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## DIGITAL PORTFOLIOS AS A LEARNING TOOL IN TEACHER EDUCATION IN NORWAY

### A THEORY BASED DISCUSSION OF DIFFERENT MODELS IN TWO SITES

#### **Abstract:**

*In this paper we present what we call a basic model for portfolio processes based on sociocultural perspectives of learning and assessment. Three 'learning phases' are identified; the first and most extensive phase focuses on the production processes resulting in objects for the Working Portfolio. The second focuses on selection for a Presentation Portfolio and/or a final exam, with self-assessment as an important element, and the third phase relates to the learning involved in the final assessment.*

*Two teacher institutions in Norway involved in an ICT-supported portfolio project provide data for our study. We describe and discuss differences and similarities of their portfolio models in relation to our basic model and highlight some areas for improvement. The latter include more focus on student control, on developing quality criteria and metaprocesses, as well as on utilizing the qualitatively new learning opportunities in digitalized portfolios. By way of conclusion we explore some critical aspects of portfolios in teacher education in light of Wenger's social theory of learning, focusing on the concepts participation, reification and identity formation.*

### INTRODUCTION AND CONTEXTUALIZATION

There has been a sudden rise in interest in portfolios in higher education in Norway due to a major education reform that was signaled by a government appointed committee report in 1999 and instituted by Parliamentary Proposition 27/2001, generally called the "Quality Reform of Higher Education". One central aspect of the reform is aligning the Norwegian higher education system to international systems regarding organization, length of study, grades etc, another is improving the learning environment by focusing on student active teaching methods, closer fit between teaching and evaluation, new forms of assessment and closer supervision of students. Since portfolios were specifically mentioned in both the report and the proposition as one example of new assessment forms, many portfolio experiments are underway or planned in a variety of disciplines at universities as well as in professional education.

The project reported in this article is called "Alternative Assessment in Teacher Education". Three Norwegian teacher institutions are involved, the Department of Teacher Education at the University of Oslo, which runs a one year program for students who have finished their subject specialization, and the Departments of Teacher Education at the University Colleges of Vestfold and at Stord/Haugesund, both of which have four year teacher programmes. The two latter institutions are included in our study. The Alternative Assessment Project is connected to an ICT project, and the digital portfolios are part of a larger effort to develop technology rich learning environments in Norwegian teacher education. A constructivist perspective on knowledge and learning is common to most portfolio use in teacher education (Mc Laughlin & Vogt 1996). Our project is based on social constructivist and sociocultural perspectives and a major concern is how collaborative learning can be supported in the portfolio processes. Our focus in this article is on describing and discussing the portfolio models and typical learning and assessment processes in the two

sites, with a particular emphasis on the learning potential and areas of improvement. Our main questions are:

- What are similarities and differences in the portfolio models the three sites have implemented?
- What are particular areas for further improvement?
- What are critical factors in portfolio work as regards students' learning processes?
- How is the digital aspect of portfolios utilized and what are unused potentials?

In order to answer these questions we have developed what we call “a basic model of portfolio processes” which we use as an instrument to describe variations within each site and across sites. Our data come from three sources: project reports from each site, semistructured interviews with teachers and regular, reports from semimonthly meetings in the project group during the autumn semester 01 and the spring semester 02.

## II. A BASIC PORTFOLIO MODEL

Zeichner & Wray (2000) distinguished between the “learning portfolio”, often used throughout the duration of a pre-service teacher education program, the “credential portfolio”, often used to assess prospective teachers' readiness to receive an initial teaching license, and the “employment portfolio”, a showcase portfolio representing students' best work and used when they applied for teaching positions (pp 615-616). The portfolio type we discuss in this article does not correspond to any of these categories, as it is a *discipline based “learning and assessment portfolio”*.

Before presenting our theoretical perspectives we will outline what we have called ‘a basic portfolio model’. Defining the portfolio in education is no easy task. One of the most commonly used definitions is by Paulson, Paulson & Meyer (1991):

A portfolio is a purposeful collection of student work that exhibits the student's efforts, progress, or achievements in one or more areas. The collection must include student participation in selecting contents, the criteria for judging merit, and evidence of the student's self reflection (p. 60).

This is a normative definition that would exclude several of the ‘portfolios’ we present in this article; and we will discuss this point later. In international literature there is a great variety of portfolio models (Black et. al. 1994, Brown et al. 1997, Yancey & Weiser 1997, Klenowski 2002), but common to most of them seem to be “collection, reflection, selection” as well as the postponement of summative assessment (Hamp-Lyons & Condon 2000, p. ). Portfolios were first widely used in the arts and in writing and consensus has developed in these subject areas about the usefulness of these characteristics. The model presented in Fig. 1 is based on a collection-reflection-selection framework, and as such it can be seen as a benchmark to determine the success of portfolios in these two sites. But because of the rapid spread of portfolios to a great variety of disciplines and contexts in Norway, it is important to discuss whether this framework is equally useful everywhere. There was no unified conception of portfolios among teachers in the participating sites. It is also worth noting that none of the institutions had any previous experience of using portfolios. By presenting this model we want to raise the awareness of advantages and disadvantages of this particular model.

But the model is primarily a descriptive tool, and our purpose is to illustrate how the learning potential at different stages in the portfolio processes depend on

what choices are made regarding some key factors in each of the 'learning phases'. We have chosen this term because we have been particularly interested in how the portfolio can support student learning. In real life the portfolio learning processes are continuous and iterative. Our figure is meant to identify critical factors for improvement in institutions where they have just started using portfolios. Fig. 1 is called the basic model because it summarizes the questions we posed to each institution in order to describe them, and figs. 2-5 show some characteristics of portfolio use in four disciplines.

### **Learning phase 1**

This phase comprises activities and processes resulting in a variety of objects (written, oral, visual, practical) which are collected in a Working portfolio, learning is dependent on a number of factors that vary from site to site. We have identified a number of key questions to ask in order to identify how portfolios are used in phase 1. Some questions relate to the macro level, some to the micro level:

- *Organization.* How are learning processes organized? (i.e. are they mainly lecture based, case based, project or problem based?) What combinations?
- *Individual-collective.* How is the relationship between individual and collective/collaborative work? What kinds of work dominates?
- *ICT.* Are ICT used primarily for individual writing and for organisation of portfolio processes, or also for feedback, discussion and collaboration?
- *Feedback practices.* Who gives feedback and how is it organized? (peer/teacher, written/oral, individual/group, digital/paper based)
- *Metaprocesses.* To what extent are reflection as well as discussion and negotiation of criteria integrated in the work with theoretical and practical aspects of the subject area?

