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# Fostering reflective practice with mobile technologies

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## **Abstract.**

During 2 school days and 2 days off, 37 college pupils were offered a daily reflection and reporting exercise about how (intensity and channels) they learnt in the day. This pilot experiment had 2 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 (life-long) learners when they are prompted to reflect on this theme. Results show 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 (professional) learners is not a common and/or understood practice for the participants. These findings, which questions the common life of young people from a learning perspective, are discussed in the light of the call to breed mindful, responsible and committed learners.

**Keywords.** Reflection; awareness; mobile technologies; lifelong learning

## **1 Introduction**

Average European pupils have spent, at the end of college, about 13000 hours on the school benches (OECD, 2011). There is no doubt about the quantity of academic content that they have acquired as students. Less sure and explored is how they have developed an identity as learners. Yet, the acquisition of such an identity, and the associated reflective transversal skills, grows in importance in a “lifelong learning society” (EuropeanCommission, 2006), a context precisely wherein learning attitudes and behaviours become central assets of individuals and organizations. Research on the akin notions of “learning to learn”(Claxton, 2006), “meta-learning” (Jackson, 2004) or “meta-cognitive development” (Aviram, 2008) have put various levels of emphasis on the social and pedagogical relevance of promoting thinking about thinking. Most often however this call to more thoughtful learning have centered on mechanics and methods learning, usually purposed to train the self-as-a-performer (Azevedo, 2005; Csapó, 1999). Recently, emerging research strands like the narrative approach to learning (Watkins, 2006) or student’s voice (Lodge, 2005) have 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 practice it can conceptualize all these hours of tuition as a specific activity that they are able to qualify, describe, distinguish and practice 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 meaning of the daily life at school (student’s “common life” as defined by Lasch (1997)), the personal commitment to knowledge or 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 (Le Cornu, 2009), 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 tests an instructional setting deemed to stimulate students to make what they live at school a deliberate object of attention (Watkins, 2001) through the use of reflection amplifiers instantiated by smartphones.

### **1.1 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 (2011) in their work on “reflection amplifiers” (RAs). This expression refers to compact and well-considered prompting approaches that offer learners structured opportunities to examine and evaluate their own learning. Whereas 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 present as structured and repeated introspective episodes, offered in the course of action and meant to make learning visible (Hattie, 2008) and to nurture internal feedback (Butler & Winne, 1995). Such instructional practice does not simply aim at engaging learners at the level of presenting information for understanding and use, but also direct them at meta-levels of learning. The concise reflection, which they call for further characterizes RAs. As support to condensed reflective processes, RAs operate through miniature Web applications providing a single engagement point with a defined type of reflection, here the daily SMS about their learning day. So far, RAs have been tested in regular formal online learning. Furthermore, the “learning to think” approach enacted by RAs have concerned academic reflective skills like summarizing or self-assessing. This study transposes the RAs to mobile (meta-)learning, after-school setting and analytical scrutiny onto one’s learning day.

## 1.2 Mobile technologies

This pilot study builds upon 3 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.
- They are likely to promote a more personalized approach to learning because they represent a direct channel to the learner and one that is open at all time. Not only are the reflection prompts received on personal devices but the targeted reflection bears on the deepening of the personal relationship of the smartphone owner to knowledge and self-growth (Ranson, Boothby, Mazmanian, & Alvanzo, 2007).
- They increase the chance of learning in unconventional contexts (waiting times, transportation, etc.) with the virtual promise of replacing this perceived "lost time" into perceived "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 this reflection break will offer an opportunity for learning from reflection in a non traditional context.

## 1.3 Research questions

In an exploratory study, students have been assigned to amplify their reflection about the learning affordances offered to them throughout the day. Three main research questions have guided this pilot:

1. Will students react actively to invitations to reflect on personal learning sent on their own device and outside the school hours (participation)?
2. What insight does this sampling of experience bring regarding how learning takes place in students' today common life (channels of learning)?
3. What effects (or lack thereof) of these structured episodes of introspective reflection can be pinpointed on dimensions of the learning (familiarity, appreciation perceived learning, account of the learning experience)?

