave responses emphasizing management and coordination tasks, while the other half emphasized more content-oriented and social-oriented guidance, stimulation, and communication aspects. It will be interesting to see if these differences in approach to the task become associated with differences in the extent of the multiplier effect in the various schools.

Problems encountered. Again, a clear distinction arose among the school coordinators, although not directly related to if coordinators felt themselves to be more in the management or stimulation role. Approximately half the coordinators felt they were not encountering any particular difficulties with their tasks, while the other half indicated a long list of problems and concerns, relating to software and hardware problems, to problems in motivating the teachers, to problems in finding adequate time for their tasks, and to problems relating to information management, among others. Given all the complexities of the task described by the coordinators who did indicate problems with their role, it will be interesting to follow-up why the other half of the coordinators did not perceive any particular difficulties. The focus of follow-up analysis will be to determine if it is because they can handle the many aspects of the task with comparative comfort or because they have not yet fully considered many of their functions.

Impressions of IT use by the PIT teachers. A critical aspect of the project is, of course, if teachers are stimulated to integrate IT into the new curricula. Even in the early days of the PIT Project, this aspect seems to be developing well. The coordinators were asked to describe the extent to which the PIT teachers were already trying new instructional approaches involving IT, based on their experiences in the PIT Project; two-thirds of the teachers had already done so. Given the difficulty that teachers frequently face in making the step between in-service and classroom practice, a percentage of 67% is very good. The coordinators also indicated that most of the PIT teachers were enthusiastic about the project: 27% of the coordinators indicated that all of their PIT teachers were enthusiastic, 40% indicating that most of the PIT teachers were enthusiastic, 18% indicating a range of opinion among the teachers, and only 7% indicating dissatisfaction. These are encouraging figures, particularly given the triple-innovation aspects of the PIT Project context.

Impressions of first evidence of a multiplier effect. The coordinators were also asked to estimate how much interest they felt was developing among other teachers in the eight core curricula areas who were not participating in the PIT Project with respect to integrating IT into the new curricula and if the coordinators were of the opinion that this interest was at least partially a result of the multiplier effect beginning in the schools. The coordinators felt that an interest in IT integration in the new common curricula was generally present among all the teachers in their schools, not just those involved in PIT, but in most cases (70%) they described this as, "yes, but only a little bit." Most important, however, was the opinion of the coordinators that some indications of a multiplier effect were beginning. Twelve percent of the coordinators felt they saw it strongly beginning, and 56% of the coordinators felt it was gradually starting to develop.

Thus, despite inevitable start-up problems, and the complexities of the triple-innovation situation, the PIT Project already seems to be having an important impact in the schools.

The Subject-Area Specialists' Reactions to the Start-Up of the PIT Project. A third area of analysis is related to the various theme-group activities and the impressions of the subject-area specialists and teacher educators providing leadership to these activities. At the time of the first analysis, we had written summaries of 27 of the 48 theme-group meetings that had been held. These written analyses varied greatly, as no format had been imposed upon the theme-group leaders for reporting on the progress of the meetings, other than a general request for communication. Some submitted nothing written at all, relying more on informal verbal communication, and others submitted materials ranging from short agendas to long reflective analyses and summaries of questionnaires which they had administered to the teachers in their groups. Synthesizing these sources of input was difficult.

In our ongoing questionnaires to the teachers, we intend to continually compare these starting-point assessments and predictions with new assessments and predictions, and look for patterns of change. We added to the synthesis some more systematically collected information, this time from an extensive questionnaire sent to the curriculum-specialists serving as overall coordinators for the theme-group activity in their subject areas. All eight overall coordinators completed this in-depth questionnaire. Highlights of all this input include the following:

- The specialists were of agreement that the theme-group meetings were being enthusiastically received by the teachers and that the teachers are generally positive about the software they are finding out about and about its instructional possibilities.
- In at least four of the curriculum areas, the teachers had already volunteered to begin developing instructional-support materials relating to various software packages that they had discovered because of the theme groups, and that some of these packages were of such a high quality that their broad-scale distribution was being planned.
- The task of steering the theme groups was difficult because of the great variety in computer-experience levels among the teachers in the groups.
- Although much of the software being used in the project (to date, approximately 40 packages) was being well received, some of the choices were much less successful. Teachers criticized the tone, style, and level of the software.
- A consistent concern is the amount of time it takes teachers to learn how to use a package, and then the additional amount of time it takes to develop strategies for using the package in instruction;
most of the packages available to the teachers are powerful and complex, which also means a long and complex learning curve, beginning with installation problems.

CONCLUSIONS TO DATE?
Is a triple innovation a good idea? Although it may seem three times as difficult to expect three innovations to succeed as one, it appears from the PIT Project that perhaps three concurrent innovations are what is necessary for any one of them to succeed, at least with respect to integration of IT into instructional practice. Despite many years of effort, in the Netherlands and throughout the world, to stimulate this sort of integration, results so far are disappointing (Pelgrim & Plomp, 1991). It has been frequently stated that overall school reform should occur in order for IT utilization to move into a more powerful place in instruction; it has also been stated that IT in instruction is a powerful component in expecting any real reform to occur. In The Netherlands, three levels of innovation—policy, curriculum, and in-service—are taking place at the same time, in a coordinated fashion, with a strong infrastructure of support, overall coordination, and funding. This model can be of value to other educational jurisdictions.

Is the Project meeting its goals? Measuring the effects of the individual components of a triple innovation is difficult, and measuring the effects of individual aspects of any one level of the innovation is impossible, except if an effect is sufficiently negative in impact as to seriously jeopardize the whole initiative. However, it seems to date that the PIT Project is on track to meeting its goals of stimulating teachers to integrate IT into their instructional practice and of being a catalyst to a double-multiplier effect. Certainly the amount of energy and output...
which it is stimulating is impressive. Which "software-subject areahuman network characteristics" combinations evolve as being associ-
ated with the strongest multiplier effect remains to be seen. Our tenta-

tive hypothesis is that the development of the sense of a human net-
work, a "community of practice," may well be a critical variable.

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REFERENCES

Collis, B., & De Vries, P. (1993). The emerging Trans-European Network for
Education and Training: Guidelines for decision makers. Brussels: Task

Force Human Resources, Education, Training and Youth, Commis-

sion of the European Community.


On-Line Communication and Information System for The Netherlands. The

Hague: PTT Netherlands.


about the innovation. Austin TX: University of Texas Research and

Development Center for Teacher Education.


Thijssen, A., Slise, P. van der, Collis, B., Plomp, Tj., & Abbink, M. J.

(1990). The effectiveness of inservice for information technology in the

secondary school. Enschede: Educational Research Centre OCTO.

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