Teacher and peer feedback are crucial aspects of formative assessment (Topping 2003).

### **Learning phase 2**

In our basic model this phase is connected with students' selecting documentation for their Presentation Portfolio (PP), regardless of what media it is presented in. Important questions to ask in order to determine what and how students learn in phase 2, are:

- *Self assessment* Are students involved in self assessment as part of the selecting what goes into the PP, and do they use criteria and reflection in doing so?
- *Criteria* Have students been given explicit criteria for what counts as good quality work? Have these been developed in cooperation with the students or negotiated with them?
- *Reflection* Are students asked to write reflective texts for their PP?

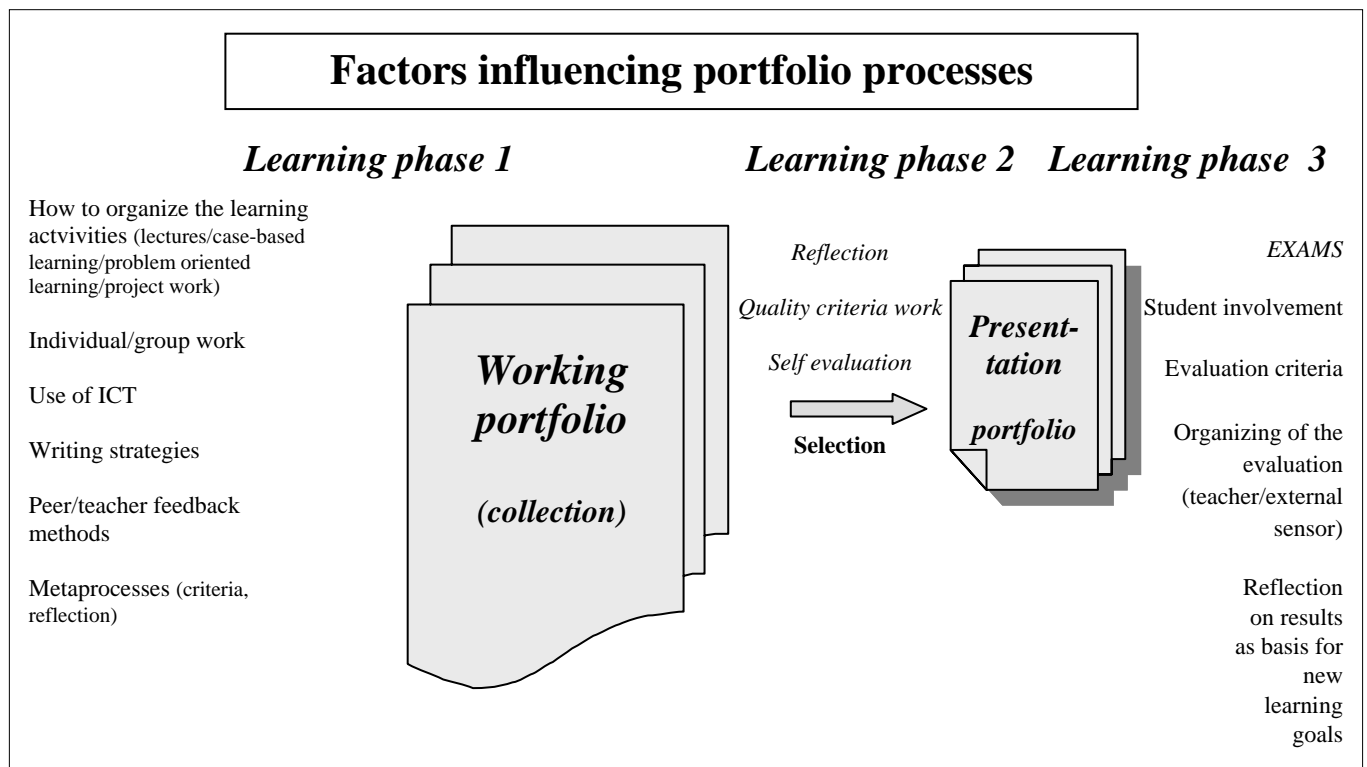
Self assessment of portfolio work are seen as important aspects of formative assessment (Topping 2003).

### **Learning phase 3**

Summative assessment is center stage in phase 3, which covers a very short period of time compared to phase 1. By calling also this a 'learning phase', we want to emphasize the learning potential in the summative assessment process, and we have identified some critical factors:

- *Object of assessment.* What is being assessed? The portfolio itself? Portfolio based oral or written performance? Combination of portfolio and traditional exam?
- *Student involvement.* Is the student directly involved? What degree of control does the student have over the object of assessment?
- *Criteria.* Are the criteria implicit or explicit? Do the criteria include process or just product?
- *Assessor.* Is the traditional Norwegian pattern of external assessors + teacher still dominant? Are peer and self assessment used for summative purpose?
- *Reflection.* Is there any space for setting new learning goals on the basis of assessment results?

Fig. 1. Basic model for portfolio processes in the project "Alternative assessment in teacher education in Norway"



in Norway"

This model is influenced by Hamp-Lyons & Condon (2000) who insist that *collection, reflection and selection* are "the basic components, the essential proteins, from which we believe all portfolios must be built" (p. 120). They argue that a portfolio model without these components "will be less than it could be" (ibid.). Even though Hamp-Lyon & Condon are mainly preoccupied with the writing portfolio, we find their argument relevant for portfolios in general.

This raises, however, the question of the status of our model, whether it is purely descriptive or normative. Primarily we see the model as just a tool which is useful for visualizing some basic elements of how portfolios are used; a tool to help us distinguish similarities and differences in different sites. As is often the case with models, however, there is a thin line to normative usage, and we will return to the question about whether "collection, reflection and selection" are in fact constitutive of portfolios as a learning tool.

