Fostering reflective practice with mobile technologies

Abstract

During two school days and two days off, 37 secondary school pupils were offered a daily reflection and reporting exercise about how they learnt in the day (intensity and channels). This experiment had two purposes: (a) to assess the extent to which the mobile phone can be used as an instrument to develop awareness about learning, and (b) to explore how young people attend to their identity as learners when they are prompted to reflect on this theme. Results suggest that students accepted to answer questions about learning on own mobile appliances and outside school hours. The study also provides indications that getting aware of and reflecting about their identity as learners is not a common and/or understood practice for the participants.

At the end of college, European pupils have spent on average 13000 hours on the school benches (OECD, 2011), or maybe more (Goober, n.d.). There is no doubt about the quantity of content that they have been confronted with as students. Less sure and explored is how they have developed an identity as learners.

Yet, the acquisition of such an identity grows in importance in a "lifelong learning society" (European Commission, 2006), *a context precisely wherein learning attitudes and behaviours become central assets of individuals and organisations*. Research on the akin notions of "learning to learn" (Claxton, 2006) or "meta-learning" (Jackson, 2004) has put various levels of emphasis on the social and pedagogical relevance of promoting thinking about the act of learning.

Most often however this call to more thoughtful learning has centred on mechanics and methods learning, usually purposed to train the self-as-a-performer (Azevedo, 2005; Csapó, 1999). Recently, research strands like the "narrative approach to learning" (Watkins, 2006; Wagner & Watkins, 2005) or the "student's voice" (Creanor, Trinder, Gowan, & Howells, 2008; Lodge, 2005) have emerged and proposed to also question the educational needs of the self-as-a-learner. If learning becomes a critical part of life, it is expected that those who practise it can conceptualise the many hours of tuition it represents as a specific activity that they are able to qualify, describe, and distinguish from others.

Developing this kind of awareness goes along what could be called *a "student professional development"*. Its provision implies to make room for issues like the sense-making of the daily life at school (student's "common life" in the meaning given by Lasch, 1997), the personal commitment to knowledge, and students' conceptions of the relationship between elements of the environment and learning (Elen & Lowyck, 1998).

This holistic approach suggests that *a way to sharpen reflective habits about learning is to problematise the daily exposure to the learning activities*. This approach recommends that students do

not simply think of their interactions with learning opportunities as a process of "performing" them but also pay attention to the personal internalization of these experience (Daudelin, 1996; Le Cornu, 2009; Lemon, 2004), in an effort to steadily see own intellectual growth as a product of intentions and choices rather than externally-imposed or incidental entities.

The current study aims at validating an instructional setting that exhorts students to think about what they live at school.

Reflection amplifiers

Training the self-as-a-learner implies to attend to learning processes with increased time, attention and resources. There is therefore a challenge in finding ways to provide pupils opportunities to mentally evoke what they have lived throughout the day with regard to learning, so that this experience can be turned into a deliberate object of attention and reflection. One possible way is offered by Verpoorten, Westera, and Specht (2011b) in their work on "reflection amplifiers" (*RAs*).

This designation refers to compact and well-considered prompting approaches that offer learners structured opportunities to examine and evaluate their own learning. While the promotion of reflection is often associated with post-practice methods of experience recapture (Boud, Keogh, & Walker, 1985), through portfolios or learning diaries, RAs are structured and repeated introspective episodes, offered in the course of action and meant to make learning visible (Hattie, 2009) and to nurture internal feedback (Butler & Winne, 1995).

RAs do not simply aim at engaging learners at the level of presenting information for understanding and use, but also at directing them at meta-levels of learning. The concise reflection they call for further characterises RAs. As support to condensed reflective processes, RAs operate though miniature applications providing a single engagement point – here, a daily SMS – with a specified theme for thought – here, the learning day.

