Adopting Concepts of Freinet Pedagogy in Higher Education – A Report on the Design and Evolution of a Didactical Experiment[1]

Stefan Oppl, Department of Software Science, Radboud University, Nijmegen, NL

1   Introduction

Scientific writing is a topic usually adopted in academic curricula on bachelor and master level (Marušic & Marušic, 2003; McNeill, 2009). Courses in scientific writing often focus on topics like formulating scientific questions, literature research, structuring of an article or correctly referencing sources (Rice, 1998; Rönnebeck, Bernholt, & Ropohl, 2016). Those craft-like skills are often be complemented by introducing students to skills related to scientific inquiry in general, such as analysing, interpreting and evaluating data, engaging in argumentation or communicating scientific results (Etkina et al., 2010; Rönnebeck et al., 2016).

The European Qualification Framework[2] requires students on EQF level 6 and above (i.e., from bachelor level on) to have the competence to "manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups"[3]. While these aspects are usually addressed from a professional perspective in most curricula, they are hardly ever considered with respect to scientific work practices. Taking responsibility for selecting one's research questions, making informed decisions on how to tackle scientific problems, and developing the necessary skills in a self-directed way are usually not part of courses on this topic (Rönnebeck et al., 2016). While one could argue that educating students in that respect is superficial for their professional development, there is broad evidence (e.g., as summarized by Ganobcsik-Williams (2006)) that students can benefit from such skills in their professional life.

The educational focus outlined above calls for an experience-oriented, work-based learning approach (Raelin, 1997; Hughes, Moore, & Bailey, 1999). This article presents a concept for a higher education course that focusses on students' autonomous and self-driven skill development in the field of scientific writing and inquiry. It derives its fundamental pedagogical principles from approaches on work- and enquiry-based learning, describes a course concept based on those principles, and finally reports on the evolution of the concept based on design-based research process lasting six years so far.

Work-based education focusing on students' autonomy and enquiry is not a novel concept. It dates back to Dewey and has been picked up in the early 20th century by educational reformists (Pihlgren, 2006). The approaches proposed by Célestine and Élise Freinet in particular are grounded in the idea that skill development can be facilitated by enabling students' autonomous work and collaboration when working on practical problems (Eichelberger & Laner, 2003). The present work hypotheses that their concepts can be used for

---

the aims described above. The proposed course design is thus based on the didactical principles and techniques proposed by the Freinets.

The remainder of this work is organized as follows: In the next section, we review the existing body of literature on the adoption of Freinet concepts in higher education. The article continues with a brief account on the principles and instruments proposed by the Freinets and how they are interpreted in the light of today's changed working environments. In particular, the developments of information technology in the last decades are discussed, as they have been recognized to enable reformist pedagogical approaches even under the strict formal and temporal constraints of curricula driven by the aims of the Bologna process (Reinmann, Sporer, & Vohle, 2007). Section 4 presents the theory-informed course design for scientific writing practices has been developed in the course of the present work. Section 5 reports on the evolution of the concept following a design-based research approach, which has been deployed over a duration of 12 terms as of the time of writing this article.

2   Related Work

So far, no comprehensive overview about how the Freinets' principles can be deployed in higher educational settings is available. Furthermore, the amount of discussion of how Freinet pedagogy can be adapted and used in today's technology-supported learning settings also is relatively scarce. This section sets out to summarize the current state of research in this field.

To establish a body of literature to draw from, a structured literature review has been conducted. The educational database ERIC[4] and diverse publisher's databases as indexed by Google Scholar[5] have been used as a source for the literature review. In ERIC, titles, abstracts, and identifiers have been searched for the term "Freinet" and "Ecolé moderne"[6]. The results have been checked exhaustively for relevancy to the present field of interest. In Google Scholar, an overview about available scientific literature on Freinet pedagogy in general was obtained by searching for "Freinet" and "Ecolé moderne" as a sole keyword. Subsequently, each of those keywords was combined with one of the following keywords to narrow results to the field of interest of the present study: "academia", "academic", "university", "higher education", "online", "internet", "web". For second level search, the lists of references of the identified articles were consulted for potentially relevant further sources. In addition, the works of identified key authors[7], who appeared to have published extensively about Freinet and also have received attention in the scientific community (as measured by citation counts provided by Google Scholar), were checked for further relevant publications. In a third strain of literature study, practitioners' literature identified via references in scientific publications and/or via searches in Google Books was examined for relevant statements.

Of all identified articles, only those available in English or in German were considered. Several potentially relevant articles are only available in French, Spanish or Polish and could not be considered further due to lacking language skills. All remaining articles were checked for potential relevancy based on their abstracts. Duplicates (i.e., articles that have

---

[4]   http://eric.ed.gov
[5]   https://scholar.google.at
[6]   as the school concept proposed by the Freinets is generally referred to in literature.
[7]   N. Beattie, H. Eichelberger, W.B. Lee, G. Schlemminger, J. Sivell

been published via several outlets and/or in different versions) were removed. Where possible, full texts were obtained. Overall, the search could identify 34 articles, book chapters or edited volumes, which either discuss the fundamental principles of Freinet pedagogy[8] or its potential role in higher education, with or without support of information technology. The following discussion of related work is based on these articles. The full bibliography can be obtained from the author[9] upon request.

2.1 Publications on Célestin Freinet's life and pedagogy

As several authors (e.g. Schlemminger (2002), Eichelberger (2003)) note, the role of Célestine Freinet's wife Élise Freinet is generally underestimated in the perception of Freinet pedagogy. While Élise Freinet has proposed genuine pedagogical concepts (Schlemminger, 2002), her impact on what is generally perceived on the concepts proposed by Célestin Freinet remain unclear, but can assumed to be substantial (ibid.).

This article thus considers the concepts of Freinet pedagogy a joint work of Célestin and Élise Freinet. Most published scientific articles, which describe the principles and techniques of Freinet pedagogy, focus on Célestin Freinet alone. Legrand (1993) gives a brief account on the life of Célestin Freinet before describing Freinet techniques and discussing their relevance for contemporary education. Articles with a similar scope are available by Lee (1984), Temple & Rodero (1995) and Acker (2000). The latter focuses on the political foundations that have informed Freinet's work. Those foundations can be found in Marxism, a connection that is also stressed by Schlemminger (2002) and Kock (2006).

