Using the development of eLearning material as challenging and authentic learning experiences

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Students can contribute to the design and development phases of eLearning projects, and also learn through the process. This study focused on two projects at a university in Hong Kong (development of Pharmacy eCases, and the establishment of an eLearning Assistants scheme) in which students designed, wrote and developed teaching materials with space to show initiative. Evaluation strategies included a survey, communication logs with teachers, and a self-reflective student blog. Learning benefits from such student-centred, authentic eLearning projects include consolidation of knowledge, and development of skills (including independent learning, critical thinking and creative design) and attitudes (about professional work and ongoing personal development). The projects also led to enhanced course learning environments, thus benefiting other students. However, there are significant challenges in preparing such learning opportunities for students, including training and scaffolded supervision. Our overall reflection is that students' learning was different from that achieved in many traditional university courses.

Key words: higher education; Hong Kong; authentic learning; student input to design; website development

Student-centred authentic eLearning

The roles of teachers/ developers and students in eLearning projects tend to be distinct. While teachers plan the learning environment, students are often expected to adopt a receptive mode, and participate and learn as a result of using the materials or the learning strategies. McNaught, Lam and Cheng (2007) suggested that such a distinction is not justified and that students can take an active role in shaping the eLearning environment. In addition, it is our contention that contributing to the design and development of eLearning strategies or resources can be an authentic learning task for students.

There is an extensive literature on student-centred/ learner-centred approaches to teaching and learning (classic examples are Biggs, 2003; Laurillard, 2002; Roblyer, 2002; Weimer, 2002). Stefanou, Perencevich, DiCintio and Turner (2004) proposed giving students a certain degree of ownership of the organization, procedure and activities in the classroom. They discussed how suitable student control can lead to a number of advantages, including a sense of well-being and comfort, engagement with learning activities, and an ongoing investment in deep thinking. Poon, McNaught, Lam and Kwan (in press) explained how students can participate in defining the marking criteria for assessments, and then engage in self- and peer-assessment. They found improvements in students' ability to make critical judgments about the quality of work. In this study we look for evidence that students' active participation in shaping the course eLearning environment is beneficial for their learning.

Authentic learning engages students in real-world problems, thus simulating professional practice to some extent. Herrington, Oliver and Reeves (2003) suggested that authentic online learning activities should have real-world relevance, be ill-defined and complex, provide opportunities for students to collaborate and reflect together, use a variety of resources, and examine the task from different perspectives. There are claims that authentic learning designs are more motivating for learners (e.g. Martens, Gulikers & Bastiaens, 2004) and that the activities inherent in the learning design assist learners "in some way to

construct and refine concepts in personally meaningful ways" (Squires, 1999, p. 2). Creating web-based teaching and learning materials to be used in actual courses can thus be regarded as authentic and meaningful tasks for students.

Eagleton (2006) studied the benefits of grade 7 and 8 students when they were asked to create their school website. She noted students' enthusiasm for the authenticity of the task, their ability to use multiple forms of symbolic representations, their understanding of complex information, the increased use of language skills in collaborative negotiations, and their abilities in trouble-shooting strategies and group-work skills.

McNaught, Lam and Cheng (2007) involved university students in four eLearning development projects. In these projects, students provided information and/or commented on prototype eLearning materials. Even with this limited level of involvement, the researchers found evidence that students could contribute to the eLearning environment and learn from these authentic tasks. The study outlined the following three different types of student involvement:

- Students' giving views on the role of the web in learning. Students' comments on their expectations of the role that the web can play in assisting learning are illuminating. These comments can come from both existing and former students of the course.
- Students noting areas of difficulties in the discipline domain. Students' feedback (especially from former students of a course) on the level of difficulty of the topics in the course can enable resources to be spent where the learning needs are greatest.
- Students commenting on actual design ideas. Many students are sophisticated web users and their comments on actual designs can assist in the identification of strengths and weaknesses in overall website design, as well as the design of specific activities and resources.

