

Design of teacher e-learning: *The scenario model*

Bent B. Andresen

Danish University of Education, Copenhagen, Denmark

Abstract: This paper deals with design principles for teacher education. In particular, it reveals the findings of research funded by UNESCO, the EU and the Danish Ministry of Education concerning scenario-based e-learning. According to this approach, learning scenarios can be considered as a focal point in the process of the design of computer-supported collaborative learning events tailored to the professional development of teachers. The teachers mainly produce these learning scenarios in order to develop knowledge about the learning potentials of information technology (IT) and planning competences regarding the implementation of IT into various learning environments.

Keywords: teacher professional development, learning scenario, use of information and communication technology, e-learning

1. INTRODUCTION

This paper reports findings from research, currently in progress, concerning teacher professional development. The research indicates that a crucial point in the development of teachers' competences is the design of learning scenarios.

A scenario of learning can be defined as a postulated sequence of imagined events aimed at someone's learning. It is characterised by particular roles of the learners, the teachers, and the IT.

Previous research (Nordenbo, 1989) concerning the planning processes, when teachers make decisions about situations of teaching and learning, indicates that teachers need knowledge about such scenarios. Choosing the best scenario can improve teaching efforts and increase learning outcomes. Therefore, it is recommended that the curriculum of both pre-service and in-

The original version of this chapter was revised: The copyright line was incorrect. This has been corrected. The Erratum to this chapter is available at DOI: [10.1007/978-0-387-35615-0_52](https://doi.org/10.1007/978-0-387-35615-0_52)

service teacher education contains topics and tasks where teachers construct and describe innovative learning scenarios with IT integration.

By producing learning scenarios, teachers can learn to implement IT productively, creatively, and effectively into their classes in order to foster their students' learning. These learning scenarios can then support the teachers in imagining and reflecting on their domain of practice.

2. LEARNING SCENARIO BACKGROUND

The flow of a learning scenario can be compared to a journey. The activities of the students and the teachers are the important steps of the journey. Like a journey, a learning scenario has a starting-point and an end-point. The starting-point is the learning potentials of the students, which depend, among other things, on the pre-requisite knowledge and skills of the students. The intended learning outcomes are the end-point.

Learning outcomes can be expressed in terms of the competences, which the students will be in a position to demonstrate when they have successfully finished the learning event. A competence framework can include personal and general competences, for example, the competence to co-operate and communicate by means of IT (Andresen, 1996) and fluency with respect to IT (Being Fluent with IT, 1999).

The scenario-based approach also deals with particular teacher competences. In this paper, the notion 'teacher competence' refers to teachers' knowledge and skills concerning reflective planning, performance, and evaluation of learning when students use IT in various ways to foster learning.

The traditional curriculum-related competences and the new IT-related competences complement each other (Andresen, 1998). Teachers thus need competences in both areas as illustrated in Figure 1.

The IT-related competence reflects the application of a variety of software genres into education. The mainstream IT genres are, among others, word processors, painting and drawing genres, spreadsheets, e-mail, and web-based sources and services. Thus, teachers must be capable of deciding how to use each of these genres according to the overall goals of the students' learning. In making these decisions, teachers benefit on having knowledge about how to use the IT genres most effectively in relation to subject-related and cross-curricular learning objectives. In particular, teachers appreciate being able to recognise and judge the specific contribution that the use of the genres makes to students' learning.