### III. PORTFOLIOS AS A LEARNING AND ASSESSMENT TOOL IN LIGHT OF SOCIOCULTURAL THEORIES OF KNOWLEDGE AND LEARNING

From sociocultural perspectives knowledge and learning are viewed as situated, social, distributed and mediated, dependent on language and dependent on participation in communities of practice (Säljö 2000, Dysthe 2001). In our view these perspectives of learning may help us understand as well as improve learning environments in higher education. Computer Supported Collaborative Learning (CSCL) (Salomon 1995, Koschman 1996), which is the paradigm for introducing information technology in the teacher education project we deal with in this article, is based on sociocultural perspectives. They also govern our understanding of assessment as closely integrated in the learning processes instead of as a separate event after learning has taken place (Gipps 1994, Greeno, Collins & Resnick 1996).

#### *Portfolios as mediating artifacts*

The cultural historical school of Vygotsky, Luria and Leont'ev underlined the fact that human beings develop and use physical, technical and semiotic tools. Tools are intellectual and practical resources which we have access to and which we use to understand the world around us and to act on it. Portfolios are mediating cultural tools, and the physical and cultural aspects of them are important, as well as the rules and routines and processes the portfolios are surrounded by and embedded in. If portfolios are seen solely as an assessment tool, the main focus is usually on the products. We look at portfolios primarily as tools or artifacts that mediate learning. Digitalization of portfolios provides an interesting example of how learning processes change when the mediating tool changes. The first step is often to use digital portfolios just as a different medium of storage, and the next one is to ask what new learning potential digitalization offers (Otnes 2002). Is there a potential in using multimedia and hypermedia in general? (Woodward & Nanlohy 2002) Can the possibility of openness given by ICT offer better conditions for self- and peer assessment? (MacDonald 2002) Could written dialogue, both synchronized and asynchronized, be complementary to oral dialogue and thereby improve reflection? (Sorensen 1999) Our empirical data suggest such possibilities.

#### *Learning as situated, social and distributed*

The term 'social' is used in at least two meanings when related to learning (Wertsch 1998); one emphasizes the historical and cultural *context* which the learner is situated in, the other the relational and interactional aspect. Both are relevant to portfolio processes.

The second meaning of 'social' focuses on *interaction* processes. As shown in Fig. 1 collaborative learning in various forms are at the centre of what we have called "Learning phase 1". Koschman (1996, p. 13) points out that it is easy to recognize examples of 'collaborative learning', but difficult to define what it is. While Bruffee (1993) focused on the goal of collaboration as enculturation into communities of practice, Roschelle & Berend (1995) described it as mutual engagement in problem solving. Salomon (1995) emphasized "genuine interdependence" as the main prerequisite for collaborative teamwork, and he has also pointed out some of the common pitfalls for productive group collaboration. Technology should ideally serve as support to collaborative processes (CSCL) and a long-term goal of our project is therefore to find out in what ways the digital portfolio may enhance collaborative learning processes.

When knowledge development and knowledge *production* is in focus instead of knowledge *reproduction*, the notion that knowledge is *distributed* becomes of practical importance in the learning activities. Learning is dependent on how well the group is able to draw on the different skills and insights of its members and thus extend beyond the capacities of the individual. Digital portfolios may open up new opportunities of making visible how the knowledge of different students complement each other, for instance because they gain access to other students' portfolios and to different kinds of collective shared documents, and because they can make hypertextual connections. The mother-tongue models from Vestfold and Stord/Haugesund and their elements of collaboration across institutional borders are examples of this. An important issue is whether coproduction of knowledge and distributed learning actually takes place, or whether it is only a juxtaposition of different persons' knowledge? The latter is often the case when students coordinate different learning tasks without utilizing each other's knowledge. Do the portfolios reflect not only the contributions of each member but also the 'added learning value' of dialogical interaction of different voices? (Dysthe 1996).

From a sociocultural perspective language is not just a mediating tool for learning, but closely bound up with thinking itself (Vygotsky 1986). Language is part and parcel of all phases of portfolio work, not only when the documentation is a written product. Collaborative learning processes are dependent on shared oral and written information and on dialogic interactions at all stages of knowledge production.

***Learning as participation in communities of practice.***

In theories of 'situated cognition' learning is seen basically as a process of enculturation into a community of practice (Brown, Collins & Duguid 1989, Lave & Wenger 1991). A community is characterized by *mutual engagement, joint enterprise and shared repertoires* (Lave & Wenger 1991, Wenger 1998). Students in teacher education participate in several communities of practice during their education, most noticeable the learning community of peers and teachers at the particular teacher institution and the community of practitioners in the school(s) where they are student teachers. Within each of these communities students may also participate in a number of others, for instance the various disciplinary communities and various peer groups. In order to define a teacher education class or a peer group as 'a community of practice', the students must share a mutual engagement in learning, be willing to define the particular learning task as a joint enterprise and share 'repertoires', for instance strategies for group work, for how to give response or for how to create hypertextual links. A portfolio assignment may be located within different communities of practice, and the particular context where it is situated will make a difference regarding the opportunity space it affords for the students.

'Participation' is both personal and social, and the term describes "a complex process that suggests both action and connection. It combines doing, talking, thinking, feeling, and belonging (Wenger 1998, p. 56). Participation includes all kinds of relations, not just collaborative, but also conflictual and competitive. This is in keeping with Bakhtin's view of dialogue where the creative potential lies in the tension between multiple voices and conflicting perspectives (Bakhtin 1986, Dysthe 2001). An important question to ask is therefore whether portfolio assignments presupposes students' participation in and across different communities of practice or only individual engagement with the tasks.

'Reification' is a concept introduced by Wenger (1998) which etymologically means "making into a thing". Wenger uses reification in a more general sense about

processes that give form to our experience by producing objects, processes that include for instance "making, designing, representing, naming, encoding" (Ibid p. 59), as well as the products of such processes. The concept is a difficult one, but we will nevertheless explore some implications of seeing portfolios as reification of practices.