Overview of this study

The present study builds on the student roles noted in McNaught, Lam and Cheng (2007) and investigated contexts where students are given even greater responsibility in eLearning projects. The paper reports two projects at The Chinese University of Hong Kong (CUHK) in which students designed and/or developed eLearning materials in a relatively *independent* manner:

1. *Development of eCases* with students in charge of producing the eLearning resources.
2. *An eLearning Assistants scheme* where students assist teachers in using eLearning technology and provide basic pedagogical advice on using eLearning strategies.

eCase development

In the first project, 14 previous students of a pharmacy course were recruited to collect information and then write learning eCases to benefit future students in the subsequent cohorts of the same course. These previous students of the course were paid for 10 to 20 hours (approx. US$6.5 per hour) for writing the cases. The eCases were designed as feedback-rich online quizzes. The teacher guided the students throughout the process. First, she provided examples of good eCases. She then monitored the design and development stages closely and provided timely assistance. The eCases typically contain the medical history of a patient, symptoms of the illness, examination findings, and are then followed by questions that involve authentic clinical decisions.

The teacher had a very clear timeline for the project. Recruitment for student case developers took place from 14 to 28 May 2008. A total of 14 students joined the project on a voluntary basis. The student developers attended a project briefing on 30 May 2008. The teacher explained in the briefing session the purposes of the eCases, components of a typical eCase, the topics the eCases were to cover, and then she gave students a few working examples as reference. The case development period was from 1 June to 15 July 2008. Case reviews were done by peers and teachers from 16 July to 1 August 2008. Case developers finalized their cases from 1 August to 7 August 2008. The students then worked with technical assistants to place the developed cases onto the Moodle learning management platform from 8 August to 6 September 2008, ready for the start of the academic year.

The teacher expected the outcomes of the project to include:

- *Enrichment of materials* through the development of practical and useful learning resources for future students
- *Student learning* through student developers consolidating the knowledge they had previously learnt

eLearning assistants

The second project is the establishment of an eLearning Assistant service at CUHK in 2008. A group of senior undergraduate students was recruited and trained as 'eLearning Assistants'. Their service was paid a standard student-helper rate of about US$6.5 an hour. They were then assigned to assist teachers to set up simple eLearning strategies and materials in the campus-supported learning management systems, Moodle and WebCT.

At CUHK, teachers have been encouraged and supported to use technology for teaching and learning through the provision of courseware development grants (CDGs). The scheme has attracted many successful applicants. However, the scheme seems to be particularly relevant to teachers who already have some experience in eLearning so that, when they apply, they already have a reasonably clear idea of the learning outcomes, pedagogical designs and technical solutions that they want. The grants are not so attractive to teachers who are just beginning to explore innovative strategies using eLearning.

The number of teachers who are relatively new to eLearning greatly outnumbers the experienced eTeachers at this university which has a strong tradition of face-to-face teaching. The eLearning Assistant project provided an elementary level of support to novice eTeachers so that they could gain experience and then design their own CDG projects.

Ten students were trained as eLearning Assistants (eLAs). Each teacher-client is limited to 20 hours of service by our eLAs. Students were trained in the knowledge and skills needed to assist teachers to use the more common eLearning strategies. The topics in the training sessions included pedagogical issues such as using the web to enhance existing learning activities through quizzes and forums, and technical skills needed in the use of the various platforms and software.

The expected outcomes of the project were:

- *Enrichment of materials:* supplying a student perspective to teachers' ideas
- *Student learning:* eLAs learning how to handle projects and request for service
- *Practical considerations*: easing the workload of full-time teachers

Authentic components in the two projects

Herrington and Oliver (2000) summarized how eLearning activities can be authentic learning experiences for students. Learning experiences can be authentic in a number of ways – for example, with the following characteristics – an authentic learning context, authentic activities, access to expert performance, the opportunity to take multiple roles and perspectives, collaborative work, chances to reflect, chances to articulate, and authentic assessment. We consider that the two projects in this study supplied authentic learning opportunities to students as they were authentic in a number of these aspects (Table 1).

Evaluation

In both projects the central questions are whether students were able to take up these demanding tasks and, if so, what learning benefits resulted.

eCase development

Evaluation data in the first project came from two sources. The course teacher's comments on the quality of the teaching cases produced at the end of the project were one source. Data was also collected from the student developers through a mid-project open-ended reflective survey. Thirteen of the 14 eCase developers responded to the survey (they are referred to as students 1 to 13 in the rest of the paper). The email below was sent to all case developers on 24 June 2008, providing the framework to guide students' reflection:

Q1. What have you done for the project so far?
Q2. What went smoothly?
Q3. What did not go well and how did you resolve it?
Q4. What have you learnt in the process?
Q5. What other thoughts do you have about the project?