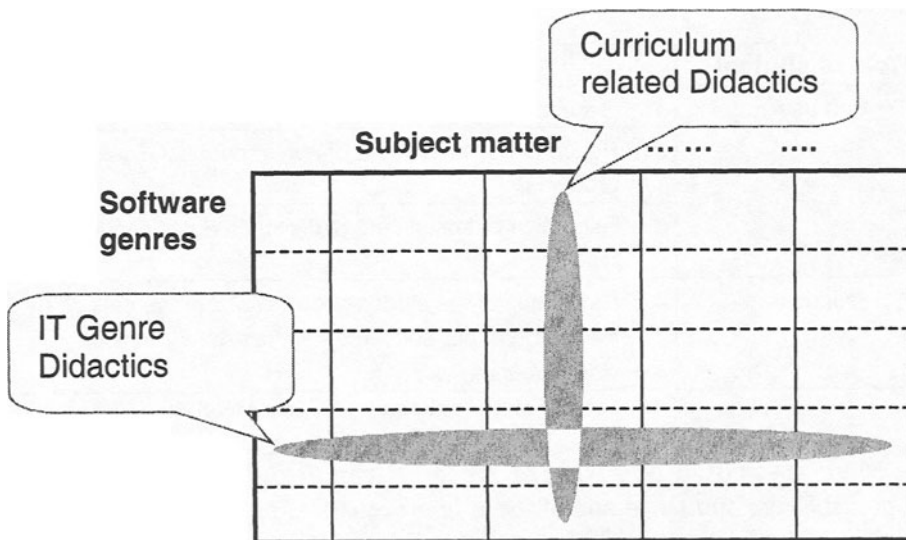


Figure 1. Two perspectives considering the application of IT genres into education

For those aspects of learning where an IT genre is to be used, teachers must be able to identify in their planning the way(s) in which it can be used to meet learning objectives. This encompasses knowledge about: 1) ways to assess students' progress and to make sure that the use of IT is appropriate to the particular students' capabilities; and 2) ways of teacher intervention in order to stimulate and guide students' learning (DfEE, 1998). In particular, teachers' competence encompasses knowledge about how to organise the work of groups of students dealing with IT for collaborative efforts ensuring that teacher coaching takes place when appropriate.

In short, teachers have to be capable of planning, implementing and evaluating learning scenarios, which reinforce teaching efforts and foster students' learning.

3. FOUR EXAMPLES OF LEARNING SCENARIOS

The number of scenarios is enormous. It is, however, possible to identify some ideal types of scenarios, which are typical of the everyday life of teachers in primary school, secondary school, at university, etc. Table 1 describes four learning scenarios with the use of web-based products. The scenarios vary with respect to the role of the students and the role of computers. The widespread use of IT is not limited to these four scenarios.

Role of student	Learning Scenario
End-user	1. Reception of the content of linear digital products
	2. Reception of the content of non-sequential digital products
	3. Reception of the content of digital products aimed at teaching
Producer	4. Production of the students' own digital presentations by means of proper editors to handle texts, graphics, video, sounds, etc.

Table 1. Four examples of the application of IT into education

More specialised or advanced scenarios can also be found, but many approaches are similar to one of these four scenarios, or consist of a mixture of these. The first scenario concerns the use of linear products – on-line or on CD-ROM or DVD – that are designed to control the process of presentation.

The second scenario covers the use of hypermedia, admitting linear as well as non-sequential reception, where the locus of control is assigned to students. The students are assigned an active role, since they select topics and jump between these.

Research findings indicate that scenario No. 2 is superior to No. 1 (Luckin et al., 1998). The reason is that the students' recall of concepts is better and the number of misconceptions is lower when they are able to control the media. This is not the case in scenario No. 1 where the narrative, so to speak, controls the students. Compared to this, the students use the media in an interactive way in scenario No. 2. This can help them to get rid of their misconceptions and to generate a narrative coherence of the subject matter for themselves.

Scenario No. 3 covers the use of digital products aimed at teaching. The teaching strategies form a spectrum ranging from provision of ordinary corrections and responses to comments and explanations tailored to the particular needs of students.

Scenario No. 4 considers students as producers of hypermedia, i.e. the students are assigned the roles of creator, inventor, producer, developer, and designer of messages, information, and knowledge. In principle, the process of production begins with an empty sketchpad and with a mind full of ideas. The students then use the computer as a versatile representing tool. They can make several drafts before they finish their product to be handed over to their teacher or presented in public. At each stage, the teacher can supply verbal advice or written comments, so the students can rethink and improve

their design. The new paradigm changes the learning styles towards a process-oriented approach as opposed to a product-oriented approach.

