Towards communities of learners for vocational orientation.
Teachers and researchers designing innovative learning environments in pre-vocational secondary education

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Abstract
In the last decade many reforms were undertaken in pre-vocational secondary education in the Netherlands. Most
of these reforms aimed at optimizing teaching and learning by engaging students in (simulated) vocational
practices. Our design research is an elaboration on educational theory and practice with the goal of furthering
these innovations. For two consecutive years a team of researchers and teachers, supported by their school
leader, designed learning environments for the vocational subject Care & Welfare at two schools. They
translated the four parameters of our theoretical framework of a community of learners for vocational orientation
(Boersma, Ten Dam, Volman & Wardekker, submitted) into the educational practice. This paper focuses on two
research questions: ‘How may the process of joint design by teachers and researchers be described?’ and ‘Which
instructional activities of teachers and learning activities of students constitute learning environments that foster
communities of learners for vocational orientation?’ The data collection focussed on both the design process and
the design products (minutes of design meetings, lesson materials, lesson observations, stimulated recall
interviews with teachers and students). The data was analysed by means of matrix display techniques (Miles &
Huberman, 1994). The results show that it was difficult to balance the input of the teachers and the researchers.
However, such a balance appeared to be necessary in order to arrive at ownership on part of the teachers and
ecological valid design products. The results also show why the designed activities did or did not lead to
realization of the parameters of a community of learners for vocational orientation. We conclude with some
parallels between teacher and student learning that appeared during the design research.

Introduction
Over 50% of all students of 12 to 16 years old attends schools for pre-vocational secondary
education. The central aim of pre-vocational secondary education is to raise the level of
students’ general competences and to prepare them for senior secondary vocational education.
Therefore, a crucial aspect of pre-vocational learning is vocational orientation, i.e. exploring a
professional identity as part of a student’s personal identity (c.f. Meijers & Wardekker, 2002).

For some time pre-vocational secondary education had an inferior reputation. However, in
the last decade many reforms undertaken aim at optimizing pre-vocational learning by better
fulfilling the learning needs of students, the expectations of continued education and the
labour market. Many innovative learning environments are organized around (simulated)
vocational practices. As in other European countries, engaging students in work-related
assignments is seen as providing a context that can make learning more meaningful to these
students (Stern & Wagner, 1999; Guile & Young, 2003). Such a context offers opportunities
to develop students’ general competences and initiate the development of basic vocational
competences. It appeals to students’ affinities, abilities and possibilities regarding future
vocations and associated continued education. Students are thus stimulated to vocational
orientation, and as a result see the point of learning, i.e. become motivated to learn.

In our view, the further development of innovations in pre-vocational secondary education
that focus on taking the work sphere as a learning environment would benefit from a better
theoretical understanding and elaboration of the teaching-learning processes intended. We
developed a theoretical framework of a ‘community of learners for vocational orientation’
(Boersma et al, submitted). Subsequently, we conducted a design research. The aim was to
actually design innovative learning environments based on our theoretical framework. Three
research questions were addressed: ‘How may the process of joint design by teachers and
researchers be described?’, ‘Which instructional activities of teachers and learning activities
of students constitute learning environments that foster communities of learners for vocational
orientation?’, and ‘How do the realized communities of learners affect student’s motivation
for learning?’.

This paper briefly describes our work with respect to the first two research questions. In
an attempt to keep it short, we structured the paper by five characteristics of educational
design research. Design research is theory oriented, interventionist, iterative, utility oriented and process oriented (Van den Akker, Gravemeijer, McKenney and Nieveen, 2006).

Theoretical background
The first characteristic, theory oriented, can be divided in two parts. Firstly, designs are (at least partly) based upon theoretical propositions. Secondly, field-testing of the design contributes to theory building. We start our paper with the theoretical propositions, and will conclude with possible contributions to theory building. Our theoretical framework of a community of learners for vocational orientation is based on the concept of a ‘community of learners’ (c.f. Brown & Campione, 1994) and the concept of a ‘community of practice’ (c.f. Lave & Wenger, 1991; Wenger, 1998). The framework reflects an ideal picture of learning environments in pre-vocational secondary education. In most cases current educational practice does not meet this ideal (Boersma et al, submitted). Our conceptual framework enables to determine what evokes and what inhibits students to act and learn like members of a community of learners for vocational orientation. It also enables to identify starting-points for moving forward to the ideal. The framework consists of four interrelated parameters: shared learning, meaningful learning, reflective learning, and a focus on transferable learning outcomes.