2.2 Critical reception of Freinet pedagogics

Scientific publications criticizing the concepts of Freinet pedagogy are scarce. Lee (1980) discusses Freinet's lack of formal educational background and his critical view on "theory" in general. The lack of theoretical underpinnings is also noted by Ubbelohde (2001). Schlemminger (1999) gives a brief account on the criticism Freinet has received from communist intellectuals in the 1950s for "creating illusions in teachers' minds, who are being encouraged to believe that they can change the realities of school life in a world dominated by capitalism". Schlemminger (1997) does not criticize Freinet pedagogy itself but how it has been contemporarily interpreted, taught and implemented.

2.3 Publications on Freinet pedagogy in current educational settings

The body of literature on how to transfer Freinet pedagogy to current educational settings is relatively large. Most publications are written from a practitioner's background with the target group also being practitioners. Examples are (Riemer, 2005) or (Hagstedt, 1997).

Influence of Freinet pedagogy could predominantly be observed in continental European countries, in particular in the Freinets' home country France (Lee, 1984). The concepts were hardly perceived or implemented in English-speaking countries (Beattie, 1998). While the mentioned authors and others have aimed at changing this, most contemporary scientific publications, although partially written in English, still stem from continental European countries:

---

[8]   based on the original writings of the Freinets or their translations, which have not been included in this review

[9]   stefan.oppl@jku.at

Schlemminger (1996) has discussed how to apply Freinet pedagogy to support foreign language learning in schools. More recently, Kuznetsova & Régnier (2014) report on a study conducted in the same domain and found Freinet principles to lead increased motivation for learning as well as in greater student autonomy.

Hansen-Schaberg & Schonig (2001) present an edited volume on Freinet pedagogy that — aside introductory texts — contains several contributions on contemporary implementation of Freinet concepts in German schools. In a similar effort, Eichelberger (2003) presents an edited volume providing an Austrian and Italian (Southern Tyrolean) view on the potential relevance of Freinet pedagogy in the context of these countries. They are also one of the first to report on the use of modern IT technology, in particular web-based tools, to support the implementation of Freinet concepts (see section 2.5).

Freinet pedagogy is also frequently discussed in the context of reformatory pedagogics in general. Watling & Clarke (1995) discusses reformatory approaches with a focus on Freinet for early education. Eichelberger (1995) provides a structured review of Freinet contrasted with the approaches of Hellen Parkhurst (Dalton Plan), Maria Montessori and Peter Petersen (Jena Plan). Purmann (2009) engages Freinet in an imaginative discussion with Montessori and Petersen with respect to the envisioned role of reformatory pedagogics principles for schools in 2020. Pihlgren (2006) provides a discussion of Freinet principles in the context of John Dewey and Mortimer Adler (Paideia Program) and their implications for modern schools.

2.4   Publications on Freinet pedagogy in higher education

The principles of Freinet pedagogy have been discussed for application in a higher education context by several authors in the last 20 years. Rabe & Schlemminger (1999) are the first to discuss the potential transfer of Freinet concepts to higher education settings. They present and discuss a comprehensive concept for implementing a Freinet-based seminar, but do not report explicitly on any lessons learned during implementation (although their concept is based on practical experiences). Ubbelohde (2001) discusses the potential for Freinet-informed project-based learning in academic teacher education. Different class-based interaction settings are described that are proposed to be combined with working on a long-term project in groups. The same domain is addressed by Bolland (2005), who does not focus on particular techniques but discusses, how a whole curriculum on teacher education could be designed based on the principles of Freinet. Génevaux & Pelat (2012) describe a concept for autonomous collaborative learning in a university course context following rules the authors claim are based on Freinet pedagogy. Pyykkönen & Kalliomaa (2013) introduce a project-based learning method informed by Freinet principles and describe its application in a curriculum on sales management. The concept is based on collaborative writing in small groups that contains individual study phases followed by co-operative consolidation and synthesis of the individuals' contributions. Student groups are asked to identify their own research question based on topic areas specified by trigger sentences. Similarly to this approach, Aleksander (2014) discusses, how academic courses can be designed around the idea of collaboratively creating a piece of writing (i.e., a book) of practical value for the respective educational domain, where individual articles are create by small groups of students. He illustrates the concept on a seminar-like course implemented in a curriculum of pedagogy.

2.5   Publications on the potential of IT use for Freinet pedagogy

Biographies of Célestin Freinet claim that he (having died in 1966 and thus still having perceived the beginnings of the IT revolution) was always interested in new technological

developments and open to incorporate them in his work-based techniques. With the advent of web-based work and collaboration platforms, several authors have discussed, how they could be used to implement Freinet-based learning approaches even in spatially and temporally distributed settings.

Sayers (1990) is the first one to explicitly address this issue by discussing the potential of "computer-mediated writing networks", i.e. the computer-based exchange of text. These networks are used to implement the Freinet technique of "school correspondence", where publications of students are exchanged among schools (cf. next section) and students' literacy development in general. Dillenbourg, Schneider, & Synteta (2002) discuss virtual learning environments as a platform for text production (among other use cases) and mentions their potential to support the implementation of Freinet techniques (without going further into detail). Bronkhorst (2003) discusses the potential of networked computers for supporting students' writing and correspondence, which are emphasized by the Freinets as important techniques. He furthermore identifies the potential of the world wide web as a resource to be used for autonomous work and researching topics of interest during learning. Similar potential is identified by Escofet & Marimon (2010), stressing the potential for collaborative work online. Eichelberger, Laner, Kohlberg, Stary, & Stary (2008) discuss the use of eLearning platforms that enable students to work on content, by annotating and discussing it online, from the perspectives of several reformatory pedagogic approaches, among them Freinet. They also stress the potential for collaborative activities but also identify the ability to individualize learning processes as a potential added value of web-based learning processes. Finally, Tavares (2005) identifies computer games and user-generated modifications thereof on the example of Counterstrike[10] as a potential application of the Freinet principle of the class journal where students can publicly document their work.

2.6   Summary

The body of available literature on the Freinets' concepts and their potential for adoption in contemporary educational settings in higher education appears to support the hypothesis that skill development in scientific writing in an autonomous and self-direct way can be facilitated by techniques of Freinet pedagogy. In particular, seminar-like settings based on individual and collaborative writing and inquiry in combination with technological support for communication and coordination among students seem to be a promising approach for achieving the aims of the present study. In the next section, we briefly discuss the fundamental principles and techniques of the Freinets and subsequently discuss how they could be operationalized for the intended target setting.