So far, RAs have been tested in regular formal online learning. Furthermore, the "learning to think" approach enacted by RAs has concerned academic reflective skills like summarising or self-assessing. This study transposes the RAs to: (a) mobile (meta-)learning, (b) after-school setting, and (c) analytical scrutiny onto one's life as learner.

Mobile technologies

This study builds upon three core-features of mobile technologies, and of smartphones in particular:

- smartphones represent the only technology that students have permanently inside and outside the classroom. In this way, smartphones appear as possible mediations between scholarly and after-school contexts. These appliances therefore recommended themselves in a study aiming at developing awareness of learning (Marton & Booth, 1997), both formal and informal.
- smartphones are likely to promote a more personalised approach to learning because they represent a direct channel to the learner and one that is open at all time. In this study, RAs are not only received on personal devices but they intend to promote a deepening of the personal relationship of the smartphone owner to knowledge and self-growth (Ranson, Boothby, Mazmanian, & Alvanzo, 2007; Santos & Ali, 2012).
- smartphones increase the chance of learning in unconventional contexts like queues, waiting times, transportation, etc., with the virtual promise of replacing some of the "lost time" associated to these periods into "productive time". If it is impossible to know beforehand where and when the participants to this study will use their smartphone for meta-learning, it is nevertheless likely that the RAs sent via SMS will offer an opportunity for learning from reflection in a non traditional context.

Research questions

This study assigns students to amplify their reflection about the learning affordances encountered throughout the day. Three main research questions have guided this pilot:

1. to what extent will students react actively to the incentives to reflect sent on their personal device and outside the school hours? This research question bears upon the mere participation to the study;
2. what insights does this sampling of experience bring regarding how learning takes place today? This research question bears upon perceived channels of learning;
3. what effects of these structured episodes of introspective reflection can be pinpointed? This research question bears upon dimensions like familiarity with reflection, appreciation thereof, perceived learning, and account of the learning experience.

Method

Sample

The study enrolled 37 students (mean age = 17 years old, 37% female, 63% male) from two colleges (Connect College, Hecht, The Netherlands and European School, Mol, Belgium). An iTunes voucher of 15 euros rewarded their participation to a series of experiments, including this one (see section "Context and assignment").

Tooling

The experiment required using both an SMS messaging system to prompt students to reflect and a response system to answer the questions raised. In a dry-run design of the experiment, the capacity of an online voting system (Votapedia, http://www.urvoting.com) to combine the two functions was evaluated. Although this system supported multiple choice questions and was free of cost, it was discarded since it did not support long text answers. Eventually, a specific provider was selected for each function: Textmagic (http://www.textmagic.com) as the SMS broadcast system and Socrative (http://www.socrative.com) as the student personal response system.

Socrative offers facilities like multiple choice questions and short/long answers (Fig. 8.1, label a), that can easily be tuned to educational purpose. The response space can be accessed via smartphones, tablets, laptops, and personal computers, as soon as an Internet connection is available. The system also lets the teacher monitor how many students are performing the activity in every moment (Fig. 8.1, label b).
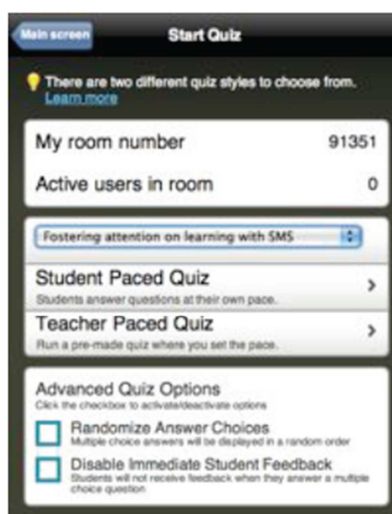

a   b

Figure 8.1. Personal response system seen from the tutor's side: a. Tutor can select various questionnaire formats, b. Tutor can monitor the exercise.

