Participation of teachers in design teams: professionalising as designer and implementer of context-based material

(participatie van docenten in ontwerpteams: professionalisering als ontwerper en uitvoerder van concept-context materiaal)

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Abstract

In the Netherlands, an innovation is taking place in the science subjects in the upper levels of secondary schools aiming at more appreciation of the sciences and at better learning results of the students. New teaching materials following the concept-in-context- (CoCo) pedagogical approach are being created in design teams comprising teachers. These teachers are expected to professionalise due to their participation in the design team and to develop CoCo-proficiency. Apart from CoCo teaching competencies, CoCo-proficiency comprises competencies in designing CoCo-material and competencies in helping implement CoCo in school. The central question in this PhD project is: how does the participation of teachers in CoCo-design teams contribute to their professional development towards CoCo-proficiency, and which factors concerning the teams hinder or facilitate this.

First, an instrument for measuring CoCo-proficiency is developed and tested in a pilot study. It comprises a questionnaire, an interview, and a scorecard for observing CoCo-teaching. Second, this instrument will be used in a multiple case study (n=32) to evaluate the CoCo-proficiency of teacher-designers from various teams. These will be compared both mutually and with non-designing teachers. The characteristics of their teams will be monitored using an analytical framework previously designed and tested in the pilot study. Besides this, a retrospective interview with the teacher-designers will help to attribute the observed CoCo-proficiency to factors within the design teams. Finally, an intervention study is performed with two teams, in order to confirm the relations found in the second study.

The PhD project will establish what kind of characteristics of design teams foster or hinder the development of CoCo-proficiency in participating teachers. The results can be used to
optimise design team set-ups and to develop professional development courses concerning the CoCo innovation.

**Introduction**

In the Netherlands an innovation is taking place in the science subjects in the upper levels of secondary schools aiming at more appreciation of the sciences and at better learning results of the students (Boersma et al., 2007; Driessen & Meinema, 2003, Commissie Vernieuwing Natuurkunde Onderwijs HAVO/VWO, 2006, Commissie toekomst wiskundeonderwijs, 2006; Stuurgroep Natuur, Leven en Technologie, 2006). A particular pedagogical approach forms the core of the innovation, usually denoted as ‘concept-in-context’ (here abbreviated to CoCo) or ‘context-based’. Therefore, teachers have to familiarise with the CoCo pedagogical approach and become competent CoCo-teachers. There is also a tendency to stress that the role and competencies of teachers should not be limited to the classroom, but should also comprise (re-) design of educational materials, and active support of an innovative educational practice in schools (SBL, 2004; Stuurgroep Natuur, Leven en Technologie, 2006). Hence, in order to be successful, the innovation requires teachers to become CoCo-proficient teachers, competent in teaching with CoCo-materials, in (re-) designing CoCo-materials and education, and in supporting the innovation in their school.

Traditional professional development in workshops seems to fall short in supporting teachers’ professional development (Fullan, 1994) and is probably ineffective in acquiring CoCo-proficiency. In general, active participation in the innovation itself by teachers is claimed to be more effective (Cochran-Smith & Lytle, 1999; Fullan, 1994). In line with this, CoCo-educational materials are currently being designed in teams of science teachers led by science pedagogical professionals and under the authority of the five science innovation committees (biology, chemistry, mathematics, NL&T\(^1\) and physics). This not only ensures that the new materials will fit classroom needs, but also engages the teachers in the innovative design process, and is likely to contribute to these teachers’ CoCo-proficiency.

This PhD projects focuses on the question: **how does the participation of teachers in CoCo design teams contribute to their professional development towards CoCo-proficiency, and which factors concerning the teams hinder or facilitate this.** The insights gained from this research can be used to optimise design team set-up and will support the development of teacher professional development sessions when the CoCo innovation is being implemented nationwide. It complements other studies in this field like that of Dolfing (2008) and Coenders, Terlouw and Dijkstra (2008) that focus on chemistry alone and focus on a limited number of participating teachers.

\(^1\)Nature, Life and Technology
Conceptual framework

The innovation

In the Netherlands a new curriculum is being designed for the upper levels of secondary education (HAVO and VWO) in the science subjects. For each science subject, an innovation committee has been established consisting of experts in the pedagogical field and the content field. The central element in the work of the committees is the CoCo-pedagogical approach. The common core in these ideas is rooted in the work of the front-runners of the CoCo-approach such as Salters’ in the UK (Pilling, Holman, & Waddington, 2001) and ChiK (= Chemie im Kontext) in Germany (Parchman et al., 2006).