Shared learning is the first parameter. It refers to a learning environment in which students jointly strive to reach a shared goal. In a community of learners for vocational orientation, students and teachers work co-operatively as if they were colleagues working at an institution or company helping their clients. They are regarded as peripheral members of a community of vocational practice. As in any community of practice they interact and share knowledge to attain their goal, thereby acquiring new knowledge, skills and attitudes, both individually and as a group (Lave & Wenger, 1991; Rogoff, 2001).

The second parameter is meaningful learning. This takes into account the use of what is learned for society and working in that society in the future on the one hand and for students personally on the other. Students are supposed to develop competences in school that are indispensable to and for our society. Nevertheless, students do not always understand the meaning of developing these competences in the light of their own personal goals and lives. In a community of learners for vocational orientation students participate in authentic vocational practices with others. They thus frequently experience not being able to participate fully in these practices due to faulty or missing competences. It is this experience and the wish to join others (i.e. to be part of the community of vocational practice) that make students realize that the competences our society requires are in fact competences they themselves need.

Reflective learning, the third parameter, refers to the need for students to reflect on the content of what they are learning and the processes through which that learning takes place. A community of learners offers opportunities for reflective learning, as students are surrounded by fellow students and the teacher who, in order to achieve a shared goal, comment upon the students’ ideas and what they do. Together they try to find better ways of thinking and behaving. ‘Learning through participation’ is not just a question of taking part; if students are to develop competences and a professional identity, the quality of participation must be improved through reflection. A community of learners for vocational orientation might prompt reflection on three planes. First, students are encouraged to reflect on the way they function and develop as a beginning professional in a particular sphere of work. Second, they should think critically about the importance of a profession for society. Third, students are stimulated to realize what being a professional in a sphere of work means to them.

The fourth parameter is a focus on transferable learning outcomes. Precisely because vocational education explicitly aims at preparing students for professional activities in the
future, it must also equip students with the ability to transfer from school to new situations in their own lives, and vice versa (cf. Tuomi-Gröhn & Engeström, 2003). Students should be made aware that the concepts and processes they are introduced to are generative and useful across many settings (Campione et al., 1995). In a community of learners for vocational orientation students acquire competences in the context of their intended use, i.e. a certain vocational practice. In this process students construct new knowledge, identities, ways of knowing, and new positions in the world. They become someone new (Beach, 1999). When they become aware of this, students are able to take their new selves to other contexts. They themselves are then the bridges between different settings. The implication is that students should be encouraged to reflect on why they are supposed to learn certain concepts or ways of doing things, and what this has to do with their own lives as future professionals.

**Interventions**

Design research aims at designing an intervention in the real world. Our aim was to foster communities of learners for vocational orientation in two schools for pre-vocational secondary education with a focus on the sector Care & Welfare. We selected two schools that had already started improving their learning environment by introducing authentic learning in simulated workplaces. At each school two teachers Care & Welfare and two teachers Dutch language volunteered to participate in the study, along with two of their classes of students a year and their middle-manager (from now: school leader). In this paper, we focus on one school, and the subject Care & Welfare. The teachers Care & Welfare of this school already had experience with the implementation of innovations. The students were in their penultimate year of pre-vocational secondary education (14 to 15 years old). The school leader was responsible for further development of the schools vision on teaching and learning and the stimulation of educational innovation in the school. He was also responsible for the professional development of all teachers in the school. The interventions comprised learning environments based on the four parameters of a community of learners for vocational orientation, and were jointly designed by the teachers and researchers.