Table 1: Authentic components in the two projects

Characteristics of authentic learning	Pharmacy eCase development	ELearning assistants scheme
Authentic context that reflects the way the knowledge will be used in real life	Cases are context-rich with authentic problems	Actual content was built; materials built are for use in courses
Authentic activities	--	Genuine working relationship with teachers
Access to expert performances and modeling of processes	--	Senior staff provide constant advice
Multiple roles and perspectives	Learn from both teachers' and students' perspectives	Learn multiple perspectives: what teachers and students need, and also learn to be in the role of supporting staff
Support collaborative construction of knowledge	Team work	Work in an organization
Promote reflection	Developers conscious of the users' comments	Teachers' evaluation is essential
Promote articulation	Writing resources	Constant communications with teachers (clients)
Coaching and scaffolding	Teachers' close monitoring	Senior staff provide constant advice
Authentic assessment of learning within the tasks	--	Teachers' evaluation is authentic (based on whether the products are meeting genuine needs)

ELearning assistants

Evaluation data in the second project came from three different sources. Firstly, the authors kept close contact with teachers who were being served. Informal communications were recorded about overall satisfaction with the service and quality of the eLAs' service. Secondly, the authors also had frequent communications with the eLAs in the project. Lastly, and more formally, the eLAs were asked to write a regular reflective journal in the form of online blogs to record their thoughts about serving the teachers. The students were prompted to write about their experiences, what they contributed and what they learnt in the process. At the time of writing this paper, five developments have been completed (referred to as cases 1 to 5 in the sections below), involving six of the 10 trained students (eLAs).

Findings

eCase development

In general, the teacher appreciated that the students could build practical and useful learning resources for future students. She found that the cases were comprehensive and well designed. Many of the questions were also quite demanding. Clear understanding of the relevant issues was required before one could distinguish the better answers from other possible responses. Judging the quality of the eCases in general, she also remarked that the students had obviously consolidated and even extended the knowledge they had learnt in the course.

Similarly, the students were also very positive about the case development task as a useful learning experience for them. Below are some quotes from students' feedback on the open-ended survey (slightly edited for clarity and language accuracy).

Writing the cases allowed the students to apply multiple concepts they learnt in one or more courses at the same time. The exercise thus allowed the students find linkages among concepts. One student remarked:

> I learnt that cardiovascular panel consideration in renal patients is very important, and it helps me to integrate individual topics (e.g. renal, hypertension, dyslipidemia) to form a whole. (student 9)

The students learnt more about the topics in order to be able to provide answers that are clearly correct. Students actively self-learnt and sought clarifications from the teacher. At the end, they found the task a good revision and knowledge consolidation exercise:

> Besides recapturing, I also had a chance to look more in-depth into the lecture material and the suggested readings, which made me learn even more than the lectures (student 1)
>
> … because we need to create a case, we should have thorough knowledge on our topics, so when I saw something I didn't understanding clearly, I went onto the internet and did some searching with the hope to make clear the concepts. (student 4)
>
> The difference of what is written on books and what is actually practiced. And through this project I got the chance of revising the old topics! (which is good) and also focusing more on the dosage regimen which I overlooked many last year. And I also got some more information other than that in the old notes (student 13)

One student even suggested that case-writing could be turned into a course assignment in the future:

> I thought it would benefit everyone who participate in it and I think may be this can be one of the homework during the course!!! (student 12)

After reading about the topic, students had to condense the many facts and concepts into a case. This demanded critical-thinking skills. The students learnt to identify key points from the readings and information they studied:

> I used to eat up the notes, but now I have the time to read, to drop notes from books, and to ask. When I flipped through pages I keep asking questions like 'why' and 'how' and 'why not', which was rare. From these questions and their answers perhaps I could generate more sensible ones in the case at last. (student 11)

The exercise was related to training for other learning skills too. For example, students remarked that they learnt to be more creative, and were more able to manage time and self-learn:

> I found this case project a good time to improve my time-management skills ... The case project really forced me to use my limited time more efficiently. (student 1)
>
> This project benefits me a lot in aspects of self-learning. We are not only focusing on the lecture notes we got, but we are actively finding information and learning ourselves, using information available to all the practicing healthcare professionals worldwide. (student 5)

Like the teachers, the students were also quite confident that the cases were good learning materials for the students in the following years. The aim that the exercise would benefit both the case developers as well as the eLearning environment seemed to have been achieved.