3   Concepts of Freinet Pedagogy

This section gives a brief account on the concepts of the pedagogical approach of the Freinets. It deliberately refrains from discussing its socio-cultural foundations and focusses on what literature has identified to be its core concepts. For discussions on the historical and socio-cultural background of Freinet pedagogy, readers can refer to (Schlemminger, 1999), (Temple & Rodero, 1995), or (Lee, 1980) (the latter giving a more critical appraisal of the Freinets' approaches).

---

[10]   a first-person shooting game well known for its large body of user-generated modification

Freinet pedagogy is based on the assumption that education emerges from reflecting on experiences made in the course of interacting with the "real world" (in contrast to "artificial" school-based settings) in the course of productive work (Kock, 2006). This has led to the formulation of didactical principles that are summarized in the following. These principles are the foundation of a set of techniques that are proposed by the Freinets to be embedded in the didactics of Freinet-based education. The techniques are briefly presented afterwards. More extensive discussions can be found in related work as discussed above, e.g., (Legrand, 1993).

3.1 Pedagogic principles

Freinet pedagogy lists four fundamental principles learning should be based on. The following discussion is based on (Lee, 1984) and (Schlemminger, 1999). The translation of the original terms to English are drawn from Schlemminger (1999). It is important to note that these principles were only explicitly described some 20 years after the techniques described in section 3.2 were developed and successfully deployed:

- **Pedagogy of Work** (Pédagogie du travail): Learning is based on practical work and not driven by theory. Students learn by making useful products or providing useful services to others. Work, as defined by Freinet, encompasses both physical and intellectual activities, which cannot be separated from each other.

- **Co-operative Learning** (Travail coopératif): Learning takes place in a collaborative context and emerges from the interaction of students among each other and with the teacher. It is based on co-operation in the productive process.

- **Enquiry-based Learning** (Tâtonnement expérimental): Students learn empirically through personal experience in real life situations by a kind of rudimentary problem solving or experimental groping. Learning is based on exploring a solution space for real-world problems experimentally by trial and error involving group work.

- **The Natural Method** (Méthode naturelle): Learning is based on an inductive, global approach. It is always situated in the students' current living situation. Life here is conceived as a broad concept including nature, nature by itself, and the social and political aspects of contemporary life.

- **Centers of Interest** (Complexe d'intérêt) - Learning is based on students' learning interests and curiosity. Students within the context of the school and in alignment with others choose themselves what to work on and how to explore their topic of interest.

3.2 Techniques

Freinet pedagogy proposes several techniques that support the implementation of the principles described above (Schlemminger, 1999).

Many of the proposed techniques center around the topic of writing, printing and publishing. The **Learning Printing Technique** is maybe the one single technique that is often perceived as a cornerstone of Freinet pedagogy. Following the work-based approach to learning, students were offered to use a printing press to reproduce texts that they had composed freely. In manually compiling the letters to form words and sentences, an immediate, "tangible" understanding of syntax and semantics is facilitated. **Free Writing** is another cornerstone of Freinet pedagogy, aiming at enabling students to focus on their centers of interest and allowing them to verbalize their experiences from their daily life (following the principle of the natural method). The students are asked to write down their own personal adventures, or incidents that they had experienced inside and outside

school. In an effort to integrate cooperative learning, the individually created texts are presented to the whole group, are discussed and/or edited there, before finally being printed by the students themselves working together. This concept was eventually extended to publish collections of the created texts as **Class Journals** and **School Newspapers**. Going beyond the borders of single schools, one technique called **School Correspondence** is used to exchange printed materials among spatially distributed groups of students or whole schools.

To aid individual learning processes around their own centers of interest, students are provided with free access to a **Class Library** assembling documents, files, books and other materials on relevant topics. This can also include materials created by the students themselves in the course of their work, which is referred to as **Working Library**. Engagement with different topics is facilitated by prepared environments, called workshops or **Ateliers** which offer materials, tools and tasks to engage with a particular topic the atelier is focused on (Legrand, 1993). In order to facilitate autonomous learning, the tasks are augmented with **Self-Correcting Files** where possible (ibid.).

Freinet pedagogy encourages students to conduct their own **Field Investigations** and research to aid enquiry-based learning. Students regularly observe and study their natural environment and their local community. Back in class, they use the writing and printing techniques presented above to reflect on their findings.

In terms of organization of learning, Freinet pedagogy centers around the concept of students' self-organization on an individual and collective level. Each students develops an individual a **Work Schedule** which is discussed and evaluated together with the teacher. The overall co-ordination of activities, and any problems affecting individual students or groups are regularly discussed and resolved in the **Classroom Assembly**, which consists of all students and the teacher. The work results and progress of the whole group of students is documented in the class journal described above.

4 Course Concept

The pedagogic principles of the Freinets have been applied to a single course in a bachelor curriculum of business information systems ("Wirtschaftsinformatik"). This limits the comprehensiveness of the principles and techniques' implementation, as they in part rely on being embedded in the complete educational environment. These limitations are discussed at the end of this section.

The course used for implementing the didactical principles is a "proseminar". "Proseminars" are concerned with introducing students to the fundamentals of scientific work practices, in particular to scientific writing. In the overall curriculum design, proseminars are intended to be completed in preparation of writing the bachelor thesis. While most students follow this suggestion, it is not mandatory and not enforced in the curriculum. Students have to complete two of four proseminars, which are offered each term. Each proseminar has a genuine scientific focus derived from the research of the department it is offered by. The proseminars also differ in their didactical approaches, which students know upfront before registering. The participants of the proseminar discussed here therefore chose to participate deliberately and voluntarily.

4.1　Global Course Design

The course has been designed based on the pedagogical principles of the Freinets by using the didactic approaches described above. The whole course is created around the principle of self-organization. Aside the formal aims of the course according to the curriculum (i.e., to support the development of skills in scientific work practices), the syllabus sets forth the additional aim of developing and training skills of self-assessment and self-organized learning processes.