What did ‘the real world’ look like? At the start of our design research the learning environment of the vocational subject Care & Welfare was organized around six workplaces: Welfare, Housekeeping, General Services, Care Assistance, Beauty Care and Workplace Assistance. Three or four students occupied each workplace at a time. For about fourteen hours a week for three weeks, students learned on the basis of theoretical and work-related practical assignments about what a real care provider would do in that particular workplace. A study guide indicated when to carry out which assignment. Theoretical assignments may comprise reading an introductory case about a care provider and answering questions about it, looking up difficult workplace-related words, studying theory units, and doing a diagnostic test. The practical assignments are more diverse. For example, Housekeeping students may cook, taste and compare home-made tomato soup with tinned tomato soup. General Services students check the temperature in and outside the refrigerator in the food storeroom. They also plan a week’s menus for an old people’s home and prepare shawarma (döner kebab). And Care Assistance students learn how to bath a baby (doll). The students followed worksheets drawn up by the teachers, pointing out the practical assignments step by step. After three weeks, students went on to the next workplace.

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6 This study is part of a larger research programme called ‘An instructional design for pre-vocational secondary education: the school as a community of learners for students and teachers’. The programme focuses not only on vocational orientation but also on the integration of the Dutch language as a general subject into vocational subjects and vice versa, and the professional development of teachers in school. The Dutch Council for Educational Research subsidizes the research programme.
In terms of the parameters of a community of learners for vocational orientation ‘shared learning’ and ‘meaningful learning’ seemed to be more manifest in teaching-learning processes than ‘reflective learning’ and ‘learning for transfer’. Shared learning almost invariably took the form of cooperation between students to reach a common goal; the teachers seldom participated in the activity except by giving advice. The teachers mostly adhered to the standard teacher role keeping students in a standard ‘doing the assignment’ role. Meaningful learning was also only partly realized. The teachers presented the students authentic assignments. Still the students appeared to have trouble interpreting the various assignments as life-like situations. This inhibited them to do the assignment in a serious way and thus to attach personal meaning to what they learned. Reflection took the form of thinking about the adequacy of actions and sometimes of students realizing what they had or had not learned. Reflection was provoked by the need to accomplish a shared goal and by explicitly creating a safe environment for giving and receiving reflective comments. At the same time the authority of the teachers inhibited peer feedback. In addition, the teachers seldom created opportunities for students to experience the needs of care takers. Therefore, reflection on the importance of professional care for society and on the meaning of a caring profession for the students themselves did not take place. Regarding learning for transfer, students practised competences in multiple settings. And the teachers posed questions the students could only respond to by applying what they had learned. Nevertheless, the students did not show any signs of being aware of having learned something that could be used in other situations (Boersma et al, submitted).

Iterations
Design research incorporates a cyclic approach of design, execution, evaluation and revision. Our design research stretched over two school years. This paper describes the first year, wherein two cycles of design may be distinguished. The teachers chose two parts of the curriculum that they wanted to redesign. In each design cycle, one of these curriculum parts was redesigned with the four parameters of a community of learners for vocational orientation as guidelines. This resulted in two design products based on an ‘initial local instruction theory’ (Gravemeijer & Cobb, 2005). The product of the first design cycle was called ‘The Coffee Morning’, the second design cycle ‘The Activity Morning’.

The Coffee Morning was designed for students to get a feel for working with elderly people. The design period took 2.5 months and in this period, the researcher had 4 design meetings with the teachers. The teachers, researchers and school leader also had meetings to discuss the progress that was made. All of this resulted in a design product, wherein students had to think of, prepare and actually provide for an entertaining morning in school for elderly people. The Coffee Morning consisted of 9 preparation lessons, in which the students worked with teacher-made worksheets that had to structure their activities. The Coffee Morning itself took 4 hours. The students undertook several activities with the elderly, such as a workshop folding napkins, presenting what they learn in the Care & Welfare lessons, a discussion on the present-day youth, polishing diverse metal articles the elderly people were asked to bring along etcetera. Afterwards, the researchers evaluated the learning environment of the Coffee Morning with the teachers, school leader and students with regard to the four parameters of a learning community for vocational orientation and student motivation.