Some of the visionary dimensions of the central learning scenarios can be deduced from the curriculum. The best learning scenarios are visionary and at the same time recognisable as seen from the point of view of overall educational objectives.

4. METHODOLOGY

The underlying assumption of the research is that teacher competence relies on the capacity to image a series of steps taken by learners in order to achieve their learning objective. In their professional life teachers repeatedly deal with imagined learning scenarios before implementing them. To plan learning activities is to deal with a number of scenarios, and to choose from potential candidate scenarios.

A study about the way the teachers plan their teaching and the set-up for their students' learning, involving 62 teachers and five head teachers from primary and lower secondary schools confirms the need for knowledge about future scenarios (Andresen, 2000b). In particular, the study indicates that teachers in general preferred to learn about and to develop scenarios in order to become aware of and implement new ways of using IT to foster learning.

The teachers' design of such learning scenarios, which can be done under guidance as a substantial part of teacher education, are suitable for internet-based education, where the participants are in charge of their learning processes (Paulsen, 1995). This is opposed to computer-based instruction and web-based course delivery.

During the e-learning event, teachers use their ability to imagine an event from the beginning to the very end when they plan, conduct, and evaluate learning processes. Hereby they develop competences that, as mentioned above, are vital for educational planning. Thus, design and reflection concerning learning scenarios supports the development of professional competences.

The research considers three case studies regarding the scenario-based approach to teacher e-learning:

- the Educator Training Programme for IT advisors (in Danish: 'Pædagogisk diplomuddannelse') from 1997;
- the national in-service teacher training programme entitled 'The Danish IT Driving licence' from 1998/9;
- a UNESCO worldwide e-learning course for the teachers of teachers from 2001.

The three cases have been examined in order to judge the value of the scenario-based approach to teacher e-learning.

5. RESULTS

The Educator Training Programme for IT advisors is a one-year full time or two-year part-time further education course for teachers. During the first semester, the participants develop learning scenarios regarding the use of IT in schools. The examination of the process indicates that the work on learning scenarios helps foster innovation in thinking and planning. In particular, it fosters creativity with respect to the innovative use of various genres of IT.

The scenarios produced usually are of great interest to the other participants. They serve as a means of communication of innovative ideas with respect to the role of the pupils and the teachers, and stimulate reflection concerning the intended outcomes of the pupils' use of IT (Andresen, 1999).

The Danish Educational IT Driving Licence has been developed in order to accelerate the processes of in-service teacher education. The objective of the IT driving licence is to contribute substantially to satisfy the teachers' need for competences with respect to the implementation of teaching and learning with full integration of IT and the acquisition of the new literacy. This in-service teacher education has been offered every year since 1999/2000. A pilot course was tested and evaluated in 1998/9.

The curriculum concerns seven learning scenarios developed by the participants. To be approved, these scenarios must be a realistic and grounded description of the application of IT into the schools.

The result of the evaluation was highly positive. According to the 7,000 teachers who attended the course in the first year, the intended objectives were met. Eighty-eight per cent of the teachers considered the course content to be highly relevant (Andresen, 2000a).

The form of the course is computer-supported co-operative learning lasting from 4 to 9 months. The evaluation was very positive. For example, 90 per cent of the teachers appreciated this form (Andresen, 2000a). In particular, they appreciated the teamwork; it helped them focus their learning and increased the quality of the design of learning scenarios with integration of IT.

In order to develop capabilities and foster reflection, UNESCO asked the author, together with some colleagues, to develop a programme for in-service education, 'Multimedia in Education', to be distributed worldwide (Andresen and Brink, 2001).

The aim of this in-service education is that participants construct knowledge about important learning and teaching aspects, in particular teachers' roles, students' learning strategies, social/collaborative learning, IT literacy, meta-cognition, motivation, and methods of evaluation (in particular the use of digital portfolios).

A focus of the in-service teacher education is the application of educational multimedia according to learning scenario types 1, 2, 3 and 4 and mixtures of these into schools/educational settings.