## 2 Method

### 2.1 Outline of the experiment

#### **Context and assignment (daily reflection exercise).**

The study took place in an "Experiment day" which offered students to discover the work of the Learning Media Laboratory (the authors' workplace) through the participation to empirical experiments. At the end of the day, a presentation provided an overview of mobile technologies for learning. Afterwards, the corresponding author

introduced the participants to the exercise to be done in the next 4 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 famous speech of Steve Jobs (whose recent death had received much attention from medias) at the end of the year session at Stanford<sup>1</sup> was used as a stance on the importance to take a step backward and consciously attend to one's own life and personal identity, here as a learner. The assignment was written as follows:

*How many years have you invested studying and learning in your life? Maybe it is time to reflect in your mirror for some days and ask yourself: "If today were the last day of my life, would I want to do what I am about to do today?"*

*I offer you to live Steve Jobs' experience during the next 4 following days, so you can be aware of your learning and decide if you need to change anything. In our case, the mirror will be your mobile phone so you will receive a daily SMS asking you about your personal learning day. It could be anything you learned at school or during leisure time.*

The experiment required using both an SMS messaging system<sup>2</sup> that would alert them about the reflection moment of the day, and a student response system<sup>3</sup> where they should answer the questions they were going to be asked. An in-situ demo was performed so students could solve doubts about the interaction with these tools. The students went back to school with a paper wrapping up the goal, the assignment and the practical processes information about the study.

### **Sample.**

The study enrolled 37 students (mean age = 17 years old, 37% female, 63% male) from two colleges (Connect College, Echt, The Netherlands and European School, Mol, Belgium). An iTunes voucher of 15 euros rewarded their participation in the experiment. The voucher was delivered to students that at least completed both the pre-questionnaire and the post-questionnaire.

### **Timing.**

The daily reflection exercise was performed during 4 consecutive days (Thursday, Friday, Saturday, Sunday) after the presentation of the experiment. This setup was designed to evenly distribute the reflection exercised within 2 days at school and 2 days out of school. It allowed to encompass the awareness of and reflection on both formal and informal learning and to provide contrast to the descriptions of the learning experience.

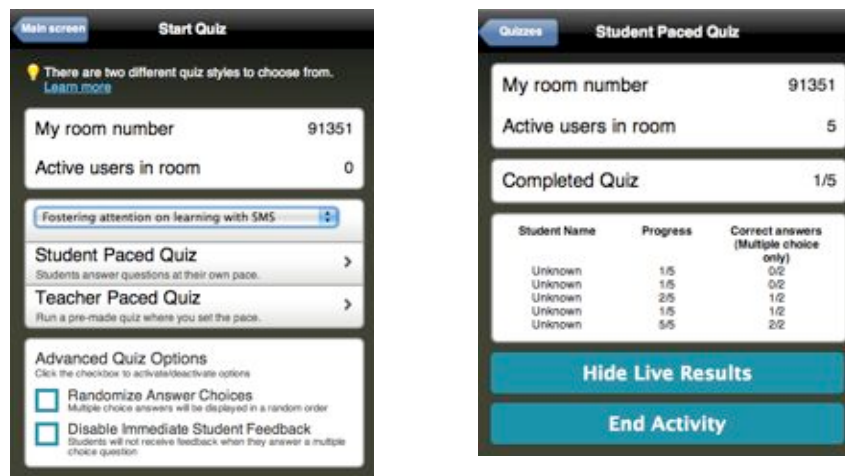
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<sup>1</sup> Steve Jobs at University of Stanford 2005. <http://www.youtube.com/watch?v=xoUfvIb-9U4>

<sup>2</sup> Text Magic. SMS broadcast system. <http://www.textmagic.com/>

<sup>3</sup> Socrative. Student personal response system. <http://www.socrative.com/>