In the next cycle, the evaluation outcomes of The Coffee Morning were elaborated on in order to arrive at a better second design product. The Activity Morning focused on getting a feel of working with primary school children. Children are, similar to elderly people, a target group in Care and Welfare professions. The design period took 3 months in which the teachers and the researchers met on 7 occasions to design together. In addition, the school leader had 7 meetings with the teachers and the researchers during this period. The Activity
Morning consisted of 42 preparation lessons by means of student-invented worksheets and cooperative learning instructional methods. During these lessons the students made up and prepared for learning activities for primary school children of about 7 years old. Compared with The Coffee Morning, this second design included far more lessons (42 as opposed to 9) and in addition to the students working with their self-invented worksheets, now several instructional methods were used to structure the interactions between the students and optimize their cooperation. Similar to The Coffee Morning, The Activity Morning itself took 4 hours, but this time the students went to the site of a primary school instead of staying at their own school. They organized and participated in activities with children, like decorating cake, pottering and a depiction game. This design cycle also concluded with an evaluation.

Utility orientation
The merit of a design is measured, in part, by its practicality for users in real contexts. We found an utility orientation important for two reasons. Firstly, an utility orientation contributes to the sustainability of learning environments that foster communities of learners for vocational orientation. If a design product, i.e. an innovative learning environment, fits the students and teachers of a particular school, it will be preserved and sometimes even extended after the design research has ended. In our design research, the teachers were facilitated four hours per week, the so-called design hours, to jointly design, evaluate and redesign with the researchers. The idea was to complement the theoretical input of the researcher with the practical knowledge and experience of the teachers. This would result in design products that have ecological validity, i.e. that fit the school. In addition, we involved the school leader in the design research. We thereby aimed to create a professional community for the teachers that would support the design efforts of the teachers and thus promote sustainability.

Secondly, a focus on utility promotes a proper intervention. A learning environment is usually not realized as intended due to all kinds of practical reasons, like unexpected lesson drop-out. However, when teachers know the whats, hows and whys of the design of a learning environment, they can adapt the instructional and learning activities in line with the ideas underlying the design. This is a precondition for doing research on interventions. We assumed that the joint design would promote this ‘ownership’ of the design products on the part of the teachers.

We tried to address the first research question in order to assure that our approach would indeed promote utility: ‘How may the process of joint design by teachers, researchers and school leader be described?’ We examined how the teachers and researcher interacted during the design of the Coffee Table and Activity Morning and how the school leader tried to support this design process in joint meetings.

We gathered data on different types of occasions: the design hours of the teachers Care & Welfare and the researcher, joint meetings of all four teachers involved in the study and the researchers and the school leader. The researcher reported the actions during the design hours. The teachers read these reports and corrected them when necessary. Now and then a second researcher joint the teachers and researcher during the design hours and observed what was going on. By doing this, the interpretation of the researcher that was designing with the teachers was substantiated with the interpretations of the second researcher. The second researcher also provided feedback concerning the behaviour of the researcher during the design hours. In order to make claims regarding the development of the first and second design products, we examined the half-products that were made by the teachers, on which the researcher provided feedback.

We systematically analyzed the written accounts of the design hours and the joint meetings by means of Miles and Huberman’s (1994) matrix-display technique. This kind of analysis consists of three current flows of activities: data reduction, data display, and
conclusion drawing/verification. Based on the research question, we built a two-dimensional matrix, with time on the horizontal axis (the dates of the design hours and other relevant meetings) and the themes (among which are the parameters of a community of learners for vocational subject classes) on the vertical axis. In the initial descriptive version of the matrix, all relevant parts of the transcripts were entered in the cells. The initial matrix was reduced by summarizing the transcripts to their essential parts. During this process the revised matrix content was regularly checked against the raw data. The matrix enabled us to formulate hypotheses, that subsequently were checked against the raw data. Objectivity was pursued by using member checks and a review of the data analysis process by a colleague researcher.

The results show that the design process of the Coffee Table may be characterized by the participants searching their roles. The people involved had not worked together until then, so it was a period of vagueness about the role everybody was to play. The researcher, in this period, assumed an attitude of expectation, trying not to steer the process too much at that time. The teachers focused primarily on the organization of the project (the where, what, when end how questions) and made a very global plan or rough design. The researcher tried to guarantee the parameters in the design, as the teachers did not on their own accord. Although the teachers endorsed the importance of the parameters, they had insufficient ideas of how the parameters may give direction to the process of designing. Besides, the parameters were mainly seen as ‘something of the researcher’ and were thus more meaningful for the researcher than for the teachers. In the joint meetings, the school leader posed reflective questions to the teachers, in order to help them reflect on what they were doing, and how their actions were linked to the school’s vision on teaching and learning.