One implication is the close connection between process and product. When a certain understanding is given a form, for instance in a portfolio artifact, this form then becomes a focus for negotiation of meaning. Reification does not simply translate meaning into an object; such translation is never possible and "therefore the process and product always imply each other" (Ibid. p. 60). In portfolio artifacts the process is implicit in the product. To what extent the process itself should be documented and thus reified, is a recurrent question of discussion in portfolio literature. Portfolio products may vary from written or multimedial texts to material objects or a video of a drama performance, and even though the latter may contain more of the process than a written text does, in principle the product always implies the process. It is therefore important to realize that portfolio artifacts "are only the tip of an iceberg, which indicates larger contexts of significance realized in human practices. Their character as reifications is not only in their form, but also in the processes by which they are integrated into these practices" (Ibid, p. 61). We will discuss some of the implications of looking at portfolios as reification of practice in the last section of the paper and tie this to identity formation for teacher education students.

## **VARIATIONS OF PORTFOLIO MODELS IN TWO NORWEGIAN TEACHER EDUCATION INSTITUTIONS**

After a brief contextualization of the use of portfolio in teacher education at Vestfold and Stord/Haugesund University College, we present a visual model of how portfolios are used in two subjects in each site. Our brief comments relate to characteristic aspects of each phase and the degree and use of digitalization.

### **Teacher Education at Vestfold University College**

#### ***Contextualization and brief description***

At Vestfold University College the faculty board decided on a model very similar to our basic model as a framework for the use of portfolios in all subjects, but there are nevertheless considerable disciplinary variations regarding content, structure, assignments, processes and assessment of the portfolio. Our data indicate that this institution utilizes the potential of ICT in the portfolio process, also as a means of achieving a collaborative learning environment, to a higher level than Stord/Haugesund has managed so far. In Norwegian (mother tongue education) the use of hypertext for building collective structures is a significant aspect. Vestfold has instituted portfolio based oral exams for final assessment. The subject syllabus is partly replaced by compulsory portfolio assignments that describe learning goals, content, work methods and use of ICT. In some of the subjects there are no parallel syllabus-based exams.

Commonalities of all the portfolio models at this site: 1. the portfolio is stored and organized digitally, either netbased or in a closed system, i.e ClassFronter<sup>1</sup> and students are

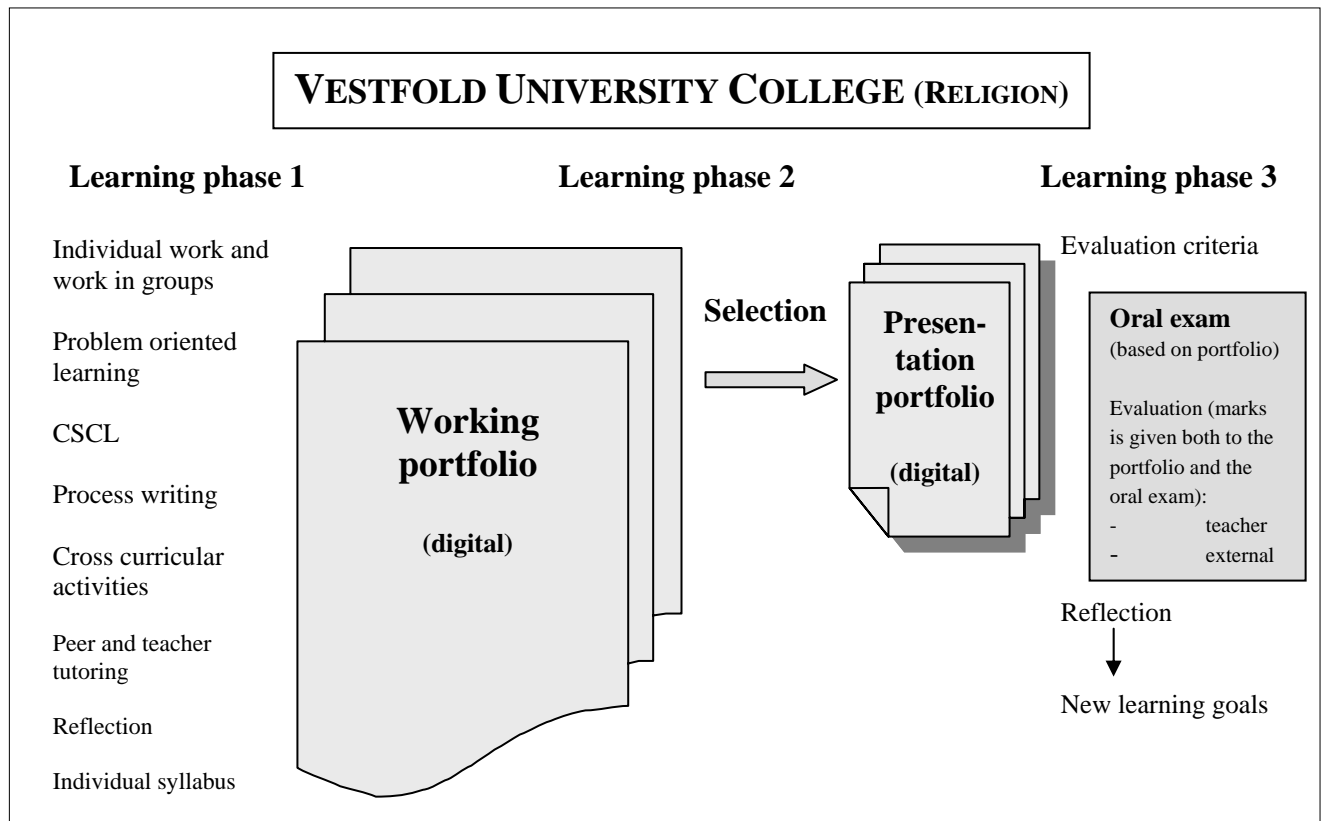


Fig. 2: Portfolio model of Religion, Vestfold

supposed to utilize the digital medium for instance multimedial texts, interactivity and hypertext. 2. the portfolios are in principle open and accessible to a general public, with the exception of sensitive material regarding pupils or the students themselves. Transparency is an important principle at the Vestfold site and this implies that fellow students can access each others' portfolios as a necessary prerequisite for cooperative learning and collective processes. 3) collaborative processes are built into portfolio assignments, including reflection and peer/teacher feedback (Learning phase 1).