The first version of the course module including the e-learning concept has been tested and the final version is ready to be distributed worldwide. At first, around 30 secondary school teachers and teacher trainers attended a one-week seminar followed by two months of self-directed teamwork (Andresen, 2002). Both the seminar and the two months of team-based learning covered the design of innovative learning scenarios. The four scenarios produced by each team of participants were of very high quality. The scenarios submitted by the participants were tailored to the particular learning possibilities of the local schools and in-service teacher education. In particular, the reflections concerning the teachers' role were very deep.

6. CONCLUSION

This paper reports some guidelines based on research, currently in progress, concerning the design of e-learning aimed at teacher professional development. The research indicates that a crucial point in the development of teachers' competences is the development and use of learning scenarios.

The concept of learning scenarios designates a postulated sequence of imagined events aimed at learning. Each of these is characterised by particular roles of teachers, students, and information technology.

Such learning scenarios can help educators imagine and reflect their domain of practice, including their own role as teachers and advisors. In particular, the objective of the work on learning scenarios is to qualify the teacher to take part in the social construction of the use of the information technology. The teachers learn to develop innovative learning scenarios where IT is used productively, creatively, and effectively to foster students' learning. Examination of the various forms of e-learning devoted to teachers indicates that the participants value the scenario-based approach to teacher education and that as a consequence they develop professional competences needed for applying IT into their schools. Therefore, it is recommended that the starting-point in the design of in-service teacher education is cooperative, self-directed activities, where teams of participants construct and describe innovative learning scenarios.

REFERENCES

- Andresen, B.B. (1996) To be Hypermedia-literate is to be Liberated: Reading, Writing, Arithmetic and Hypermedia Literacy as Basic Skills. *Educational Media International*, 33, (3)
- Andresen, B.B. (1998) *Den IT-pædagogiske dimension i læreruddannelsen - en vejledning*. Copenhagen: Danish Ministry of Education
- Andresen, B.B. (1999) *Skolen I Tiden*. Vejle: Kroghs Forlag
- Andresen, B.B. (2000a) *Evaluering af det første år med Skole-IT*. Aarhus: UNI-C (Available at www.skole-it.dk)
- Andresen, B.B. (2000b) *Evaluering af formidlingsprogrammet Lær-IT*. Copenhagen: Royal Danish School of Educational Studies
- Andresen, B.B. (2002) *The Final Report on the Seminar on the Use of Information Technology across the Curriculum (Multimedia and Internet)*. St. Petersburg, Russia: The UNESCO Institute for Information Technologies in Education
- Andresen, B.B. and Brink, K. (2001) *Multimedia in Education Curriculum*. The UNESCO Institute for Information Technologies in Education (Available at www.iite.ru)
- Being Fluent with IT (1999) Washington D.C.: National Academy Press
- DfEE (1998) *Teaching: High Status, High Standards. Requirements for Courses of Initial Teacher Training - Circular Number 4*. London: Department for Education and Employment
- Luckin, R. et al. (1998) *An Evaluators' Toolkit for Tracking Interactivity and Learning*. In M. Oliver (ed.) *Innovation in Evaluation of Learning Technology*. London: University of North London
- Nordenbo, S.E. (1989) *Når voksne lærer – fx edb*. Copenhagen: Munksgaard
- Paulsen, M.F. (1995) *The on-line Report on pedagogical Techniques for Computer-Mediated Communication*. NKI (Available at www.nki.no/~Morten)

BIOGRAPHY

Bent B. Andresen, Ph.D. is an associate professor. His research areas are teacher professional development, IT and the curriculum, new literacy, e-learning, and qualitative research methodology. He is currently in charge of a UNESCO project *Multimedia in Education* and the project *Usability of IT for Teachers and Learners* funded by the Danish Research Council. He is also a member of the Steering Committee concerning *The Danish IT Driving Licence*.

ACKNOWLEDGEMENTS

Sponsors of the work described in this paper are the EU through the project *PEDACTICE* (Project MM1043), UNESCO through the project *Multimedia in Education* (Contract No. 878 411 1). and the Danish Ministry of Education through the three projects *Lær-IT*, *Skole-IT*, and *Den pædagogiske dimension i læreruddannelsen*.