Students are provided with the syllabus that outlines the course objectives and didactic concept, access to content and instruments that could help them achieving these aims, and some rules that need to be adhered to in the course of doing so. Choosing the way of achieving the aims is in the students' responsibility.
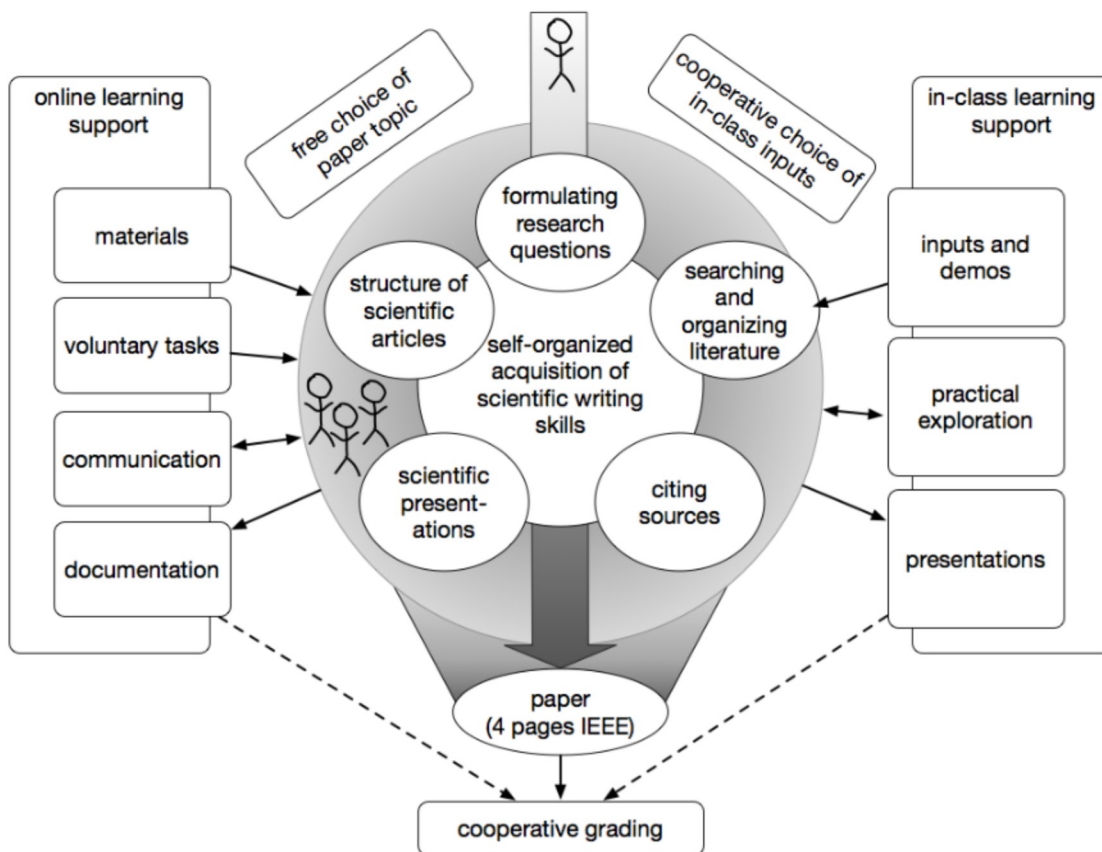

Figure 1: Global course concept

4.2　Learning Environment

The learning environment provided in the course is outlined in Figure 1. We describe the shown didactic elements in the following. The whole course is organized around two principles that should support students' individual and collective responsibility for their learning processes and make their own decisions on the relevancy of particular content in these processes.

First, the students are responsible for choosing the topic for their own paper. All students are writing a paper on their own in an individual process. They are asked to select a topic for this paper they are genuinely interested in and, if possible, already have mundane knowledge about.

Second, the students are responsible to organize themselves in small working groups (2-4 students) to support each other in acquiring the necessary skills to complete their writing task. For class-based elements, the whole group of participants has to agree on which input is requested from the teacher (see below for class organization).

4.2.1 Ateliers

The support for the acquisition of skills on scientific work practices is organized in ateliers. An atelier is a prepared learning environment, which contains learning content on a particular skill and tasks that help to practice this skill.

For the particular course, five ateliers have been specified:

- formulating research questions

- structure of scientific articles

- searching and organizing literature

- citing sources

- scientific presentations

Each atelier contains tasks that are described using a uniform template. In the following, we show a sample task described using this template.

```
Searching through references of a given article
-----------------------------------------------

Aim: You know the meaning of the term "citation search" and
   are able to conduct a citation search using literature
   search engines and databases.

Required skills:
  - Using literature databases and search engines

Recommended documentation:
 - identified articles
 - documentation of literature search

Estimated time effort: 3 hours

Self correction: compare your identified articles with those
  provided as an attachment to this task, optionally also
  discuss your results with colleagues or the teacher

Inputs:
 - slideset "literature search"
 - video recording "search strategies"
 - book "The craft of research", ch. 5, sec. 5.5
```

The template's fields not only allow to describe the task itself, but also outline its aims, the required skills (by referring to other tasks) and other meta-information, such as estimated time effort or means of self-assessment.

In addition, the students are provided with a graphical overview about the dependencies among the tasks (cf. Figure 2), enabling them to assess, which tasks they might consider to complete and which they do not consider relevant for themselves.
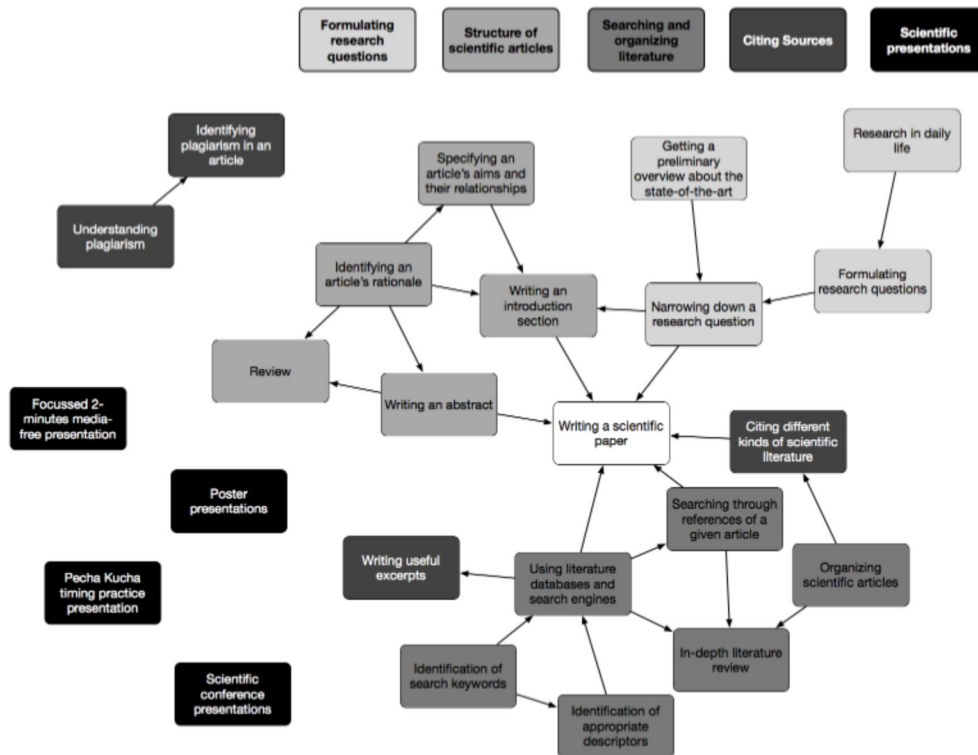
Figure 2: Atelier tasks and their dependencies

For each task, pointers to relevant learning materials are provided. A library of learning materials is prepared for each atelier. It contains written information, slides and recordings of presentations on the topics relevant to the atelier.