The virtual classroom was opened everyday 30 minutes before sending the SMS (Fig. 2.a) in order to have the “Student paced quiz” ready when students would login (Fig. 1.a). An SMS was sent to students every day at 8 p.m. alerting them that the student response system was ready to receive answers with their reflections. Students that had smartphone with Internet connection could push the link and perform the reflection exercise within the platform in that moment. The ones that did not have an Internet connection in their mobile devices could do it later until 7 a.m. of the next day when the activity was closed. This platform lets the teacher monitorize how many students are performing the activity in every moment (Fig. 1.b).



a. Tutor starting daily reflection exercise in classroom 91351      b. Tutor monitoring daily reflection exercise

**Fig. 1.** Personal response system

**Tooling.**

In order to prompt every student to perform the reflection exercise, no regard to the mobile device they were using, it was decided to use SMSs notifications. In a first design of the experiment, a missing-calls response system<sup>4</sup> was evaluated in order to be used as reflection virtual environment. Although it supports multiple-choice questions and it is free of cost, it was discarded since it does not support long text answers. The student personal response system that was selected includes a series of educational exercises (multiple choice questions, short and long answers) and games via smartphones, tablets, laptops and personal computers. It is necessary to be connected to the Internet to perform the reflection exercise.

<sup>4</sup> Votapedia. A missing-calls response system. <http://www.urvoting.com/>

## 2.2 Measure instruments

### Pre-questionnaire.

The pre-questionnaire gathered perceptions of students about the intensity of their learning in the previous week and the channel they use for learning. Additionally, they were asked to provide an account of their learning in the previous week.

### Daily questionnaire.

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

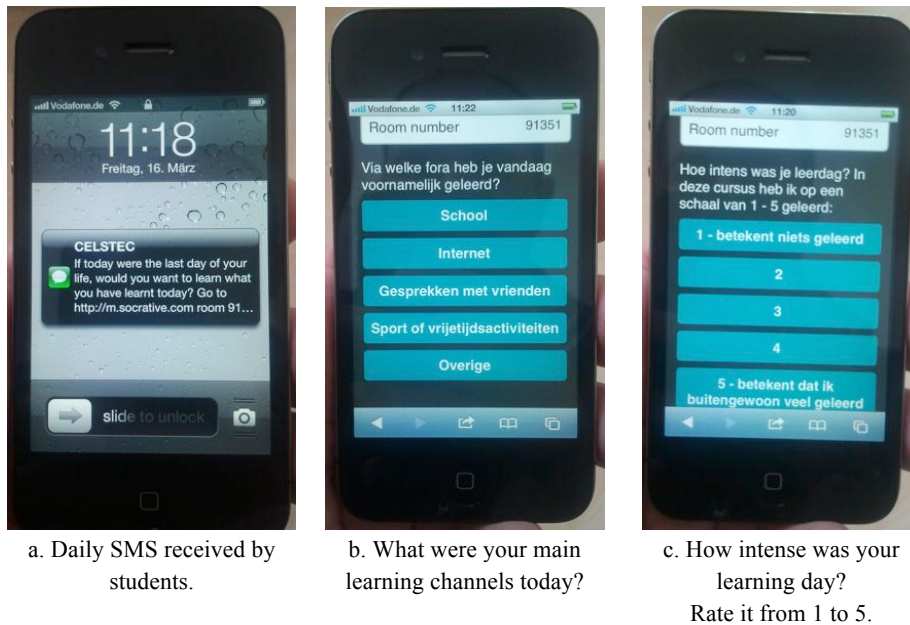


Fig. 2. Student reflective practice

### Post-questionnaire.

The post-questionnaire, left active during one week, had 2 versions. The one sent to the students who performed the reflective exercise at least once presented the very same questions as in the pre-questionnaire, plus some questions deemed to collect students' evaluative data regarding the daily reflection exercise. The other version was sent to students who dropped out, these are, students who did not complete any of the 4 daily reflection exercise. It raised the three same questions as in the pre-questionnaire, plus one asking them the reason why they did not participate.