The innovation committees formed small design teams consisting of teachers and a professional in the field of pedagogy of science and CoCo in particular. These design teams are producing new study units for the contexts and concepts within the new science curricula. Currently, there are over one hundred active teams in the various science subjects, working on new material. However, the actual situation is more complicated. First, the committees for the various subjects hold different interpretations of the CoCo-approach and have interpreted their task differently. An example is the role of self-directed learning of students. The innovation committees of NL&T and chemistry advocate this kind of teaching strategy, whereas the others only mention it.

Secondly, it appears that the science subjects-committees differ on how tightly the teacher-designers should follow the committee’s interpretation of the CoCo-approach. This relates to differing styles in managing the design process and its outcomes. Physics leaves the interpretation of the CoCo-approach up to the designers and implementing teachers (Commissie Vernieuwing Natuurkunde Onderwijs HAVO/VWO, 2006). Chemistry uses a mixed design approach, resulting in different learning tracks and an extensive trial and evaluation cycle (Driessen & Meinema, 2003). Mathematics have chosen the concept of ‘realistic environments’ as the context approach would clash with the abstract level of thinking required in some mathematical areas (Commissie toekomst wiskundeonderwijs, 2006). CoCo-based education will only appear in economical and probability mathematics. The mathematics innovation will therefore not be part of this research, since we specifically consider the CoCo-designing teachers.

Thirdly, the committees differ in the way the implementation of the produced materials is organised. For example: The biology committee has chosen the same teacher-designers for the context-based materials as those who try out the material in the classroom (Boersma et al., 2007). Physics and NL&T have deliberately chosen another evaluation school than the school where the designer works (Commissie Vernieuwing Natuurkunde Onderwijs HAVO/VWO, 2006; Stuurgroep Natuur, Leven en Technologie, 2006).

Besides these subject related differences, there are individual differences between design teams with respect to the way the teams are built, maintained, supported, and guided. Some teams effectively consist of only one working member that may be a university employee instead of a teacher. In others, the teachers within the team turn out to be experienced in designing teaching/learning materials. Some teams employ student teachers or former teachers to produce the study material.

In summary, we conclude that the design teams vary widely concerning important aspects as their composition, organisation and pedagogical approach.
The concept-in-context proficiency and teaching competencies

The central element in the CoCo pedagogical approach is the use of contexts as the starting point and anchor for learning, concepts in particular, thereby giving significance and meaning to the content. This requires that the context provides "a coherent structural meaning for something new that is set within a broader perspective" (Gilbert, 2006). A context should be relevant and recognisable for students. It should address their questions on a need-to-know basis, should build on their existing knowledge and should aim at an increasing involvement of students in the teaching-learning process (Bennett, Gräsel, Pachmann, & Waddington, 2005; Bulte, Westbroek, & Pilot, 2006). Other terms for the CoCo approach are: context-in-concept education and context-based learning (Driessen & Meinema, 2003; Gilbert, 2006; Boersma et al., 2007). The commonly held expectation is that CoCo education will help counter the decreasing interest in science among students and will allow students to acquire a better understanding of their natural environment. A crucial element within the CoCo-approach is that students should be able to use concepts learned in one context, in different contexts as well. To help learners to acquire such transferable knowledge the intricate process of context making and reconceptualising in those contexts should take place (Van Oers, 1998).

Another general focus of the CoCo-approach is the role of science for present society and technological and societal issues (Vos, Taconis, Jochems, & Pilot, submitted). According to Van Berkel (2005), elaborating on Roberts’ emphasis theory (Roberts, 1982), this is expressed by stating that CoCo-education employs a STS (science, technology and society) and/or a KDS (knowledge development in science) emphasis, whereas traditional education employs a FS (fundamental science) emphasis. In CoCo-education, students should learn to communicate and to make decisions about real-life issues involving scientific aspects (Van Driel, Bulte, & Verloop, 2005).

CoCo is also associated with a greater emphasis on creative student activities and self-steering by the students. Students typically work in groups on their own (research-type) activities. The students are to explore the context and construct the concepts they need to explain the phenomena. The teacher does not disclose the concepts directly to them (Fey, Gräsel, Puhl, & Parchmann, 2004; Bennett et al., 2005; Boersma et al., 2007).