While the task descriptions and materials are provided to the students in a digital format (cf. description of online collaboration platform below), they are not necessarily to be solved using ICT support. The tasks can be completed individually to a large amount. Still, collaboration is always possible and encouraged in the course syllabus. Some tasks (like mutual review of students' papers) require collaboration with other students.

Students are basically free to choose which tasks they complete. The only constraint is that they have to select two tasks from the atelier on "scientific presentations", as practice of presentation skills had been requested by the curriculum committee. Students have to commit themselves to complete the tasks they select at the end of each presence-based session. While they are free to choose to not complete any task, failure in demonstrating the required skills in the paper in combination with a lack of respective tasks is a factor that is considered during cooperative grading.

4.2.2 Classes

The course contains 7 sessions held in-class, which last at most 3 hours. They are split in two parts: one of mandatory attendance and one of voluntary attendance. The first part contains three agenda items: Administrative questions and announcements, discussion items concerning the whole group, and presentations by students.

Administrative questions and announcements is concerned with agreeing on the organizational implementation of the course. This, e.g., covers agreeing on deadlines for submission of documents as well as mutual commitments to give feedback.

The block for discussing items concerning the whole group is an opportunity to bring forth issues that need to be discussed in the plenary with all students and the teacher. It is an

open forum that is not constrained to organizational or administrative issues but can cover any aspect relevant to the course.

The final mandatory block contains presentations by students. All participants have to complete at least one scientific presentation on their chosen topic and one exercise on timing presentations (cf. below). In order to provide each student with appropriate and equal audience, attendance of the block is mandatory. Planned presentations are subject to public prior announcement via the online collaboration platform (cf. below).

Participation in the second part of each session is voluntary. It contains inputs by the teachers as requested from the students and open individual or group working sessions on atelier tasks. Teacher inputs are requested by the students upfront via the online coordination platform. Teacher inputs can take the form of presentations, interactive demos or guided exploration. After the requested teacher inputs are completed, students are free to individually or collaboratively work on atelier tasks or continue to work on their paper. The teacher remains available for questions or as a facilitator if required.

4.2.3   Online coordination platform

The course is accompanied by an online collaboration platform. No particular technical solution is mandatorily used here. The course concept requires to have means for publishing learning materials, announcements and maintaining discussion forums. Furthermore, it requires to enable students to publish documents. Learning platforms[11] or project management tools[12] have been successfully deployed for this purpose.

The online collaboration platform is also used to host the learning ateliers provided for the course. It contains the link to the content libraries for each atelier, as well as the task descriptions and materials to work on or for self-assessment.

Each in-class session is represented by a planning document (or forum thread) in the collaboration platform. Students use this document to announce their intention to give a presentation or to request teacher inputs. Potential teacher inputs to choose from are published as a part of the content libraries in the ateliers.

The online collaboration platform also contains a document (or forum thread) in which students publicly commit to complete atelier tasks in a particular timeframe (usually between to in-class sessions or in the course of an in-class session). This is not only used for documentation but also to encourage cooperation among students committing to the same tasks in the same timeframe.

The platform is also used as a publishing channel for intermediate or final versions of students papers. As part of the atelier on "structuring scientific articles", they are free to agree upon mutual review by other participants. Furthermore, they can request individual feedback by the teacher on an intermediate version of the paper (but are not required to).

Additionally, students use the collaboration platform as a means to document the work they have conducted for the course. This is implemented in the form of an individual learning diary that is accessible by all students and the teacher. Students are required to post regular updates in their learning diary, with the suggested posting frequency being at least once per in-class session interval.

---

[11]   such as Moodle, https://moodle.org
[12]   such as Basecamp, http://www.basecamp.com

Finally, the platform provides means for administrative and content-oriented discussions by means of forums (one for each atelier and one for administrative purposes). Content-oriented discussions are primarily to be used by the students themselves for mutual support. The forums, however, are monitored by the teacher, who is committed by the syllabus to provide support when requested or if no responses of other students are available after two days

4.2.4 Cooperative grading

The course concept introduces a cooperative grading approach, in which the teacher and each student collaboratively review the course results (i.e., the paper, the presentations, and the documentation of learning progress) and agree on a grade for the course. The paper is discussed in terms of structure, clarity of the formulated research questions, usage of literature, and formal citation correctness. Evident shortcomings are reviewed in the light of document effort to acquire skills in the respective field. Students have to opportunity to revise their paper once to compensate for identified shortcomings. The final grade in this case is determined by the teacher.

4.3 Adoption of Freinet Pedagogy - A Reflection

The course design can be mapped to the principles and a number of the techniques originally conceived in the works describing Freinet pedagogy. We discuss this mapping, the necessary interpretation and adaptation as well as its limitations in the following.

The course design is fundamentally based upon a **pedagogy of work**, fully focusing the process of creating shareable artefacts (in this case: scientific papers, presentations, materials created in the course of completing atelier tasks) and considering traditional teaching inputs as only one means among others that can be used by students to gather information necessary to complete their work.

The principle of **centers of interest** is addressed in the course concept by asking students to select a topic for this paper they are genuinely interested in. This approach resonates with the ideas of the **free writing** technique, which should enable students to focus on developing writing skills rather than being disturbed by some artificial topic constraints. Letting the students autonomously assess their individual need developing skills in the different aspects of scientific working (as they already might have existing experiences) also follows these principles. Operatively, the latter is supported by the technique of the **work schedule** which is implemented in a forum where students commit to complete particular learning tasks.

The development of the work schedule is informed by the offered prepared tasks that follow the idea of **self-correcting files**. Their form of presentation is not described in detail in Freinet pedagogy. The approach chosen here is close to what Parkhurst proposes for describing "allotted tasks". The tasks are organized in virtual **ateliers** that are made available via the online collaboration platform along with prepared materials (**class library**) and - if available - students' self-created materials (**working library**).