> I think this project is both meaningful to our school and students ... After we have developed the cases, the classmates next year can try on our cases and grab more knowledge in every topic, which is very good for learning concepts and also for preparing exam. I really hope that this project can start earlier so that we can also try some cases before our exam last year! (student 4)
>
> After all there seem very few questions (with answers) available nowadays to stimulate thinking and addressing practical issues. I felt, to be frank, hopeless when I sat in the exam hall (I am sorry to say so). (student 11)

However, completing the development work relatively independent was challenging. The students mentioned workload and the amount of self-learning work they needed to do. Despite all the effort paid to further studying the subject material, writing cases that can be reusable still imposed a great deal of stress on the students because the questions and answers had to be accurate:

> However, for the drugs that I have to choose for the treatment, I will be confused and do not make sure whether this drug can be used for the patient or not. But luckily, I can find the answer from some textbooks or websites that make me know which drugs are more appropriate. (student 6)

> Sometimes I have uncertainties about the content such as the dosage, the symptoms and the response of the pharmacist. So, I look up the reference books and notes. (student 8)

They also remarked that designing teaching and learning resources requires pedagogical and instructional skills which they lacked:

> Another problem encountered in the development of case is that it is not easy to set inspiring questions in the MCQ format. When browsing through the guideline, I can see many points that are worth asking. However, it would be difficult to set it into MCQ format so that the question does not look 'silly' (student 9)

> It's more difficult to formulate choices that are also correct, but not the best option available. I think that needs a little more explanation to the wrong answers (why it is not the best). (student 13)

ELearning assistants

Compared with the eCase development project, the eLAs mentioned less about acquisition of academic knowledge. In their blogs, they outlined technical knowledge they had learnt. For example, the students acknowledged learning some basics about using the learning management platforms (Moodle and WebCT) in the summer training sessions. They also recalled that the training session made them aware of the design issues for effective online learning strategies. They also noted that the experiences in servicing the teachers allowed them put the knowledge into practice: "The teacher is nice and understanding, and the work involved some html knowledge and some knowledge in the summer training" (students who assisted in case 3). However, much of the learning of the students in this project was about improvement of working skills and working attitudes.

As expected, the majority of the teachers demanded the basic content delivery type of web functions, or required the students to do limited web designs. For example, the students who assisted in case 1 wrote on the blog "actually, the teachers were quite familiar with Moodle. However, they were not able to create logos with software. Also, they were not able to handle some of the functions related to HTML coding". During the processes of actually working with the teachers, students found that the experiences enhanced their interpersonal skills and skills needed to effectively handle projects.

Students seemed to have learnt more in cases where they worked with more demanding teachers or projects. The teachers of case 2 and case 5 expected the students to accomplish more. Case 2 involved the development of a programme-level site in which there were quizzes and many forums. The teachers knew how to use many of the functions but wanted a number of professional-looking graphics. Case 5 involved a number of interactive quizzes. The teacher depended on the students to provide full technical support, including the generating of students' quiz performance reports towards the end of the course.

Students assisting case 2 wrote on the blog "the work looked simple, however much communication was needed in order to understand the teacher's need. Although we seemed to have met the teacher's requirement, the teacher did not fully understand the effort we had made for the design work".

In personal communication, the researchers learnt from the students that the teachers were not completely satisfied with their design, and they thought the students spent too much time on the work. The students remarked that the teachers did not seem to fully acknowledge the fact that they were new to these tasks and needed more time to pick up the skills and deliver. The students reflected upon the experience and told the researchers that they had learnt a great deal about handling work and working relationships because of the 'authentic' working experience. For example, they now realized the importance of recognizing one's own limitations, and they also understood the importance of setting a clear timeline for tasks. Good communication is also essential in real-world tasks. They commented that much of the misunderstanding could have been avoided if the teachers and they had better understanding of each other, their abilities and expectations. They would also negotiate a clear delivery date for any future tasks.

