Process- and context-sensitive research on academic knowledge practices: Developing CASS-tools and methods

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Abstract: The Contextual Activity Sampling System (CASS) methodology and CASS-Query tools have been developed for the investigation of learning and working practices. The CASS-methods and tools provide contextualized data that allow the analyzing and modeling of within-person changes across time. This paper describes a pilot study with 3G mobiles used by eight engineering students. Students answered questionnaires concerning their ongoing study projects, academic-related emotions, and collaboration, with a mobile phone five times a day for a period of two weeks (70 queries per person). Variations in their emotions were examined by time-series analysis. Students were interviewed before and after the CASS-query period. Interview and query data were used to form a picture of the variation of daily routines, challenges, and activities related to engagement in academic tasks or leisure. The study reports results regarding students' experiences of the CASS-methodology, emotional experiences, their objects (projects) and activities during this period.

Aims

Traditional methods of learning research are usually individually oriented, focus on the participants’ beliefs and other discursive entities rather than their practices as they occur. Therefore such methods provide a frozen picture of students’ behavior rather than address sustained processes of individual and social transformation. The participants are often asked to provide retrospective global assessments (Reis & Gable, 2000) of their beliefs and conceptions of learning that are assumed to determine the nature of their concrete approaches to learning. There are few empirical studies linking students’ predispositions to actual practices, other than studies where students have been asked to report how strongly they prefer various study strategies. Several learning researchers (e.g., Engeström, 1987; Marton & Trigwell, 2000; Säljö, 1997; Wegner, 1998), argue, by contrast, that social practices play a central role in learning and instruction. Further, Gale (2002) and Quinn (2004) point to the sociocultural explanations of students’ difficulties in higher education. Overall, everyday institutional practices of working with knowledge—taking courses, reading, writing, presenting, interacting with other students, as well as the structuring of activity in space and time, by the curriculum—appear to be in a central position in determining also individual practices of learning. Evidently, these variables are interacting with students’ personal dispositions. However, understanding of the contextualized factors of learning, which are cross-time, cross-situational, and multilayered, is currently rather primitive (Alexander, 2002). In short, research on sociocultural dynamics of learning and instruction appears to require transformation of available research tools.

One of the central aims of the present investigation is to develop and validate contextual tools for longitudinally analyzing transformation of university students’ knowledge practices, i.e., processes, routines, or procedures of working with knowledge. Knowledge practices represent socially constituted, rather than merely individual activities (Hakkakainen et al, 2006). Background for methodological development is provided by the Ecological Momentary Assessment (EMA) (Bolger, Davis, & Rafaeli, 2003; Reis & Gable, 2000; Stone & Shiffman, 2002) and Experience Sampling Method (ESM) (Csikszentmihalyi & Larson, 1987) which provide methods of assessing participants’ contextual activities, events, and personal experiences. Whereas ESM focused originally on capturing elusive flow experiences, EMA is more broadly oriented toward recording mundane and
routine everyday activities that constitute social practices. The participant is asked to assess only one situation in time and generalizations are made by researchers by aggregating observations or modelling changes across time.

**Developing and validating The Contextual Activity Sampling System (CASS)**

The CASS-query tool is a Java-application for collecting process- and context-sensitive data. The system is implemented on 3G mobile devices (e.g., Nokia E70) with Symbian operating system, MP3, video, GPS, wlan. The CASS system provides generalizable tools in open-source terms (i.e., adaptable and free of charge) that can, in a flexible way, be tailored and elaborated for particular needs and requirements of researchers and users.

Basic functionalities of the CASS-Query tool include: Administrator tool (XML-editor) enables the construction of queries, defining questions and types of responses (open text, Likert-scale, audio- or videorecording, picture); Queries are customizable to each user; The application connects to the Internet and downloads the intended query from the server; Responses are returned to server database; Data are transferrable to statistics software SPSS.

**Pilot study**

A pilot study was carried out with eight third-year students at EVTEK in November 2006. The calendar in their mobiles was set to send an alarm signal to each student at pre-set times, prompting the student to open the application. They were introduced to the CASS data-collection procedure, queries, and mobile phone in an introductory session; a feedback session was held after the pilot. The students were interviewed individually before and after the pilot. The actual pilot consisted of 14 days, during which the students were asked to answer five queries each day. A daily set of questionnaires included morning query, three identical day queries and an evening query. The time spent in the morning and evening was approx. 5 minutes per query and for the day 2-3 minutes per query.

Examples of issues addressed were the objects (What are the personal projects defined as papers, exams, work, hobbies), self-efficacy and flow (How absorbed are you in what you do?, How competent do you feel?), stress (see Elo, Leppänen, & Jahkola, 2003) (Do you feel stress?), affects (e.g., enthusiastic, nervous), social context (where, with whom), social sharing (Are you interacting with someone else?), obstacles and constraints (what hampers or restrains your activities). In analyzing the data, we apply multi-level models, such as the time-series models adapted to repeated measures data.

**Findings**

The students in the pilot study considered the tool very easy to use; they became accustomed after two or three queries. The pilot study provided evidence that the sampling was able to show both within-person and between-person variation in the responses to the affect and motivation questions. We discovered very different rhythms (some students study from 8-4, while others start in the afternoon and continue late into the night), range in the number and type of personal study projects, type of constraints they experienced, and types of networks in which the students were active.

![Figure 1. One student’s interest and stress scores in relation to the self-reported activities during 14 days.](image-url)
In the pilot data, factor analysis of the affect variables yielded two factors representing interest (determined, interested, enthusiastic) and stress (nervous, irritated, anxious, stress). A time series analysis represents (figure 1.) the normalized interest and stress factor score coefficients for one student, based on the day queries. The stress score showed lower levels as the student reported to be on freetime during this period of 14 days. Further, small scale projects in teams appeared most stressfull, but also elevated interest during studying.

Theoretical and educational significance

It appears that the contextualized CASS-sampling provides investigators with a novel type of information on learning and working practices. Specifically, it enables the investigator to connect context and social interaction to academic-related emotions, study practices, and progress of personal projects. Additional analysis with qualitative methods enables one to address the type of activities students reported. Further, a combined use of both within person (time-series) and cross-sectional (between groups) analyses appears feasible to extend understanding of knowledge practices beyond single individuals (Schmitz, 1990).

References


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