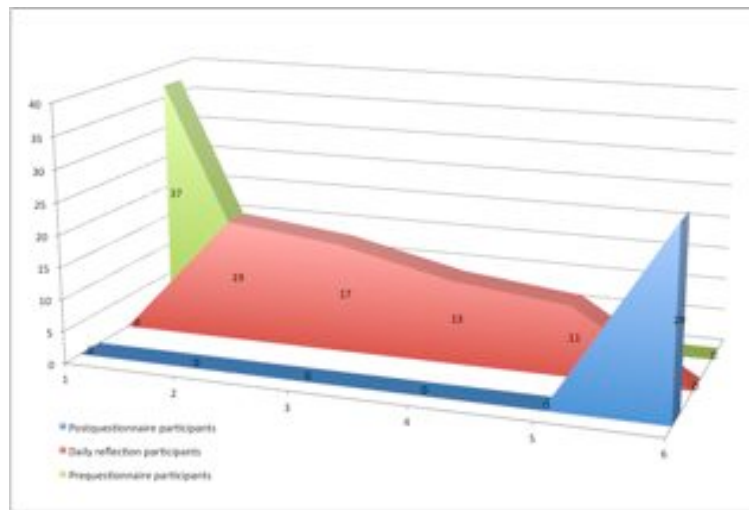
### 3 Results

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” (Erkens, 2005).

#### 3.1 Acceptance

*Research 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. 3) but was not as severe as the dropout rate from the pre-questionnaire to the mere entrance in the exercise. The 29 recorded post-questionnaires comprised both the participative (56% [n=16]) and the drop-out versions (44% [n=13]).



**Fig. 3.** Evolution of student’s participation during experiment

Main invoked reasons for dropouts (n=13) were for 46% “I did not receive any SMS” and 38% “I had no internet connection in that moment”. No respondent selected lack of interest, boredom of the intrusive character of the experiment as justifications for not participation. The SMS 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 the student right from 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 happened also (mainly 6 in day 2). Additionally, the monitoring tool also displayed how many students were connected to the platform filling-out the questionnaire in every moment. From these observations, it can be concluded that the majority of the students completed it in the same moment they received the SMS.

### 3.2 Today's learning

*Research question 2: "What insight does this sampling of experience bring regarding how learning takes place in students' today common life (channels of learning)?"*

Table 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 sources of learning.

	School	Internet	Conversations	Leisure	Other
Pre-quest. (n=37)	65%	27%	3%	0%	5%
Day 1 (n=19)	26%	53%	11%	5%	5%
Day 2 (n=17)	73%	9%	9%	9%	0%
Day 3 (n=13)	0%	31%	7%	31%	31%
Day 4 (n=11)	0%	46%	9%	9%	36%

**Table 1.** Main channel of learning

### 3.3 Reflection

*Research question 3: "What effects of the structured episodes of introspective reflection can be pinpointed?"*

#### **Familiarity with reflective practice.**

Looking backward on one's life as a learner is not a deep-rooted habit in students if the answer to the question "before the start of this experiment, can you remember the last time you thought about your learning day?" is taken as an indicator. 81% of the participants (n=16) answered "No".

#### **Appreciation of reflective practice.**

When asked whether they liked the reflection ritual implemented through their smartphone, 69% (n=16) answer positively. Four categories emerged from the justifications of 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” and “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 ( $N = 10$ ): 31% versus 7% respectively. However, a Mann-Whitney test granted no significance to this observation:  $U = 79, p = .12, r = .03$

	Mean intensity	SD	N
Perceived learning for the week before the experiment	1.8	.6	37
Perceived learning reported in the daily reflection exercise (all days)	1.7	.8	56
Intensity rating for the week of the experiment (non participants)	1.8	.5	13
Intensity rating for the week of the experiment (participants)	2.2	.6	16

**Table 2.** Perceived learning

### 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.

## 4 Discussion and further research work.

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 3 guiding research questions of this study.