The student who assisted case 5 also found the task challenging. He remarked on the blog that "additional work is required to set up the peer assessment and generate submission reports". The tasks had made him learnt to be an independent and responsible worker as he had to ensure work was done according to schedule, and ensure the quality of work as the final product was used in an actual course.

Comments from the teachers about the service were on the whole quite positive. The teachers of case 2 admitted to the researchers that they were at first disappointed by the time spent on work and the quality

of the design. However, at a later stage they were pleased because the eLAs (who were students themselves) were able to suggest ideas and changes to designs which made the site better aligned with the taste and needs of the students. They acknowledged that the students contributed to the enhancement of the learning materials.

Teachers in the other cases also found the eLAs able to satisfy their technical needs. For example, students who assisted in case 3 recorded on the blog that the teacher "was quite satisfied, and referred me to another teacher". The teacher of case 4 also told the researchers in an email that the student "is doing a good job with Moodle". The practical reason for the provision of the service, i.e. to ease the work load of the full-time teaching staff, also seemed to have been achieved.

The overall success of this initial batch of eLAs has enabled the Information Technology Services Centre at CUHK to secure funding for eight full-time eLAs, beginning with the 2009–2010 academic year. Part-time student helpers often have scheduling conflicts and the University now expects to be able to provide much better service to our eTeachers.

Discussion

The findings tend to show that students can take a more dominant role in assisting in the design and development of eLearning environments. The learning benefits for students in doing so are substantial.

Creating learning materials allows students to revisit and even reinterpret the knowledge they have previously learnt. The learning benefit may be particularly obvious as the students were not asked to write factual questions but to develop eCases that were related to authentic use of the knowledge to solve real-life problems. Students could not simple copy and paste textbook content into the exercises. On the contrary, the eCases call for deep understanding and meaningful linkages among different topics and concepts. Self-learning skills were also enhanced in the process. Also, students had to decide about what were likely student misconceptions and identify key points for discussion. The learning material creation task was authentic – students had many open-ended decisions to make and the case-based exercises were going to be actual learning resources in the course.

Assisting the teachers in technical aspects of eLearning enhances students' working attitudes and work-related skills. The eLA tasks were authentic learning resources in a course. The eLAs had many decisions to make during the various stages of the service and resolve problems that could occasionally turn out to be quite complex. Teachers could also be demanding in terms of time schedules and expectation of work quality.

In both of the projects, students were able to successfully enhance the eLearning environment for other students and produced materials that have been reused.

However, challenges were also found especially when the students took rather independent roles in the projects. Guidance and supervision was needed especially in the following areas.

Discipline knowledge
Creation of web learning materials often requires students to have clear understanding of a wide spectrum of knowledge and the ability to see relations among the different concepts. The task thus requires extensive self-learning. Initial support by teachers on how to approach independent learning is needed. Also, opportunities are needed for students to talk to each other and/or to talk to the teachers for clarifications about the knowledge, so that the students can feel confident about their understanding.

Pedagogical ideas
Creation of web learning materials also requires students to understand effective ways to design learning resources that are pedagogically appropriate. Initial guidance on courseware design is useful. Students can also be encouraged to give each other comments on their prototype designs and materials.

Instructional design ideas
Similarly, students may lack the skills in presenting concepts and explaining them in a clear manner in text. Students have to be able to identify key concepts and write instructions that are focused. Teachers can prepare sample teaching materials for the sake of demonstrating good practice. Students can also assist each other in giving comments from a user perspective.

Technical skills
Transferring the designs and planned instructions to the actual web platforms requires a certain degree of technical skill. Many learning management systems such as Moodle and WebCT have quite user-friendly interfaces so that the actual web development tasks can be easily handled by students after short introductions to the functions. Nevertheless, teachers or technical support staff still need to be constantly available for further technical consultations. Teachers should also be aware of the need for more advanced web skills which may involve simple html coding, programming and graphical design.

*Skills in handling project*s
Authentic web development projects often are framed in time and space. Students are expected to work closely with the other project members and/or the teachers they serve and deliver products for use within a certain timeline. Handling projects like these independently requires appropriate skills and attitudes. Students need to communicate well and be reflective about progress. Time management is important. Students also need to have a good sense of responsibility. Support should be given to students, listening to the achievements and challenges at various points during the projects, suggesting resolutions to problems. The development of these skills and attitudes is a gradual process over time.