So, the CoCo-educational innovation requires teachers to acquire specific competencies that are usually quite new to them. However, the competencies necessary for adequate CoCo-teaching have not yet been described systematically, though they are implied in various research papers (Fey et al., 2004; Gilbert, 2006; Wilkinson, 1999).

In search of a ‘list of CoCo teacher competencies’, various sources were found describing science teachers classroom performance using schemes well applicable to describe the teacher competencies we are interested in. Three categories of teacher competencies are conceived crucial, each corresponding to a core element within the CoCo pedagogical approach listed above.

First, the teachers should be competent in dealing with the context, the related concepts, and their interrelations. They should be aware of the need of (re-) contextualising, should have knowledge of the interplay of concepts and contexts (Van Oers, 1998) and should be able to make (re-) contextualising happen in the classroom. These competencies can be described in more detail by analysis of the work by Gilbert (2006) and Bennett and Lubben (2006).

Second, the teachers should be willing and competent in following both the STS (science, technology and society) and KDS (knowledge development in science) emphases. Such learning may comprise a considerable attitudinal shift as well as the mastery of new teaching strategies.
These are described in Roberts’ emphasis-approach (Roberts, 1982; 1988), which has been complemented by Van Berkel (2005) and by Van Driel et al. (2005).

Third, the teacher should be competent in handling the teamwork and the self-directed learning activities for students as implied by the CoCo-approach. Self-directed learning is systematically covered in the work of Vermunt (Vermunt, 1992; Vermunt & Verloop, 1999). They distinguish three categories of instruction learning functions: presenting and clarifying the subject matter (cognitive), establishing an affective learning environment (affective) and regulating learning processes (regulative or meta-cognitive). Each category has clear tasks and activities, the responsibility for which (student or teacher) differs in the different pedagogical approaches: strong teacher regulation and shared regulation. The self-directing role of students requires the teacher to ’follow and steer’. This in turn puts a demand on his improvising skills and ability to ’redesign his education on the spot’. Hence, it may also be expected that the teachers’ competency as ’educational designer’ be more demanded in CoCo-education than in traditional education. The use of the instruction learning functions by Vermunt in evaluating CoCo-education has been shown to be effective by Vos et al. (submitted).

In addition to this, CoCo-proficient teachers should be able to contribute to the realisation of the CoCo-innovation in their schools, requiring competencies such as: explaining CoCo to colleagues, providing support on CoCo issues, and collaboration.

In summary, our provisional list of competencies to be evaluated when measuring teachers’ CoCo-proficiency is: a) competence in handling content and concepts in relation to contexts, b) adopting the required emphasis, c) ability to realise suitable educational functions, d) ability to (re-) design education, and e) competencies in contributing to CoCo-innovation in school.

Teachers learning in design teams

Having described the contours of what teachers should learn to become more proficient CoCo teachers, we now turn to how and what they can learn from participating in the design teams. Since the design teams are focussed at producing ’study units’ most learning - except for learning about the subject of that unit and ‘designing educational materials’ - will be of implicit nature. Eraut (2004) defines informal learning as changes in behaviour that have occurred from an activity that was not designed as a training tool. He distinguishes eight categories for which such changes occur comprising: a) awareness, attitudes and beliefs, b) knowledge and skills, and c) judgement, decision making and performance.

Various authors have studied the circumstances that generally lead to successful professional development of teachers in small groups. Overview studies have been published by Borko and Putnam (1996), Garet et al. (2001), Putnam and Borko (2000), and Guskey (2003). The characteristics of small groups successful in fostering the professional development of their members fall into two categories; ‘structural’ and ’content-related’.

Structural setting characteristics found critical and relevant within the scope of this PhD study are: a) the teachers participating in the group are from the same school, b) the group also comprises an academic staff member, c) the group work stretches over a longer period of time, and d) the group is a ‘study community’ rather than just common participation in a workshop. The latter is also stressed by Cochran-Smith and Lytle (1999), who argue that when teachers come together in a community to learn, they extend their ’knowledge of practice', by inquiring into the subject with peers. Since they learn actively and reflect on the subject at hand together, they learn more than when they would attend for-instance a workshop.