During the design of The Activity Morning, the researcher provided more structure than during The Coffee Table. The teachers made an enthusiastic start. Between The Coffee Table and this design period, the teachers participated in a school-wide study day on cooperative learning and activating didactics. This day provided them with many ideas of how to structure shared learning by the students. The researcher structured the design process by proposing the use of a lesson plan, with attention to learning goals, learning content, learning activities and determination of student’s outcomes, along with thinking about how the parameters are present (or can be stimulated more explicit) in the design. The lesson plan became meaningful to the teachers as they noticed that it helped to foresee and tackle problems during the design process instead of during the execution. However, the closer the start of the project, preparing the materials that scaffold the instructional methods regained attention at the expense of thinking about the parameters. Something alike happened halfway the design process, the school leader asked teachers to present their experiences to the entire school team, for it was his responsibility to have teachers share new practices that are in line with the vision on teaching and learning. By doing this, he evoked reflection on the part of the teachers but on the other hand, the time the teachers could spend on the preparation of the presentation could not be used for the design of The Activity Morning. Again making the lesson plan, and thinking about the parameters, had to make space for the preparation of the presentation that had priority at that moment.

In sum, the design process of the teachers, researchers and school leader can be described by the search for an optimal balance of the input of the teachers, researchers and school leader in order to arrive at ecological valid design products and ownership on part of the teachers.

Process orientation

Design research avoids a black-box model of input-output measurement; the focus is on understanding and improving interventions. We aimed to understand which instructional activities of teachers and learning activities of students constitute learning environments that foster communities of learners for vocational orientation (research question 2). Put differently,
we aimed to investigate which activities lead to shared learning, meaningful learning, reflective learning and learning for transfer. In addition, we focused on improving the learning environments, i.e. to design learning activities and instructional activities that incite shared learning, meaningful learning, reflective learning and learning for transfer better.

The data collection was directed at the intended, realized and perceived learning environment (cf Goodlad, Klein, Frances & Tye, 1979). The intended learning environment was captured in the minutes of the meetings in which the teachers and researchers cooperatively designed the Coffee Morning and the Activity Morning, and in the materials developed. During the Coffee Morning and the Activity Morning the student and teacher activities were continuously videotaped (realized learning environment). We thereby kept track of one small group of students per class in particular. The perceived learning environment was examined by semi-structured interviews with four pairs of students from different small groups, and evaluation interviews with the teachers. Both focussed on the four parameters of a learning community for vocational orientation. During the interviews video fragments of student and teacher activities were shown to enhance reviving their experiences. All evaluations with teachers and students were voice-recorded and fully transcribed.

These data were also systematically analyzed by means of matrix-display techniques (Miles & Huberman, 1994). We now built a two-dimensional matrix display with the parameters of a community of learners for vocational orientation on one axis, and students’ learning activities and teacher instructional activities on the other axis.

The results show which learning activities of students and instructional activities of teachers stimulated shared learning, meaningful learning, reflective learning and learning for transfer. For reasons of space we mention per parameter only one example of an activity that led to the manifestation of the parameter. In the design of The Coffee Morning, shared learning was stimulated by dividing the students in small groups of about four students. The students of each group got responsibility for a specific part of the organisation of The Coffee Morning. The students had a shared goal and distributed the tasks that had to be done. However, in the realized learning environment, the tasks were allocated by the teachers and the teachers were also in charge of the tasks that had to be executed. As a result of this, it was not necessary for the groups of students to engage in joint discussion, provide each other with feedback, or work together as classmates. Meaningful learning was promoted because the students knew from the start of the project that they would engage in activities with ‘real’ elderly people. Nevertheless, it turned out that the students found it difficult to empathize with this target group. The students obviously did not have a sufficient idea of what kind of people would come and they did not realize that the elderly people would really come to their school. In the design was anticipated on reflective learning by use of a competence card. At three points in time, the students had to fill out their competences: at the start of the project, after two weeks of preparation and after The Coffee Morning itself. The teachers and the researcher made a list of competences they found necessary for the students to acquire. The students properly filled out the competence card, but seemed to do this to please the teacher instead of to learn from it. Learning for transfer was promoted by the organizational composition of the series of lessons. In line with the basic assumptions of competence based learning, the students were presented situations that were increasingly complex. What the students prepared in the classroom with fellow students through simulations, was later on carried out with ‘real’ people. For the students, however, the different elements of the project were not linked in any way, and therefore they did not see the meaning of executing the elements in a proper manner. Especially regarding the simulation of the activity in a role-play, the students were corny instead of serious.