Context and assignment (daily reflection exercise)

The study took place in the context of an "Experiment Day" which offered students to discover the work at the Learning Media Laboratory (Open Universiteit) through the participation to empirical experiments. At the end of the day, a presentation provided an overview of mobile technologies for learning. Afterwards, participants were introduced to the exercise to be done in the next four days. The experiment was described to students as a reflection exercise in which they were encouraged to amplify their awareness of their daily activity as learners.

The speech of Steve Jobs (2005), whose death, close to the "Experiment Day", had received much attention from medias, was used to buttress the importance to take a step backward and consciously attend to one's own life and personal identity (here as a learner). Yet, in his speech, Apple's manager emphasised the importance of stop-and-think episodes to question the actions of the day. An in-situ demo of the Textmagic and Socrative tools was performed. The students went back to school with a paper wrapping up the goal, the assignment and the practical information about the study.

Procedure

The daily reflection exercise was performed during the four consecutive days (Thursday, Friday, Saturday, and Sunday) following the presentation of the experiment. This setup was chosen to evenly parse the reflection exercise within two days at school and two days out of school, in a concern to deal with both formal and informal learning.

Every day, at 8 p.m. an SMS was sent to students alerting them that the student response system was ready. The sender of the SMS was "Room 91351", the identification automatically assigned by Socrative at the registration. This name had been communicated to students during the presentation. Students that had smartphone with Internet connection could follow the link contained in the SMS to perform the reflection exercise. Those who preferred to answer later on or through another medium could do it till 7 a.m. of the next day, at the latest.

Measure instruments

Pre-questionnaire

The pre-questionnaire gathered perceptions of students about the intensity of their learning in the previous week and the channels they used for learning. It provided a point of comparison to the week wherein reflection about learning was amplified.

Daily questionnaire

This questionnaire, received daily on individual smartphone (Fig. 8.2), was the reflection amplifier of the study[1]. It comprised one question about the perceived intensity of the learning day and one question about the main channel of learning used in the day.

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[1] By providing an occasion of reflection which is not embedded in any specific learning moment, the study slightly diverges from the core of this dissertation which targets RAs offered in the course of action. However, the mobile questionnaire, because it is short, repeated and purposed to excipe awareness of/reflection on learning remains strongly akin to RAs. Moreover, the mobile RA tested in this study shares attributes with new methods allowing to stimulate and capture reflection in the course of action, like the ESM ("Experience sampling method"). With this method, subjects are asked to carry a beeper device that randomly sounds during fixed windows of time. Each time the beeper activates, subjects fill out a quick survey that typically includes questions asking what the subject was doing and how the subject was feeling at the time of the alarm (Intille, Kukla, & Ma, 2002; Sas & Dix, 2011). The study was also inspired by the research strands concerned with "measured life" (Singer, 2011) or "feedback loops" (Goetz, 2011) which have commonalities with the principle of consciously documenting daily activities.
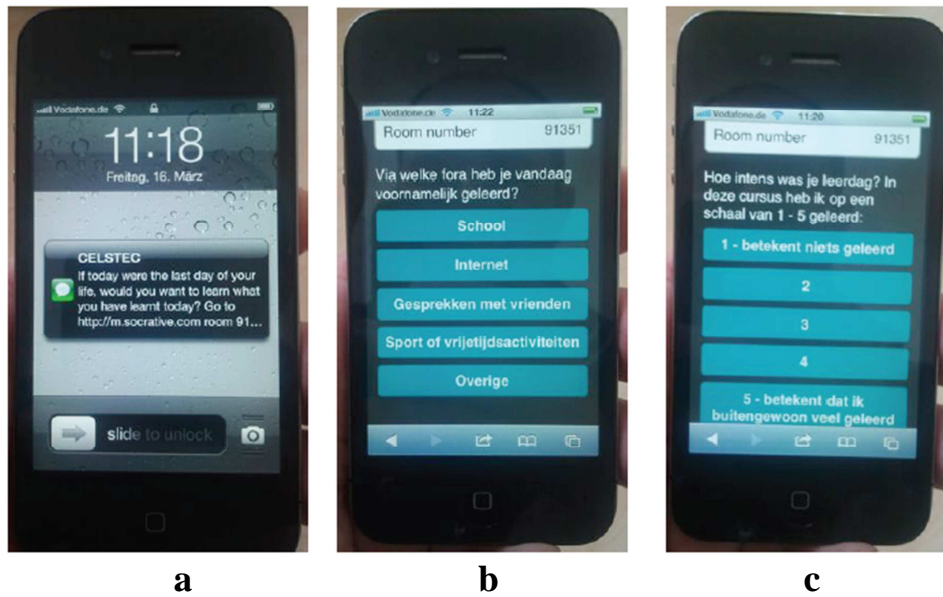
Figure 8.2. Personal response system seen from the tutee's side: a. Daily warning SMS, b. Daily reflection about channels of learning, c. Daily reflection about learning intensity of the day.