Religion emphasizes cooperation with other subjects, for instance art, and students building their own syllabus as an integrated part of the portfolio process. The Mother tongue model has a strong emphasis on building collective texts through the use of hypertext. It is also characterized by extensive use of net based dialogue among the students, especially chat.

<sup>1</sup> ClassFronter is a Norwegian framework for web-based learning



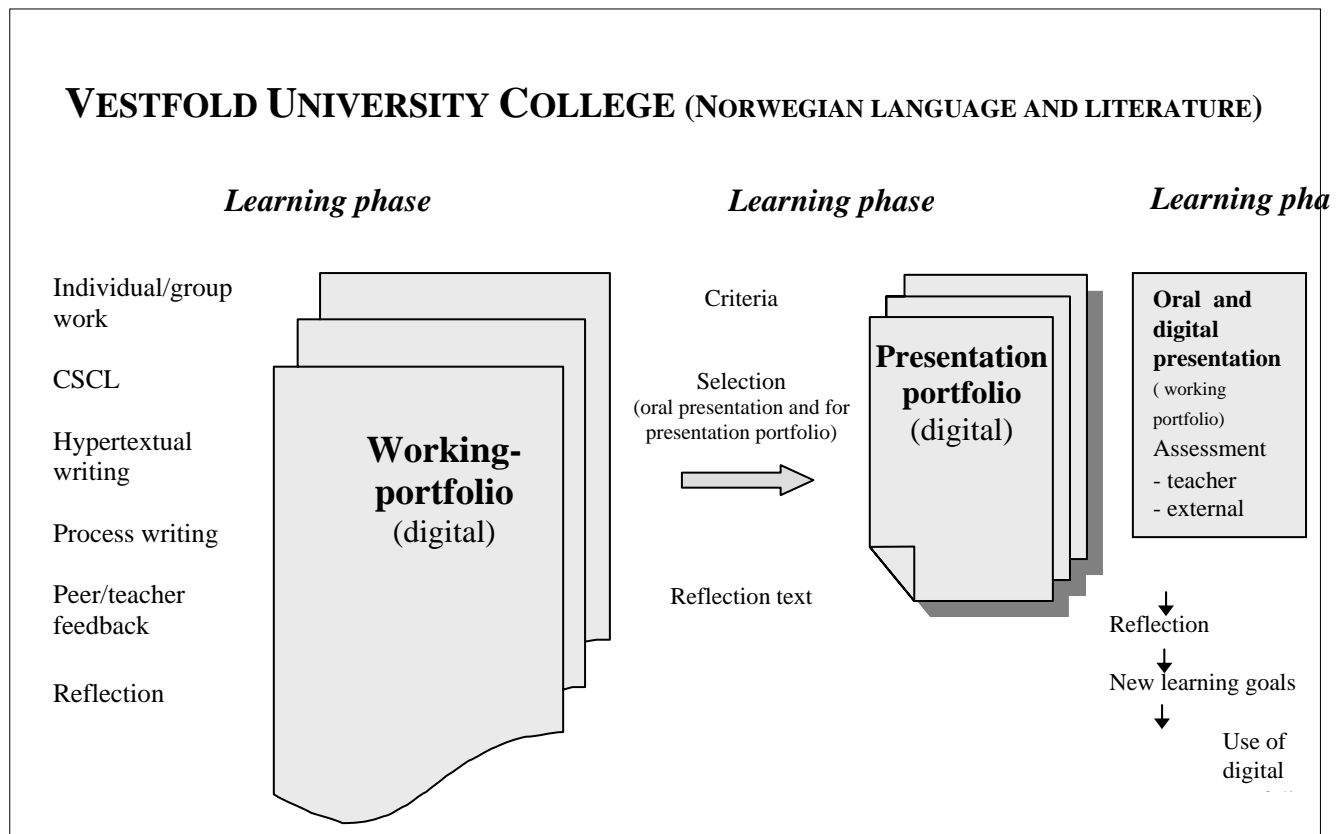


Fig. 3: Portfolio model of Norwegian language and literature, Vestfold

The criteria for selection are mainly defined by the teachers (Learning phase 2). The selection process involves a focus on new learning goals. The oral exam is based on the student presenting selected aspects of his or her portfolio.

## Teacher Education at Stord/Haugesund University College

### *Contextualization and brief description*

The Stord/Haugesund portfolios were not introduced from the project leadership as a direct and integral part of innovation. Instead each discipline was encouraged to develop their own assessment, preferably portfolios, based on the principle that the assessment should mirror the pedagogical methods used. It was thus from the outset at bottom-up innovation strategy. As a result a variety of portfolio models have been tried out, but at the expense of systematic experimentation and discussions at faculty level.

The two examples from Stord/Haugesund both differ a great deal from our basic model, especially in relation to learning phase 2, where selection and criteria work is absent. A specific characteristic is that the portfolios are not being assessed directly, only indirectly through oral exam (Mathematics) or a home based essay exam (Mother tongue), both based on portfolio content. Both subjects also use traditional syllabus-based exams in addition to the portfolio system.

We have chosen to present the portfolio model in Mathematics as well as in Norwegian language and literature, to illustrate differences within this site. In Mathematics one third of the grade was based on the portfolio related oral exam and 2/3 on two traditional written exams. The portfolios are stored digitally and thus

made accessible to all students. Some groups used ClassFrontier for sharing their work, but not much for discussion.