Content related characteristics critical and relevant within the scope of this PhD study are: e) teachers personal needs, f) the groups focus is on ‘content knowledge’ (i.e. subject matter, new
materials/books), g) (subject-related) pedagogy and students ways of learning, h) the group provides opportunities for active learning (i.e. reflection, discussion, classroom try-outs, review on the basis of student work), and i) the learning is coherent with other (learning) activities.

Some of these characteristics will be met for most design groups (e.g. characteristic f), others are probably not met by any design group (e.g. characteristic a), but the majority will be met in different combinations for different teams. This overview will be used to analyse the set-up of the teams and to establish necessary characteristics in a possible intervention.

Apart from these general perspectives, the design teams we will study have two specific characteristics that give rise to specific learning outcomes. First, the teams are all focussed on the CoCo-approach. A small number of publications report and describe learning results found amongst teachers that participated in small design teams dedicated to CoCo-education. Gräsel, Fussangel, and Parchmann (2006) found as a main learning effect that teachers who participated in design teams on CoCo study material (ChiK) were more likely to participate in collaborative learning activities in their school as well. Coenders, Terlouw, and Dijkstra (2006) who interviewed a small number of chemistry teacher-designers found that the learning effect most frequently reported was an increased knowledge of the design process, context based education, and student learning in CoCo education. Participation in a design team was also found to be a teacher belief on how to make an innovation successful (Coenders et al., 2008). However, Wilkinson (1999) found that teachers in Australia, who had been working with a context-based physics curriculum for several years, still had not used the ‘context’-principle adequately. In line with this, Dolfing (2008) reports that teacher-designers seem oblivious of the CoCo-innovation when teaching a study-module that is not their own. In summary, we may expect that the learning results of participating in design teams will concern awareness, attitudes and beliefs, and may have an impact on teaching and other professional behaviour.

Second, the teacher design teams are design teams. Hoogveld, Paas, and Jochems (2005) found that educators using an instructional design model to develop their study programs work more efficiently and produce better products (i.e. study units) than their peers who do not use an explicit design model (Hoogveld, Paas, Jochems, & van Merriënboer, 2001; Hoogveld et al., 2005). In particular valuable here are the product-oriented models (Gustafson and Branch, 1997) and models focussing on the micro level of the application of the product in school classrooms (Plomp, Feteris, & Pieters, 1992). In line with this, we hypothesise that the design task of the teachers in the design teams is facilitated by using an explicit (product oriented) design model, and that this also boosts the participants learning of the CoCo-teacher competencies.

In summary, we expect that teacher participation in CoCo-design teams will result in increased CoCo-proficiency in terms of awareness, attitudes and beliefs, and may have an impact on knowledge, skills and professional (teaching) behaviour. Teams that employ an explicit product-oriented design model are expected to have better learning results. We hypothesise that CoCo-proficiency of teachers is fostered best in well-organised design teams that meet the characteristics of a successful professional development group, share an interpretation of the CoCo pedagogical concept, and follow an explicit design strategy when constructing the CoCo study material.
Method

The general question is elaborated into three specific research questions:

1. How can CoCo-proficiency of science teachers be measured?
2. Which factors in the design teams facilitate or hinder the development of CoCo-proficiency of the participating teachers?
   a. Does participation in design teams relate to significant differences in CoCo-proficiency and its components, between teacher designers and non-designing teachers?
   b. What characteristics of participating teacher-designers are positively or negatively related to the development of CoCo-proficiency?
3. If we coach design teams to optimise the development of CoCo-proficiency by introducing/removing factors identified in research question 2, does this indeed significantly boost the development of CoCo-proficiency?

The first question requires an instrument construction study (study 1). The second question focuses on the impact of design team membership on CoCo-proficiency and will be addressed in a comparative multiple cases study (study 2). It will identify factors concerning design teams suspected to have considerable impact on the development of the CoCo-proficiency of the team members. The third research question addresses the issue of optimising design teams for the development of CoCo-proficiency. It is addressed from an experimental perspective (study 3). The empirical work on research question 3 complements that on research question 2 in answering the general question in this PhD research.