Sustainability
Both the eCase writers and the eLearning assistants in this projects received monetary returns for their contributions to the material developments. It was quite obvious to the researchers that the monetary incentives were important to motivate the students to put effort into these extra-curricular tasks, especially at the very beginning of the projects when students did not realize that the work could be learning opportunities for them as well. Before other types of motivation could be designed (e.g. case-writing becomes one of the course assignment), the ability to secure funding to pay for students' services seem to be essential to the sustainability of these projects.

Another important factor for the projects to function and sustain is the availability of the central figures who manage and supervise students' work. In the case-writing project, the teacher was the centre figure and she delivered the necessary information the students needed in order to write quality cases. She also monitored the progress regularly and gave timely advice. In the eLearning assistant project, a full-time administrator was involved in monitoring workload and distributing the work to students with appropriate skills.

Conclusion

This paper describes two projects in which students actively and independently participated in the design and development phases of eLearning projects. The findings extend earlier experiences we had (McNaught, Lam & Cheng, 2007) in which the students' took comparatively minor roles at various stages of eLearning projects. In this study, the students designed, wrote and developed teaching materials with a fair degree of independence. This is a new learning space for many students. There are significant learning benefits in this kind of student-centred eLearning project and students can advance a great deal in learning knowledge, skills and attitudes. The projects can also lead to enhancement of the eLearning environment for other students. However, the challenges in preparing such learning opportunities for students are substantial. Students lack requisite knowledge and skills, and may not be able to work independently from the start. Training and close supervision is needed. The challenging work nevertheless will provide students with rich opportunities to learn and develop.

Besides being student-centred, these two projects provided students with authentic learning tasks that closely match the criteria offered by Herrington, Oliver and Reeves (2002), discussed earlier in the paper. They required the use of higher-order thinking and a range of capabilities that are needed in most work-place settings. For Hong Kong students, who are used to quite closed and structured educational experiences, the opportunity for them to contribute meaningfully to real web development tasks is particularly beneficial.

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References

Biggs, J. (2003). *Teaching for quality learning at university* (2nd ed.), Buckingham: SRHE and Open University Press.

Eagleton, M. B. (1999). The benefits and challenges of a student-designed school website. *Reading Online*. Retrieved August 13, 2009, from http://www.readingonline.org/articles/eagleton/

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development, 48*(3), 23-48.

Herrington, J., Oliver, R., & Reeves, T. C. (2003). Patterns of engagement in authentic online learning environments. *Australian Journal of Educational Technology, 19*(1), 59-71. http://www.ascilite.org.au/ajet/ajet19/herrington.html

Laurillard, D. (2002). *Rethinking university teaching: A framework for the effective use of educational technology* (2nd ed.), London: Routledge Falmer.

Martens, R. L., Gulikers, J., & Bastiaens, T. (2004). The impact of intrinsic motivation on e-learning in authentic computer tasks. *Journal of Computer Assisted Learning, 20*, 368–376.

McNaught, C., Lam, P., & Cheng, K-F. (2007). Using the design phase of e-learning in higher education as an authentic learning experience for students. *International Journal of Learning*, *13*(12), 101–110.

Poon, W-Y., McNaught, C., Lam, P., & Kwan, H-S. (in press). Improving assessment methods in university science education with negotiated self- and peer-assessment. *Assessment in Education*.

Roblyer, M. D. (2002). *Integrating educational technology into teaching* (3rd ed.), Columbus, Ohio: Merrill Prentice-Hall.

Squires. D. (1999). Educational software and learning: Subversive use and volatile design. In *System Sciences 1999*, Proceedings of the 32nd Annual Hawaii International Conference on System Sciences, January 5-9, 1999. Maui, Hawaii, USA.

Stefanou, C. R., Perencevich, K. C., DiCintio, D., & Turner, J. C. (2004). Supporting autonomy in the classroom: Ways teachers encourage student decision making and ownership. *Educational Psychologist, 39* (2), 97-110.

Weimer, M. (2002). *Learner-centered teaching: Five key changes to practice.* Indianapolis: Jossey-Bass.

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