The post-test questionnaire

This questionnaire, left active during one week, had two versions:

- version a was sent to the students who performed the reflective exercise at least once: it presented the very same questions as in the pre-questionnaire, plus some questions meant to collect students' evaluative data regarding the daily reflection exercise;
- version b was sent to students who dropped out, that is students who did not complete any of the four daily reflection exercises. It raised the three same questions as in the pre-questionnaire, plus one asking them the reason why they did not participate.

Results

The processing of closed questions was performed with the Statistical Package for the Social Sciences (SPSS), version 20. The analysis of the questions requesting a coding of the answers was done thanks to the "Multiple Episode Protocol Analysis" (MEPA) software, version 4.10 (Erkens, 2005).

Acceptance

Question 1: "To what extent will students react actively to invitations to reflect on personal learning sent on their own device and outside the school hours (participation)?" The decrease in participation was quite visible from the first to the 4th iteration of the daily questionnaire (Fig. 8.3) but was not as severe as the drop-out rate from the pre-questionnaire to the mere entrance in the exercise. The 28 recorded post-questionnaires comprised both the participative (68% - 19 respondents) and the drop-out versions (32% - 9 respondents).
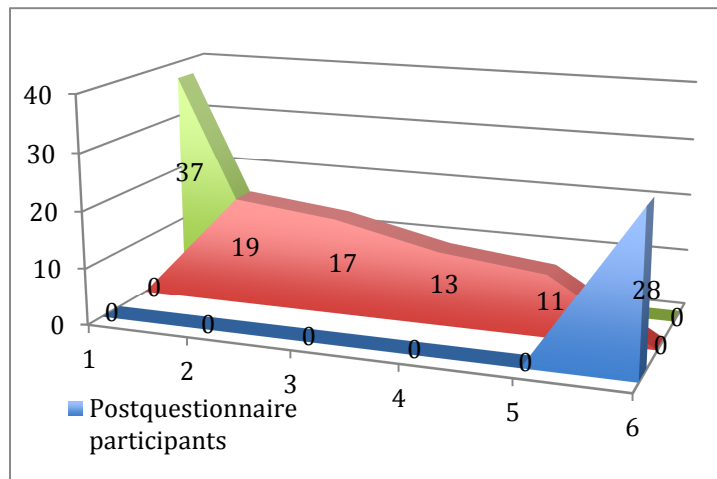
Figure 8.3. Evolution of student's participation during the experiment.

The main invoked reasons for drop-outs were for 23% "personal reasons" and for 77% technical problems or lack of facility access (mobile/internet). No respondent selected lack of interest, boredom of the intrusive character of the experiment as justifications for not participating. The Socrative monitoring tool confirmed the weight of technical failures: an average of 15% of the SMS were not delivered, a large majority thereof caused by a wrong phone number given by students at the start but also caused by malfunctions in the broadcasting (especially in Day 3 where a restart of the whole activity was necessary. Some loss also happened in Day 2).