All three studies require the involvement of the design teams, teacher-designers, and teachers. For practical reasons, teachers and teacher-designers will be sought preferably from the southern region of the Netherlands, in an even spread of the four science subjects Physics, Chemistry, Biology and NL&T and from design teams with clearly distinct characteristics. The teachers must all be teaching a new study module, but not a module they have designed themselves. The teachers and teacher-designers included may vary with respect to their initial CoCo-proficiency and teaching experience. However, teachers and teacher-designers that have secondary jobs at universities are excluded in order not to compromise the studies’ results.

Some teachers and design teams have already agreed to participate in the research. Some requests are still pending (see Appendix 2).

First study: instrument construction

In order to answer our first research question, we elaborate our description of CoCo-proficiency that is expected to be a learning outcome of optimal design team participation in detail. This is done by elaborating on the theoretical paragraph above. On this basis, particularly using the work by Vos, Taconis, Jochems and Pilot (submitted) an instrument for measuring CoCo-proficiency will be developed, which is valid for CoCo-teachers regardless of the subject, study unit or CoCo unit. Since learning outcomes will comprise various aspects (e.g. attitudes, knowledge, skills and competencies), the instrument comprises various data sources. In short:

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2 These research questions are an elaboration of the original two questions in the grant-proposal.
a) A scorecard for classroom observations addressing teaching skills and design skills will be developed sensitive to adequate CoCo-teaching (three lessons will be observed found critical by Vos, et al. (submitted));

b) A teacher-interview format addressing awareness, attitudes and beliefs, and design skills;

c) A questionnaire addressing emphasis (after Van Driel, Bulte, & Verloop, 2005);

d) Complementing information from a) A short student questionnaire to evaluate on CoCo-teaching skills (e.g. based on CLES and WIHIC questionnaires), b) short interviews with colleagues on the teacher’s way to support the CoCo-innovation in school.

e) An analysis of (adapted) teaching materials will give information on apparent skills in (re-)designing CoCo education (e.g. deliberate deviations from the unit as intended and an explanation for this deviation).

The results from these data sources will be triangulated to generate a comprehensive measurement of the teachers’ CoCo teaching proficiency.

To perform study 2, two more instruments have to be developed and tested. First, the teachers and teacher-designers will be invited to attribute their apparent CoCo-competencies to situations and circumstances in their past e.g. to their participation in the design teams in a retrospective interview. For this interview a story-line technique (Beijaard, Van Driel, and Verloop, 1999; Henze, 2006) will be used. Following these questions, teacher-designers will be confronted with their apparent CoCo-proficiency (e.g. their scorecards) and will be asked how/where they have acquired these competencies (e.g. that specific way of teaching). From this, the respondents ‘learning maps’ will be constructed depicting what CoCo-proficiency they developed (see Appendix 1) as well as where they attribute the development of their CoCo-proficiency to and which factors concerning their design team influenced this development. These learning maps construct the building blocks for answering research question 2. The whole procedure is expected to take 30-35 hours for each teacher / teacher-designer (see Appendix 3).

Second, an analysing framework for design teams (e.g. their set-up and management) will be developed based on the work by Meirink (2007) and Coenders et al. (2008), focusing on the aspects: organisation, role and participation of an academic specialist, successful professional development group characteristics, use of a design strategy.

Validation of the instruments will take place through validation by experts in the pedagogy of science, and by using them in a pilot study. Reliability of the scorecard and scorecard procedure will be established by comparing the results of multiple raters on the same lessons (inter-rater reliability; Cohen’s Kappa). Small adaptations to the instruments can be made during and after the pilot-case studies if necessary.

The pilot study aims to verify that the results aimed for are/can be reached. Four teacher-designers that are members of design teams commonly considered ‘successful’ (i.e. teachers expected to have learned most) and four non-designing teachers who are using context-based material in their classrooms will be studied as pilot-cases. From comparing the eight teachers it will become clear that the instruments are effective in finding differences in CoCo-proficiency between teacher-designers and with non-designing teachers in particular.

As a result from study 1, three effective, valid and reliable instruments for use in the other studies will have become available: a) a CoCo-proficiency measurement instrument, b) a format for the retrospective interviews, and c) an analysing framework for design teams. The
construction of the instruments and their validation through the pilot study will be reported in a first international scientific paper together with illustrative results from the pilot.

**Second study: multiple case-study on CoCo-proficiency**

In the second study the constructed instrument will be used in a multiple case study. It is a retrospective study asking teacher-designers to attribute their development in CoCo-proficiency as measured. This is due to the planning of the PhD project: most teams are currently running or have finished making it difficult to observe or participate in design teams on a large scale (this is done on a much smaller scale in Study 3).