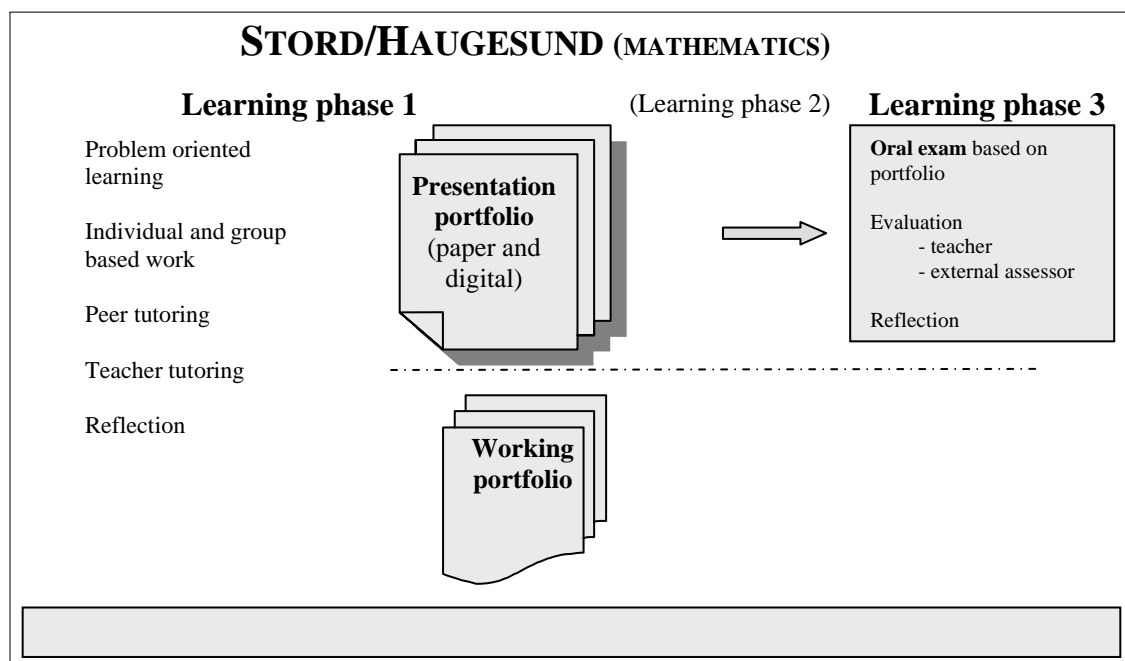


Fig. 4: Portfolio model of Mathematics, Stord/Haugesund

In Mathematics Learning phase 1 combines both a Working portfolio (containing everyday math assignments) and a Presentation portfolio consisting of coursework set by the teacher.

A particular feature of this model was that there was no connection between the students' Working portfolio and the Presentation portfolio. Students made no selection and therefore they did not work specifically with quality criteria. Learning phase 2 was seemingly non-existent, but students did choose which aspects of all portfolio group assignments to present for the oral exam. Learning phase 3 consisted of group based oral exams, where the presented aspects were discussed with the external assessor and the teacher. Reflection and self-assessment were not prominent in this model.

The portfolios in Norwegian language and literature are stored digitally and some of the portfolio products are collective with emphasis on the use of hypertext.

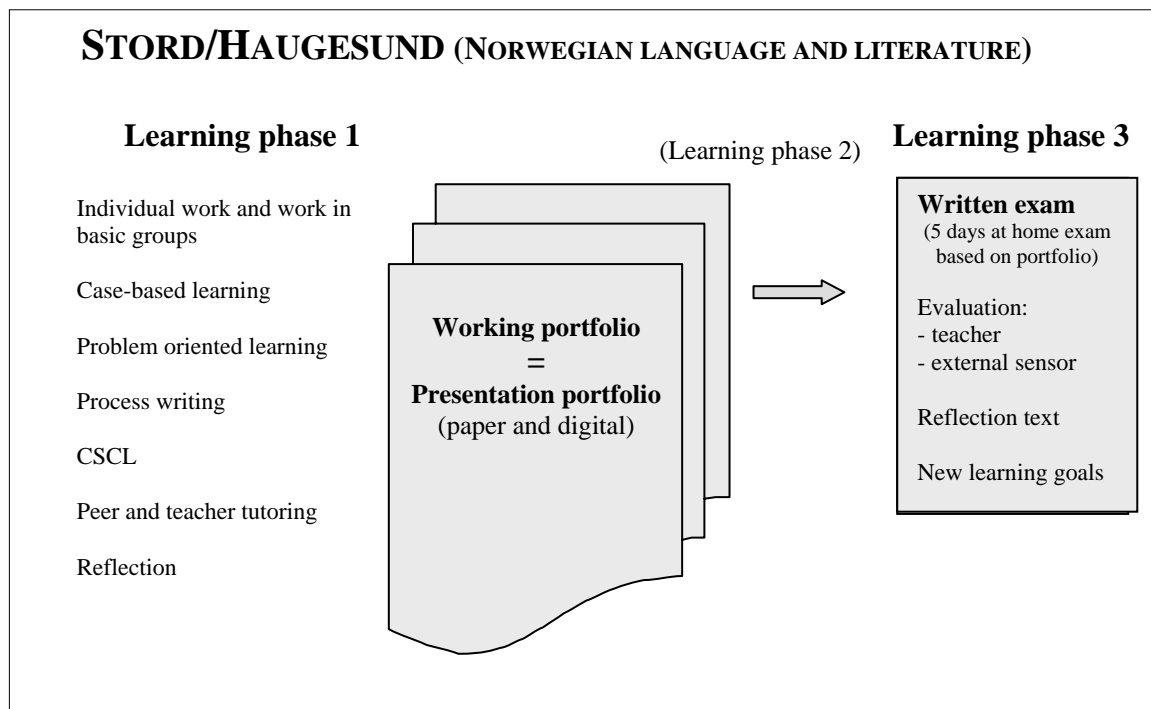


Fig. 5: Portfolio model of Norwegian language and literature (Mother tongue), Stord/Haugesund

This portfolio model contains just two learning phases. Learning phase 1 is very similar to the basic model and includes both individual and group work, problem oriented learning, process writing and CSCL. Learning phase 2 is omitted as there is no selection and therefore very little self-reflection or self assessment.

All components in the Working/Presentation portfolio must be accepted by the teacher in order for the student to take the exam, which is a 5 day home based essay exam (Learning phase 3). The assignment is made by the teacher, but based on the portfolio contents. Students are expected to reflect on their work as part of the exam. External assessor and teacher grade the essay, which only counts for 50 % of the grade. The remaining 50% is based on a traditional written exam. The criteria are largely implicit and not discussed with students.