The monitoring tool (Fig. 8.1, label b) displayed how many students were connected to the platform in every moment. This tracking feature allowed to observe that 86% of the students in average completed the questionnaire in the same moment they received the SMS.

Today's learning

Question 2: "What insights does this sampling of experience bring regarding how learning takes place in students' today common life (channels of learning)?" Table 8.1 wraps up the answers given by students in the pre-questionnaire and in the daily reflection exercises. School and Internet were the most important perceived sources of learning.

Table 8.1. Main channel of learning (in relative percentages)

	School	Internet	Conversations	Leisure	Other
Pre-questionnaire ($N = 37$)	65%	27%	3%	0%	5%
Day1 ($N = 19$)	26%	53%	11%	5%	5%
Day 2 ($N = 17$)	73%	9%	9%	9%	0%
Day 3-WE ($N = 13$)	0%	31%	7%	31%	31%
Day 4-WE ($N = 11$)	0%	46%	9%	9%	9%

Reflection

Question 3: "What effects of the structured episodes of introspective reflection can be pinpointed?"

Familiarity with reflective practice
Positive answers to the post-questionnaire question "before the start of this experiment, can you remember the last time you thought about your learning day?" amounted to 19% ($N = 28$)

Appreciation of reflective practice
When asked whether they liked the reflection ritual implemented through their smartphone, 69% ($N = 19$) answered positively. Four categories emerged from the justifications of the students valuing the experience:

- gains in meaning (18%): e.g., participant 18: "It helps you realise that your day has much value. It is eventually about my life";
- gains in self-assessment (29%): e.g. participant 5: "You look critically at what you have learnt and how you might improve. Evaluating yourself adds to the learning experience itself";
- gains in consciousness without further details (24%): e.g., participant 7: "My interest steadily grew because it made me more conscious";
- other answer (29%): e.g., participant 9: "Very interesting and well done".

Only a few students gave reason for their dislike of the experiment: "no learning comes from the reflection" (participant 6), "the reflection is quickly forgotten" (participant 20), "my reflection on learning takes place in the moment of learning and not afterwards" (participant 21), "I reflect on other things" (participant 10), "I've often asked myself before if I learnt at school and often came to this conclusion: nothing" (participant 2).

Perceived learning:
Perceived learning was rated on a 3-point Likert scale: I learnt less than usual, I learnt as usual, I learnt more than usual. A higher relative frequency of the answer "I learnt more than usual" was found for the group of students who participated to the reflection exercise and filled in the post-questionnaire ($N = 19$) than for the group of students who did not show up for the exercise but took the post-questionnaire ($N = 9$): 31% versus 7% respectively. However, a Mann-Whitney test granted no significance to this observation: $U = 79, p = .12, r = .03$

Description of learning experience:
When asked to describe their learning experience during the week, participants to the daily reflective exercise produced longer accounts: 112 characters on average versus 88 for the non participants. However, from a t-test, it turned out that these differences were not significant, $t(26) = 1.12, p = .26, d = 0.29$. The same conclusion was drawn from a chi-square test bearing upon the level of complexity of the accounts, assessed with a three-level coding rubric.

Discussion

In this study, a reflection amplifier, modelled as an evaluation questionnaire of daily learning, was relayed to the students through personal smartphones with the purpose of stimulating thinking upon learning activities, contexts and channels. The study had three objectives:
1. to check whether students would accept to talk about learning outside the school and via a personal appliance;
2. to collect first-hand information about how learning takes place today in the eyes of learners;
3. to explore if the structured educational encounters embodied by the RAs would allow students, in addition to their lived learning experiences of the day, to make these learning experiences exist in consciousness. The underpinning assumption was that "professional learning" is at the confluence of this combination of experiences of learning (action) and thought about these experiences (reflection).

This section gives an interpretation of the results and locates them in a broader educational context. The discussion and the suggestions for future research follow the order of the three guiding research questions of this study.