The teachers and researchers designed the Activity Morning with the evaluation outcomes of Coffee Morning freshly kept in mind. The parameters of a community of learners for
vocational orientation were better addressed in the intended learning environment of the Activity Morning than in that of the Coffee Morning. Shared learning was stimulated by grouping the students and by asking each group to work out an activity on a worksheet, that could be executed by all groups with the primary school children. This particular organization promoted positive interdependence, a basic element of cooperative learning, much more than the organization during the Coffee Morning. This worked to a certain extent. The teachers were still inclined to steer the students to a large degree. Meaningful learning was realized in the design by the teachers emphasizing from the start of the project that the students would organize an activity morning for real children. In addition, the students were matched to one specific child. This turned out well; the students attuned to and felt responsible for ‘their’ child, and thus felt a little bit like a teacher assistant. Reflective learning was now set up to let the students themselves think of the competences they would need to perform the activities with the children in a proper way. As a result, reflection became meaningful. A special instructional method was designed to help students to generate a list of competences. This also led to more reflection. Similar as in The Coffee Morning, learning for transfer was to be promoted by the organizational composition of the series of lessons. But this time different instructional methods were designed. Unfortunately, the teachers did not realize the methods as intended. It turned out they had not understood the idea underlying the instructional method.

In short, our process orientation did reveal instructional activities of teachers and learning activities of students that constitute learning environments that foster communities of learners for vocational orientation. We only partly managed to improve the learning environments, i.e. to design learning activities and instructional activities in the second design cycle (the Activity Morning) that better stimulated shared learning, meaningful learning, reflective learning and learning for transfer than did the activities in the first design cycle (the Coffee Morning).

**Theory building**
Field-testing of the design contributes to theory building. We haven’t finished our analysis yet, but we can share some first notions. With every design product we contributed to the development of what Gravemeijer and Cobb (2005) call an ‘empirically grounded local instruction theory’. In our case, we examined which instructional activities of teachers and learning activities of students constitute learning environments that foster communities of learners for vocational orientation. For instance, the self-invented competence card of the Activity Morning led to more reflection than the teacher-made competence card of the Coffee Morning did. In other words, reflective learning is stimulated even more when students get the opportunity to give their share. We also tried to provide insight into the design process. It became clear that it was difficult to balance the input of the teachers and the researcher. Too much input from the researcher seemed to lead to less ownership on the part of the teachers and too little input from the researcher endangered the goals of the study, since the teachers themselves did not incorporate the parameters in the designs.

Some interesting parallels appeared between the learning of the teachers and the students. For example, learning becomes less meaningful for both students and teachers, when they have less input in the process. In case of the teachers, when the researcher started to steer the process more (to achieve the research goals), and in case of the students, when the teachers take control of the learning process of the students. Another parallel that appeared concerned the stimulation of reflection. Both with teachers and students, it did not work so well to elicit reflection in an explicit way, for example by asking reflective questions. Reflection became meaningful when it was interwoven in the task. Think of the school leader who asked the teachers to present their experiences to the rest of the team. In order to do this, the teachers
had to reflect on what they had done, and why they had done it in this way, and how this fitted the schools vision. And think about the students, who had to give feedback to students of other groups on the worksheets they made for the activities all students had to carry out with the primary school children. It seems interesting to further investigate these parallels.

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