## V. SUMMARY AND DISCUSSION

### Some general findings

1. Portfolios influence the pedagogical processes in all the sites.
2. There is considerable emphasis on social learning processes in all the sites.
3. Unless cooperation and collaboration is built into the portfolio assignments, individual work continues to be dominant. Assignments are therefore crucial.
4. Developing an integrated portfolio and ICT pedagogy is a major change and takes time.
5. Increased workload is a problem both for teachers and students, especially the first semester due to the demands of developing the specific competencies in using the mediating tools (i.e. computer literacy, collaboration competence, portfolio genre knowledge).
6. None of the sites utilize fully the learning potential in all the three phases of the basic model. Some improvement areas are: a) criteria work in phase 1 and 2, b) student written reflective texts, c) self-assessment and selection. The

lack of focus on selection and criteria work seems to be significant in both sites, and students are not likely to be involved in reflection and self-assessment unless this is built into the assignment or specifically asked for in phase 2.

7. Portfolios used as a basis for final exams have resulted in more varied exam forms which students find more meaningful and where the learning aspect is more prominent as compared to traditional exams.

***How are the learning phases in the model utilized in the sites?***

*Learning phase 1.*

In our sites the use of portfolios and ICT has resulted in changes in the way student learning is organized and there are concerted efforts to create a more collaborative learning environment, also including elements of peer tutoring. Our basic model has a clear focus on student controlled perspective in contrast to the teacher and curriculum controlled perspective (Lave, 1997). Teacher education in Norway has traditionally a strong focus on teacher and curriculum control. The data from our examples indicate that learning in all sites are still mainly teacher and curriculum controlled and that moving the locus of control to students is a hard and difficult process.

Collaborative knowledge production may be documented in individual portfolios, group portfolios or through thematic portfolios constructed across individual portfolios. Ideally both the quality of products and processes should be documented. With a few exceptions, the portfolios in this project have all been individual, though Vestfold in general reports that the fact that the portfolios are transparent has strengthened the collaborative activities among the students. Since students so far have more experience producing individual products and teachers likewise have more experience in evaluating those, there is a need for developing expertise on collective portfolios.

Both our sites use digital tools for building collective, thematic structures between the portfolios. Vestfold's focus is here on the use of hypertext and this site has come a long way in exploring the new learning potential in hypertextual writing and collaboration. Stord/Haugesund has utilized hypertext as well as database dialogue (Bjørlykke & Økland, 2002, Engelsen, 2002b).

*Learning phase 2*

Learning phase 2 is weakly represented in our project. Some examples do not distinguish between a working and a Presentation portfolio. None of the sites have had a strong focus on selection, self-assessment or on developing evaluation criteria. Selection is often connected with what to present at the oral exam, and then documenting variety may take precedence over depth. There is clearly a large improvement potential in introducing collective reflection and discussion of what constitutes good quality in each discipline, relating this to the specific genres students have used for documentation in their portfolios. The collection-selection aspect of our model may not be feasible in short courses where there is only time for a limited number of projects or assignments. Criteria work and reflection could still be built into the process.

*Learning phase 3*

Learning phase 3 presents great variations. There are four exam models: 1) the portfolio itself is being graded 2) the portfolio form the basis from which students extract material to present at an oral exam 3) students are assessed on their

performance on written exams, which may more or less directly build on portfolio contents. 4) Written or oral exams are used as supplement to portfolios, for instance to check student coverage of curriculum content. In both sites the final grade is decided by the exam commission, and there is no self or peer assessment involved in phase 3. There is some limited focus on students developing new learning goals and on further use of digital portfolios in some of the examples.

### ***The potential of communication and digitalization***

In all the four examples ICT is a more or less central aspect. ICT is used both for peer and teacher response, but the problem is the time factor. The Stord/Haugesund math example indicates low activity in web-based discussion, the explicitly expressed reason being that both students and teachers find face to face oral communication to be less time consuming than written communication. The mother-tongue example from Stord/Haugesund indicates that there is a great unused potential in enhancing student and teacher competences in response giving. The Mother tongue example from Vestfold indicates that introducing synchronous dialogue (chat) leads to enhanced net based dialogue among students, and in the Religion examples they claim that the aspect of transparencies seems to have positive impact on the collaboration among peers. In general our data show that the participants are optimistic about netbased communication, but we have so far little evidence about how this improves portfolio processes or acts as a catalyst for change.

An even more important question is whether digital portfolios provide qualitatively new learning opportunities for students. Both Vestfold and Stord/Haugesund provide examples of digital portfolio processes that bring new dimensions to the learning environment. First, the individual student who has to use hypertextual links to fellow students' texts or to external sources, has to read this source quite well in order to do so. Constructing collective, thematic web-structures across the individual portfolios thus provide new learning opportunities. There are also examples in our material of structures crossing institutional borders through joint projects. Here students literally built new knowledge that was distributed to all the participants as well as to the world outside the classroom. Collective structures across portfolios could thus amount to more than the sum of the individual portfolios. The use of dialogues around the pupil-text database at Stord/Haugesund is also an example of a portfolio element that can be considered a collective text produced through collaborative activity, where students, college teachers and the partner school teachers are regarded as participants (See Bjørlykke & Økland, 2002, Engelsen, 2002b). This is also one of the few examples in our material where portfolio assignments is designed to connect different communities of practice. In spite of these notable examples, our material indicates that ICT is still not fully integrated into the learning ecology of any of the sites, and that there is an unexploited potential here.

## **V. A theory based discussion of three critical aspects of portfolio work**

In this section we want to limit our discussion to three aspects of portfolio work that our empirical material has shown to be critical: negotiated portfolio assignments, reflection/self-assessment and the format of summative assessment. We will explore some implications of looking at *portfolios as reifications of practice* for each of these.

***Negotiated, authentic assignments – a key to tapping the learning potential of portfolios?***

If we look at portfolios as reification, portfolio assignments must provide opportunities for rich and complex learning situations, where students experience central aspects of professional practice, and are challenged to bring together both disciplinary content and didactics. Assignments should also signal the need for collaboration. The key question for teachers to ask initially is, What kind of practice do we want students to document in the portfolio? Asking students to reproduce information or to solve problems where there are right and wrong answers make uninteresting portfolio assignments in a teacher education context. Problems need to be complex even if reification of individual cognitive activity is the goal, and when reification of multifaceted practices is the desirable goal, assignments need to be carefully designed.