Use of private phones to raise awareness about learning

A proportion of pupils accepted and was able to use personal smartphone for "serious" messages coming from a researcher outside the school hours. Whilst it can seem obvious, this pre-condition does not speak for itself. Hardy et al. (2008) show that, even when undergraduates do have a good level of IT competence and confidence, they tend to be conservative in their approaches to university study, maintaining a clear separation between technologies for learning and for social networking. Based on observations revealing low levels of use of and familiarity with emergent technologies (collaborative knowledge creation tools, virtual worlds, personal Web publishing), Margaryan and Littlejohn (2009)

cast doubts on the ability or the wish of students to use complex digital tools in their learning practice. In contrast, Jones, Edwards, and Reid (2008) report that, despite being unaccustomed to using their mobile phones for academic study, students willingly accepted SMS reminders – focused on time management and not on learning consolidation – from their tutor via a bulk texting service. This study suggests that it is possible to use smarphones to stimulate meta-learning about common life as a learner.

Fragmentation of the learning sources

Despite the mounting gulfs of literature stressing the emergence of a "Net Generation", "Homo Zappiens", or "Digital natives", despite the growing interest for informal learning which can go, in its extreme form of praise, till a prediction of the disappearance of physical institutions like schools (Miller, Shapiro, & Hilding-Hamann, 2008) under the pressure of the fragmentation of the traditional education landscape into thousands of personal learning environments, this study suggests that learners still perceive school as a major vector of learning. Indeed, its monopoly over learning processes is challenged by the emergence of a rich ecosystem outside school walls, as heralded by the Internet (see Table 8.1).

Acceptance and effects of reflective practice

Three findings emerge from this study regarding reflective practice in students' common life:
- there is no anchored habit in the participating students to see themselves as learners and to develop a "professional" awareness about their daily activity/job at school and the learning opportunities after school (see section "Familiarity with reflective practice");
- providing time to perform reflective activities on this topic is appreciated by about half of the sample for reasons relating to consciousness and sense-making (see section "Appreciation of reflective practice");
- the high level of drop-out combined to some students' negative feedback (see section "Appreciation of reflection") suggest that the stop-and-think beacons offered in this study are judged as useless or superfluous by a portion of students, even when these opportunities to reflect have been designed to be short. Further research is needed to disentangle the profile of the people ready or not to devote time to self-awareness development (Baeten, Kyndt, Struyven, & Dochy, 2010), and the reasons and consequences thereof.

Further research

As for Research question 1, the possible tensions/synergies flowing from the use of personal appliances and outside-school time for scholarly messages and activities should remain a topic for elucidation (for an example of an experimental interlace between the use of private mobile technologies and social media in relationship to the educational resources provided by a university, see Ferguson and Shum, 2012).
As for Research question 2, of particular concern for future investigation is to ascertain how school still contributes to youth's intellectual growth (Facer, 2011) when it is surrounded by and interacting with other vectors of education.
As for Research question 3, finding ways to help young people to externalize what they live day after day as learners remains a challenge for research and education. This study has tested one way to draw attention on daily learning: the provision though smartphones of short but frequent opportunities to take learning as an object of attention and to sharpen the awareness of oneself as a learner. Theoretical and empirical work is needed regarding the relationship between consciousness of learning and learning and the kind of new knowledge and attitude to school possibly conveyed by such episodes of introspection.

Limitations of the study

The sample in this study has shrunk for technical reasons but also for reasons probably tied to the limited importance granted to reflection. The small sample of students which went through the whole study, the low number of iterations of the reflection exercise (four), the fact that the invitation to

reflect has not come from patented teachers but from researchers unknown to the participants concur to make the findings of this study rather fragile. Also, the effect of the reward on the participation rate is uneasy to assess because it is mixed up with the attendance to other experiments of the "Experiment Day". Another limitation is that the data has been processed according to between-subjects comparisons only, due to technical limitations of the Socrative system regarding respondents' identification.

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