#### **4.1 Use of private phones to raise awareness about learning**

It is possible to use smartphones to stimulate meta-learning about common life as a learner. A proportion of pupils accepted and was able to use their personal smartphone for “serious” messages coming from the researcher outside the school hours. Whilst it can seem obvious, this pre-condition does not speak for itself. Hardy (Hardy et al., 2008) shows 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. Margaryan and Littlejohn (2009) lean on their findings on the low level of use of and familiarity with collaborative knowledge creation tools, virtual worlds, personal Web publishing, and other emergent social technologies, to cast doubts on the ability or the wish of students to use complex digital tools in their learning practice. On the other hand, Jones, Edwards, & Reid (2007) 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).

#### **4.2 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 to the prediction of a 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 seems to be challenged by the emergence of a rich ecosystem outside school walls as heralded by Internet (see Table 1). Of particular concern for future research would be to ascertain how school and other vectors of education contribute to youth’s intellectual growth (Facer, 2011). In such an investigation, student’s voice is obviously critical. And to express it, young people will have to learn to think as learners in order to provide valuable accounts of what they are living as learners in multiple contexts. This need to be able to reflect on common life as learners takes us back to the what motivated this study: defining methods and tools designed to make learning an object of attention and reflection.

#### **4.3 Acceptance and effects of reflective practice**

Three findings emerge from this study regarding reflective practice in students’ common life:

a) There is no anchored habit in the students to see themselves as learners and to develop a “professional” awareness (see section “Familiarity with reflective practice”) about their daily activity/job at school (Ertmer & Newby, 1996; Sternberg, 1998) and the learning opportunities after school;

b) Providing time to perform reflective activities on this topic is appreciated by about half of the sample (see section “Appreciation”) for reasons relating to sense-making and professional development as a student;

c) The stop-and-think beacons offered here are considered as useless or superfluous by a good deal of students, even when they have been designed not to last a long time (for similar attitudes of rejection of reflection see (Johnson & Sherlock, 2009) and (Watkins, 2001) p. 9). 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 consequences thereof. In order to get a grip on what young people live day after day as learners, finding concrete ways to make learning visible and externalize perceptions of it is also a challenge for research. Theoretical and empirical work must also concurrently be conducted regarding the relationship between self-awareness and learning and the kind of new knowledge conveyed by episodes of introspection intended to help students to sharpen awareness of themselves as learners.

#### **4.4 Limitations of the study**

The sample in this study has shrunk for technical reasons but also for reasons probably tied to the importance granted to reflection (the high drop-out right from the start of the experiment). These reasons should be investigated for themselves and subsequent study should be carried out with bigger samples. This study also prompted students only four times. More investigation is needed into the tension of intruding into the pupils' out-of-school time it has already been shown that many university students don't like their academic studies to intrude into personal time or their social networking activities. The SocialLearn<sup>5</sup> project at the Open University (UK), that uses social networking for learning and has been well received by its students to date (however, OU students are often not "typical" undergraduates so this might change the perspective on the work).

The invitation to reflect did not come from patented teachers but from researchers unknown to the participants. A better integration of the reflection amplifiers in the school context as well as attempts to take the frequency of the prompting as independent variables would cast more light on the possible interplay between action and thought. A last limitation must be mentioned: the data was processed only according to between-subjects comparisons. Any within-subjects analysis was impossible due to the inability of the Socratic system to track who answers.

## **5 Conclusion**

In this study, a reflection amplifier modeled as an evaluation questionnaire of daily learning, was relayed to the students through personal smartphones with the purpose

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<sup>5</sup> SocialLearn. Learning Through Social Connection. <http://www.open.ac.uk/blogs/sociallearn/>

of stimulating the opening up of and the reflection upon learning activities, contexts and channels. These structured educational encounters between opportunities to learn and opportunities to make them visible and conscious in the mental realm of the learners aimed at encouraging students not to merely “learn” but also to put various dimensions of this experience into sharp focus. It should be further investigated whether the actualization of true learning is not at the confluence of this combination of experiences (action) and thought (reflection).

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