A total number of 24 teacher-designers and 8 non-designing teachers complying with the general criteria described above will be selected, preferably evenly distributed over the subjects Physics, Chemistry, Biology and NL&T. For these teachers the CoCo-proficiency is measured, and the retrospective interviews are taken. The design teams the teacher-designers participate or participated in are analysed.

This study provides answers to research question 2 by analysing the way teacher-designer attribute their development of CoCo-proficiency, and comparing it to the attributions of non-designing teachers. Sub-questions are addressed as follows:

- **Research question 2a** will be answered through comparison between non-designing teachers and teacher-designers. The qualitative analysis may be supported by statistical analysis, such as t-test of
- **Research question 2b** (through comparison between the teachers of various design teams. The qualitative analysis may be supported by a descriptive\(^3\) multivariate analysis of variance in learning results (dependent variables), using the various design team characteristics as factors, and teacher characteristics as covariates). Note that individual teachers differ in their background, characteristics and way of participating in the design teams, and that this provides variance.

The results will be reported in two separate scientific papers, each focusing on either of the research questions.

**Third study: intervening in design teams to boost CoCo-proficiency**

Based on the results of the second (and first) studies, two design teams will be coached in an attempt to improve both their work ant to optimise teacher learning. The aim of the coaching is to remove hindering factors and to introduce facilitating factors and focus on factors like: role and participation of an academic specialist, successful professional development characteristics, and the use of a design strategy. Its method will be derived from Meirink (2007), Coenders et al. (2008), and Fullan (2004), and will be complemented with methods from ‘team coaching’ (Lingsma, Bolung, & de Brabander, 2005) and supervision (Van Praag-Van Asperen, 2001).

During the run of Study 3, the analysing framework for design teams will be used to monitor the design teams. Also the CoCo-proficiency of the participating teachers-designers will be measured using the instruments developed in the study 1, and the coaching intervention will be logged. After the study-module has been completed, the (elaborated) retrospect interview will be

\(^{3}\) It is to be interpreted as an effective way of summarising the data due to the low number of respondents.
used to uncover the (perceived) impact of the intervention on the CoCo-proficiency of all participating teacher-designers.

Study 3 leads to the answer of research question 3 and will be published as such.

**Planning and dissemination**

In Table 1 the planning and dissemination of the research is outlined.

Table 1: Planning

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<td>research proposal &amp; workshop VELON conference</td>
<td>April 1st 2008</td>
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<td>01/’08 - 07/’08</td>
<td>03/’08-06/’08 first study construction of the instruments, pilot study</td>
<td>journal paper 1</td>
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<td>journal paper 2 and 3</td>
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**References**


Appendix 1: Elements of CoCo-proficiency

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<thead>
<tr>
<th></th>
<th>a) Awareness, Attitudes and Beliefs</th>
<th>b) Knowledge and Skills</th>
<th>c) Performance (incl. Judgement, Decision making and)</th>
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<tbody>
<tr>
<td>a) Handling content and concepts in relation to contexts</td>
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<tr>
<td>b) Adopting a CoCo compliant emphasis,</td>
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<tr>
<td>c) Realizing CoCo compliant educational functions and student self-regulation</td>
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<tr>
<td>d) (Re-)designing education</td>
<td></td>
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<tr>
<td>e) Contributing to CoCo innovation in school.</td>
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Appendix 2: Contacts with schools

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Appendix 3: Approximate time per teacher

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<th>Teacher-designer</th>
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<td>a) Classroom observations (scorecard) Three lessons will be observed.</td>
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<td>6</td>
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<td>b) A teacher-interview addressing awareness, attitudes and beliefs, and design skills,</td>
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<td>2</td>
</tr>
<tr>
<td>c) A questionnaire addressing emphasis (after Van Driel, Bulte, &amp; Verloop, 2005),</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>d) A student questionnaire on CoCo-teaching skills,</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>e) Analysis of (adapted) teaching materials</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Construction CoCo-Proficiency</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>f) Retrospective interview (Story-line + Retrospective interview</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Constructing the learning map</td>
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</tr>
<tr>
<td>Total (hours)</td>
<td>31</td>
<td>33</td>
</tr>
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