Enquiry-based learning as a principle is picked up in the process of writing the scientific paper in respect to both, the content of the paper and the necessary steps to create a well-written paper. The content of the paper is designed by students by what Freinet would call **field investigations**, which – due to the scope of the course – students mainly perform in online and physical scientific literature libraries and – depending on their chosen topic – also in specific fields of application (e.g., when comparatively assessing a selection of social media tools with respect to a particular set of properties). The opportunity to individually discuss intermediate versions of the paper also contributes to this principle, as it

leaves room for experimenting with structure and content of the paper throughout the course.

The principle of **co-operative learning** is embedded in the course design by asking students to form small working groups supporting each other in acquiring the necessary skills to complete their writing task. The organization of these groups and their communication is facilitated by the online collaboration platform and free working time during in-class sessions. Coordination in the whole class is facilitated by time slots in in-class sessions dedicated to discussing problems and planning further steps. This is complemented by a forum in the online collaboration platform used to plan teacher inputs and student presentations in in-class sessions. The combination of these two instruments enables to implement the Freinet concept of the **classroom assembly**. The results of free writing and other completed tasks are shared via the online collaboration platform and can also be collaboratively discussed and edited there (e.g., in the form of mutual review). In this sense, the platform also takes the role of a **class journal**.

The **natural method** is a principle that is hardly considered in the original course design. Some aspects are considered in the elements concerned with practicing presentation techniques and getting a fundamental understanding about research in general. In some of the prepared tasks in these areas, students are explicitly asked to not focus on any particular scientific topic, but explore or present aspects of their daily life.

The essence of the **learning printing technique**, namely the tangible engagement with text to produce sharable artefacts, is also hardly addressed in the presented course concept. Still, students are encouraged to not write their texts in desktop publishing software like Microsoft Word, but use low-level typesetting software such as the LaTeX system, that provides a more thorough insight in the process of layouting texts.

Finally, the results of the course are not shared beyond the group of participants, thus the techniques of **school newspapers** or **school correspondence** are not currently addressed.

5 Evolution

The course concept has been instantiated each term since its initial design in 2011. Its evolution follows a design-based research approach (Collins, 1992), which methodologically is a viable and natural choice for the present study, as it is "focusing on the design and testing of significant interventions"(Anderson & Shattuck, 2012) (i.e., the deployment of concepts and instruments oriented on the Freinets' pedagogic principles) which "need to be situated in a real educational context" (ibid.) (i.e., assuming that the work-based and enquiry-oriented foundation of the course can only be effectively study in a real world context).

Following this approach, students' behavior during each instance and its outcome has been continuously observed and assessed with respect to the pedagogical principles of the Freinets and the required learning outcomes according to the course description in the curriculum.

The observation results have led to a modification of the pedagogical interventions planned in course to strengthen the pedagogic elements that led to the conceived effects and were strongly adopted by the students. In turn, some elements were also modified to avoid phenomena that arose from unreflected deployment of the concepts of the Freinets.

Overall, three design iteration can be identified. In the following, we summarize the observations for each iteration and the changes to the course concept made based on these observations.

5.1   Term 1-4 - Implementation of Original Concept

The original concept as described above was implement unaltered for four terms from 2010 to 2012. Overall, 70 of 86 registered students successfully completed the course. The remaining 16 students dropped out of the course for different reasons that were not further examined.

The course concept in general was well received and accepted by the students without any active rejection. The most prominently mentioned positive aspect in student feedback was the freedom of topic choice. Selecting a topic of one's own interest was highly valued and made use of. Furthermore, the extension of the course beyond its core topics by asking students to give presentations on topics stemming from personal context were very well received.

The most prominent observation countering the initial concept was that the ateliers were hardly used. Students attributed this to their voluntary nature and the work load resulting from other courses. Furthermore, the possibility for collaboration with peers was hardly used, as was the opportunity to voluntarily collect feedback on one's own writing from peers or the teacher. In the final talks, about 30% of student stated that they hardly did anything for the majority of the term and then wrote the paper in the final week, again attributing their behavior to the work load resulting from other courses. The vast majority of them did not reach the minimal aims of the course and used the opportunity to resubmit revised versions of their papers. Using the learning diaries to reflect on the process was hardly possible, as students perceived them to be of little value and only infrequently made entries. A specific feedback on collaborative course planning was that students felt overcharged with selecting appropriate teachers' inputs for in-class sessions due to lack of knowledge what would be important for their next steps. This feedback is in line with the findings of Kirschner, Sweller, & Clark (2006), who state based on empirical results that only if "learners have sufficient high prior knowledge that provides 'internal' guidance does the advantage of guidance begin to reduce".

5.2   Term 5-8 - Increase of guidance measures

Based on the results of the first instantiations of the course, some of its elements were redesigned. Redesign was generally characterized by a reduction of students' freedom with respect to the organization of the learning process and an increase of guidance measures.

Specifically, the following changes were made: The teacher inputs on fundamental topics of scientific writing were scheduled by the teacher for presentation in particular in-class sessions. Still, attendance remained voluntary. The ateliers were still provided but not positioned prominently, mandatory publishing of the individual work plan was omitted. In terms of guidance in the writing process, the topic of one's paper had to be publicly announced in the first month of the course. Mandatory intermediate talks were introduced with the requirement of having at least written a draft of the introduction and an outline for the remained of the paper including literature. Furthermore, mandatory peer review was introduced. The learning diaries were removed from course and substitute by individual reflection during intermediate and final talks. The remainder of the course remained unchanged.

Overall, 58 of 72 registered students successfully completed the courses following the new design. The remaining 14 students dropped out of the course for different reasons that were not further examined.

The changes in procedural guidance led to a reduction of the number of people not achieving the minimal aims of the course when submitting the initial version of the paper to approx. 10%. Students feedback and the results of the final talks showed that the mandatory peer review generally improved students' understanding of paper structures and writing constructs. Furthermore, the collaboration on topic of papers improved, as could be observed by discussions in the collaboration platform and during in-class sessions. This was indicatively caused by the public announcement of selection topics, which rose awareness about potential collaborators.