In our view portfolio assignments in teacher education need to have some degree of *authenticity*. According to Schaffer and Resnick (1999, p. 197) “thick authenticity” means that it is personal meaningful, it relates to “real life”, it demands disciplinary thinking and self-reflection. We would add that such assignments need to be discussed and negotiated with students, and in cases where other partners are implicated (for instance practice teachers), also with them (Vines 2002). Time frames, participants’ ICT competencies, documentation genres and quality criteria also need to be negotiated (Engelsen 2002a). Because of the complexity of portfolio assignments aiming at tying together theory and practice, the ground work for successful learning in all three phases is laid in the assignment. Both sites provide examples of authentic portfolio assignments, both involving cooperation with pupils and practice teachers and students at other university colleges.

***Reflection and self-assessment as vital elements of professional identity building***

In presenting our basic model we have argued that reflection and self-assessment is closely tied to the act of selecting texts or objects for the Presentation portfolio (Learning phase 2). Our empirical material has shown that sometimes the Working Portfolio and the Presentation Portfolio is the same and there is no selection. This may be the case if the course is short and there is not enough time for a variation of assignments or when a course is project based. Our basic model may not fit all, but it is possible to build reflection and self-assessment into the portfolio assignment itself in such a way that it becomes part of what is documented (reflection in learning phase 1).

Reflection and self-assessment can be argued for from different theoretical perspectives. From a socio cultural viewpoint these features of portfolio work are elements of students’ identity building, and for future teachers, this is a particularly important aspect. Wenger (1998) underlines the close relationship between identity and practice. The way students participate in their communities of practice shape their identities as teachers, whether they are conscious of it or not. Reflection and self-assessment strengthen these identity forming processes by making them explicit and we think it is vital that they are part of the portfolio work, also documented in the form of text. Whether or not reflective texts should be assessed, has been a controversial question. We advocate great caution here because identity issues are not well suited for grading. This does not mean, however, that criteria become irrelevant for reflective texts. Quality criteria are important for students in order to self-assess, but these criteria also need to be negotiated in order for students to make them their own. Wenger sees identity as emerging from “negotiated experience of self (in terms of participation and reification)” (Ibid. p. 150). The clue to enhancing the learning potential in reflection and self-assessment for teacher education students

may rather lie in sharing them with trusted peers and teachers instead of in grading such texts.

From what we have seen in the three sites, teacher education portfolios have a potential for bringing a number of experiences and practices together for the students and thus play an important role in developing their identities as future teachers. Much of this potential is, however, still unused.

### ***Students' participation in the exam – an underrated learning potential?***

From a theoretical understanding of portfolios as reification of practice, it does not make sense to let an assessor grade the portfolio as an isolated act. According to Wenger, participation and reification both require and enable each other: “it takes our participation to produce, interpret and use reification; so there is no reification without participation. On the other hand, our participation requires interaction and thus generates shortcuts to coordinated meanings that reflect our enterprises and our takes on the world “(Wenger, 1998, p. 66). In our two sites they have tried out exams where students present their portfolio for the exam commission. Such exam situations, which allow students' participation and opens up for negotiation of meaning, can bring out more of the “iceberg” of the process than just the tip which can possibly be documented in the portfolio itself. On the one hand the portfolio entries need to yield enough material for outsiders to understand what has been learnt; on the other hand not everything can be documented. Students who have been interviewed about their oral exam find an exam situation built on their own presentation of their portfolios very meaningful. First of all because they feel they are much more in control than would be the case when they just hand in a portfolio for grading. Second because of the dialogic interaction with the commission. Students report that the significance of such an exam does not stop with the grade, but that they use the feedback from the commission to reflect on their future as teachers.

## **VI. SOME CONCLUDING REMARKS**

The core issue in the assessment discussion seems to be the relation between formative and summative assessment, and our experience is that discussion about changing the assessment system from traditional exams to a portfolio based system is often reduced to the question of how to secure fairness and justice according to psychometric ways of thinking. Our basic model emphasizes collaborative and metareflective aspects, criteria development and self and peer assessment. A stronger focus on these aspects involves a shift of focus from summative to formative assessment which seems fundamental for increasing the learning potential of portfolios, a perspective that we have aimed to legitimize through our theoretical perspective. In addition to this we have also shown the learning potential in new exam formats. Altogether this implicates the hard process of shifting the locus of control and giving legitimate roles to the learners as equal members of the communities of practice (Wenger, 1998).

Changing the assessment system has more to do with learning in general than with assessment as an isolated phenomenon. Our analysis show that the metareflective aspects are still underdeveloped and our two sites advocate further development in these areas in order to enhance student learning.

We are now in a transition phase cultures of learning and cultures of assessment are changing and live side by side in all educational institutions. It is therefore necessary to analyze what characterizes the cultural contexts in higher education, particularly

what view of knowledge and learning the teachers adhere to. Traditional sit down exams where student collaboration is banned, was the result of a view of knowledge as objective and transferable and individually based. It is therefore logical that reproduction of knowledge and not the production was foregrounded in this assessment culture. If portfolio assessment is introduced into a culture dominated by a traditional view of knowledge and learning, the outcome may either be an instrumentalization of portfolios or a change in the culture itself. Portfolios are a strong change agent, but there is always a danger that it will be used only to document knowledge reproduction. We will argue that this is the case if teaching goes on as before and the only difference is that students on an individual basis produce artifacts that are collected in a portfolio. In a traditional assessment culture, where the control aspect of evaluation is highlighted, there will be considerable resistance against making portfolios alone the basis of assessment. The compromise is often that in combination with a traditional exam, the latter accounts for most of the grade.

Teacher education must provide students with basic disciplinary knowledge and teaching skills that enable them to function well in their first job as teachers. It is impossible, however, to provide them with everything they need, and therefore one of the most important tasks of teacher education is to educate teachers with the ability to self assess their own work, to discern for themselves what they need to learn and adopt adequate strategies of learning. In school contexts this means among other things to be able to learn from their colleagues (peers) and be critical to established cultures at the same time. Maybe this is an ultimate goal of collaborative portfolio models? In that case teacher education needs to be much more audacious in transferring responsibility and control to the students.



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