One unanticipated effect of the changes was that the amount of students leaving in-class sessions after mandatory part was rising. When inquiring the reasons, students stated that they gained little value of those inputs, as they did not match their individual progress in paper writing. Furthermore, students indicated that they were overcharged with specifying their topic of research in a way that it could be appropriately be dealt with in the limited space of the paper. Consequently, they would prefer more individualized guidance throughout the writing process, receiving input appropriate to the progress and their skill level. This again is in line with the findings of Hmelo-Silver, Duncan, & Chinn (2007), who propose to use scaffolding (Van de Pol, Volman, & Beishuizen, 2010) for supporting students in their individual learning processes.

5.3   Term 9-12 - Towards scaffolded experiential learning

The third iteration of the course was designed with the objective of improving individual student support by the teacher. Focus was put on implementing individual mentoring for each student, which was compensated by a reduction of the amount of time used for teacher inputs in the plenary.

In detail, the following changes were made: An additional mandatory meeting with the teacher was introduced in the first weeks of the course on discussing topic selection. Students now have three mandatory mentoring sessions with the teacher. The personal interests of the students are condensed to a topic suitable for paper writing collaboratively with the teacher. In turn, the teacher inputs are reduced and limited to core topics (structure of paper, literature search, writing an introduction) in the first two in-class sessions - the remainder of inputs is on the one hand delivered as video recordings and on the other hand provided according to students' individual needs in the context of their own writing during mentoring meetings.

Overall, 69 of 88 registered students successfully completed the course. The remaining 19 students dropped out of the course for different reasons that were not further examined.

The shift towards increased individual guidance has led to positive feedback of the students in terms of the course still being sufficiently demanding to be interesting, but avoiding the feeling of being overcharged by certain aspects in the writing process. The quality of results in general has improved, the amount of students not reaching the minimal aims of the course with their initial submission, however, remains at 5-10%. Providing inputs as video recordings of presentations is well accepted by students, as indicated by access analytics and student feedback. In particular, students having completed the course in earlier terms keep coming back to the material repository, which has been made publicly accessible, for reference. So far, no negative impact of the design changes in the latest iteration of the course concept could be observed.

5.4　Discussion

While the course design in its current iteration in well received by students and the results also do not indicate any need for change, one could ask, if all the changes made to the original concept, essentially reducing student's freedoms of organizing their learning process, still justify the course's claim to be based on Freinet pedagogy.

The current iteration of the course design arguably follows the fundamental principles of Freinet pedagogy to a bigger extent than the initial versions. In particular, the enquriy-based character of the work process has been strengthened by implementing methods of scaffolding that are provided individually by the teacher. Also, the collaborative nature of learning has been facilitated by introducing mandatory parts of interaction with peers and making discovery of overlapping interests easier by publicly announcing selected topics already during the early phases of the course. The fundamental design principles of work-centered learning based on individual centers of interest remain unchanged.

The number of didactic instruments that were initially conceived to implement different techniques proposed by the Freinets, however, has indeed been decreased. In particular, the prepared ateliers together with the work schedule were (essentially, if not formally) removed from the course concept. While these instruments were not actively criticized by the students, they were hardly ever used. Students attributed this to their voluntary nature and the work load imposed on them by other courses in their curriculum. As the option to make completing atelier tasks mandatory for students would counter the fundamental ideas of the course (and Freinet pedagogy) to facilitate autonomy and self-directed learning, they were consequently removed from the course and eventually substituted by other measures, in particular individual mentoring, which - in terms of students' commitment, appears to lead to even better results than using a written work schedule.

6　Conclusion

The present article has described a course concept to facilitate the development of students' skills in scientific writing and inquiry based on the concepts of Freinet pedagogy. Its contributions have been twofold: first, the current state of discussion about the deployment of Freinet concepts in higher education has been comprehensively summarized in a structured literature review. Second, the course concept and its evolution over a duration of 12 terms has been described based on a design research approach. It thus gives a comprehensive account on how Freinet principles can be deployed in the higher education courses in an academic environment that is shaped by the constraints of current bachelor- and master-programs with high work load and limited flexibility.

The study described here has several limitations. First, the conceptualization and implementation of the course has been driven and assessed by a single researcher in the context of a single curriculum. In order to establish a more comprehensive set of experiences for future design iterations, experiences from more diverse educational settings would be required. Second, the experiences made during the course evolution indicates that concepts enabling individual mentoring could further inform the implementation of Freinet-based learning settings. In particular, educational concepts like scaffolding (Van de Pol et al., 2010) or flipped classroom courses (Bishop & Verleger, 2013) might inform future design iterations.

References

Acker, V. (2000). Celestin Freinet (1896-1966): A Most Unappreciated Educator in the Anglophone World. *Proc. of Conf. of the Comparative and International Education Society*.

Aleksander, Z. (2014). The concept of teachers' learning in the field of early education. From the Freinet pedagogy to the training of academic teachers. *Problemy Wczesnej Edukacji*, *2*(10), 101–106.

Anderson, T., & Shattuck, J. (2012). Design-based research a decade of progress in education research? *Educational Researcher*, *41*(1), 16–25.

Beattie, N. M. (1998). Freinet and the Anglo-Saxons. *Compare: a Journal of Comparative and International Education*, *28*(1), 33–45.

Bishop, J. L., & Verleger, M. A. (2013). The flipped classroom: A survey of the research (Vol. 30). Presented at the ASEE National Conference Proceedings, Atlanta, GA.

Bolland, A. (2005). Das Sieb des beständigen Versuchens – Forschendes Lernen und Freinet-Pädagogik in der LehrerInnenbildung. In *Qualitative Forschungsmethoden im erziehungswissenschaftlichen Studium*.

Bronkhorst, J. (2003). Freinet Pädagogik und neue Medien. In *Freinet-Pädagogik und die moderne Schule*. Studien Verlag.

Collins, A. (1992). Toward a design science of education. In *New directions in educational technology* (pp. 15–22). Springer.

Dillenbourg, P., Schneider, D., & Synteta, P. (2002). Virtual learning environments (pp. 3–18). Presented at the 3rd Hellenic Conference" Information & Communication Technologies in Education."

Eichelberger, H. (1995). Reformpädagogik - vier Modelle. *Schulheft*, (80), 7–74.

Eichelberger, H. (2003). Freinet-Pädagogik und die moderne Schule. Studien Verlag.

Eichelberger, H., & Laner, C. (2003). Die Freinet-Pädagogik als Fundament des schulischen und gesellschaftlichen Wandels. In *Freinet-Pädagogik und die moderne Schule*. Studien Verlag.

Eichelberger, H., Laner, C., Kohlberg, W. D., Stary, E., & Stary, C. (2008). Reformpädagogik goes eLearning: Neue Wege zur Selbstbestimmung von virtuellem Wissenstransfer und individualisiertem Wissenserwerb. Oldenbourg Verlag.

Escofet, A., & Marimon, M. (2010). Web 2.0 and Collaborative Learning in Higher Education. In *Web-Based Education Concepts, Methodologies, Tools, and Applications* (Vol. 1, pp. 699–714).

Etkina, E., Karelina, A., Ruibal-Villasenor, M., Rosengrant, D., Jordan, R., & Hmelo-Silver, C. E. (2010). Design and reflection help students develop scientific abilities: Learning in introductory physics laboratories. *The Journal of the Learning Sciences*, *19*(1), 54–98.

Ganobcsik-Williams, L. (2006). Teaching academic writing in UK higher education: Theories, practices and models. Palgrave Macmillan.

Génevaux, J.-M., & Pelat, A. (2012). Collaborative learning in an University (p. 230). Presented at acoustic's 2012.

Hagstedt, H. (1997). Freinet-Pädagogik Heute: Beiträge zum internationalen Célestin Freinet Symposion in Kassel. in Schriftenreihe des Weltbundes für Erneuerung der Erziehung: Internationale Pädagogik-Reformpädagogik; Bd. 3. *Weinheim: Beltz*.

Hansen-Schaberg, I., & Schonig, B. (2001). Freinet-Pädagogik. Reformpädagogische Schulkonzepte.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and Achievement in Problem-Based and Inquiry Learning: A Response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist*, *42*(2), 99–107.

Hughes, K. L., Moore, D. T., & Bailey, T. R. (1999). Work-Based Learning and Academic Skills. IEE Working Paper No. 15.

Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching. *Educ. Psychologist*, *41*(2), 75–86.

Kock, R. (2006). Célestin Freinet: Kindheit und Utopie. Julius Klinkhardt.

Kuznetsova, E., & Régnier, J.-C. (2014). Individualization of Educational Process According to

C. Freinet: A Pilot Experiment in a Group of Language Learners. *Procedia-Social and Behavioral Sciences*, *154*, 87–91.

Lee, W. B. (1980). Ecole Moderne Pédagogie Freinet: Educational Bonesetters. *The Phi Delta Kappan*, *61*(5), 341–345.

Lee, W. B. (1984). Célestin Freinet, the unknown reformer. Proc. of The Educational Forum Vol. 48, pp. 96–113.

Legrand, L. (1993). Célestin Freinet. *Prospects*, *23*(1), 403–418.

Marušic, A., & Marušic, M. (2003). Teaching students how to read and write science: a mandatory course on scientific research and communication in medicine. *Academic Medicine*, *78*(12), 1235–1239.

McNeill, K. L. (2009). Teachers' use of curriculum to support students in writing scientific arguments to explain phenomena. *Science Education*, *93*(2), 233–268.

Pihlgren, A. S. (2006). A Modern Reading of Dewey Together with Freinet and Adler. *The School of Today Will Create the Society of Tomorrow, the Educational Ideas of Celestin Freinet. Norrtälje, Sweden: Norna Förlag*, 45–62.

Purmann, E. (2009). Tee mit Freinet. In *Schule 2020 aus Expertensicht* (pp. 39–46). Springer.

Pyykkönen, R., & Kalliomaa, S. (2013). PBL Applications in the BBA Programme in Business Administration in the School of Business and Services Management at JAMK University of Applied Sciences, Finland. *PBL Across Cultures*, 15.

Rabe, U., & Schlemminger, G. (1999). Hochschuldidaktik – Ein wissenschaftliches Desideratum. *Theorie Und Praxis. Osterreichische Beitrage Zu Deutsch Als Fremdsprache*, *3*, 247–258.

Raelin, J. A. (1997). A model of work-based learning. *Organization Science*.

Reinmann, G., Sporer, T., & Vohle, F. (2007). Bologna und Web 2.0: Wie zusammenbringen, was nicht zusammenpasst. *eUniversity--Update Bologna*, *3*, 263–278.

Rice, R. (1998). Scientific writing: A course to improve the writing of science students. *Journal of College Science*, *27*(4).

Riemer, M. (2005). Praxishilfen Freinet-Pädagogik. Klinkhardt.

Rönnebeck, S., Bernholt, S., & Ropohl, M. (2016). Searching for a common ground--A literature review of empirical research on scientific inquiry activities. *Studies in Science Education*, 1–37.

Sayers, D. (1990). Interscholastic Exchanges in Celestin Freinet's Modern School Movement: Implications for Computer-Mediated Student Writing Networks. *Proc. of the North American Freinet Conference*.

Schlemminger, G. (1996). Freinet-Pädagogik-(auch) ein Ansatz für den Fremdsprachenunterricht? *Fremdsprachen Lehren Und Lernen*, *25*, 87–105.

Schlemminger, G. (1997). Forschungsdesiderata der Freinet-Pädagogik (pp. 203–212). In Freinet-Pädagogik Heute. Beiträge zum Internationalen Célestin-Freinet-Symposium in Kassel, Weinheim, Beltz/Deutscher Studienverlag.

Schlemminger, G. (1999). The Freinet Movement: Past and Present. In Y. Lefranc (Ed.), *Plaisir dapprendre et travail cooperatif. Les methodes educatives et la philosophie pratique de Celestin Freinet* (pp. 17–26).

Schlemminger, G. (2002). Zur Biographie Célestin Freinets und zur Entwicklung der Grundzüge und Prinzipien seiner Pädagogik. In *Freinet-Pädagogik. Reformpädagogische Schulkonzepte* (pp. 9–51).

Tavares, R. (2005). *Freinet and Counter Strike: Machinima and Mod-Games in the Educational and Social Inclusion Process*. PUC-SP, SENAC-SP.

Temple, C., & Rodero, M. L. (1995). Reading around the World: Active Learning in a Democratic Classroom: The" Pedagogical Invariants" of Célestin Freinet. *The Reading Teacher*, *49*(2), 164–167.

Ubbelohde, R. (2001). Freinetpädagogik - erfolgreiche Praxis ohne Theorie. In *Freinet-Pädagogik. Reformpädagogische Schulkonzepte* (pp. 1–26).

Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher--student interaction: A decade of research. *Educational Psychology Review*, *22*(3), 271–296.

Watling, R., & Clarke, H. (1995). 'Our Village': Freire, Freinet, and Practical Media Work in the Early Years. *Early Years*, *15*(2), 6–12.