AN EVALUATION OF SELECTED TOOLS TO SUPPORT ONLINE PEDAGOGY

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Abstract

The ubiquitous nature of the technologies that purport to support learning requires educators to carefully select those that they incorporate into their practice. This paper aims to inform that selection by discussing five popular technological tools (mLearning, LMS, Web Conferencing, Wiki and Podcasts/MP3) and assessing how well they support effective online pedagogy. The paper includes a review of current thinking and use of the tools, with analysis of issues still to be resolved along with a commentary on their possible future use or development. It will be of value to educators at all levels considering the use of technology to enhance the learning experience.

Keywords: Technology, mLearning, Podcast, Web Conferencing, Learning Management System

INTRODUCTION

THE TASK AND GROUP

The members of the group work in diverse educational settings, which ensured the emergence of a variety of perspectives. The task entailed the discussion of a dilemma extrapolated from the broader topic “tools to support online pedagogy”. It was therefore decided to evaluate whether selected tools indeed support effective online pedagogy by linking their features and uses to five critical elements of online pedagogy.

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ABOUT THE TOPIC

In critically assessing the dilemma the group discussed a range of current and emerging learning technologies – particularly in reference to the adoption horizon for technologies discussed in the Horizon Report (NMC, 2006) and the status of various technologies put forward by Gartner (2006a, 2006b). From this analysis the group developed a fundamental question regarding each technology: *how does (x) technology support effective online pedagogy?* This question became the basis for working with the five technologies examined in this paper, and ultimately the broad topic for the paper.

A DEFINITION OF ‘EFFECTIVE ONLINE PEDAGOGY’

Online pedagogy is the utilisation of mixed modes of communication to integrate the learner as the focal point of a collaborative community providing practical and authentic educational opportunities. The effectiveness is enhanced by integrating five critical elements into the learning process:

1. Social presence: The ability to render others 'real' whether or not they are physically present — in an electronic world this may be referred to as 'telepresence'.

2. Collaborative learning: Occurs when two or more people work on a joint task and involves agreeing on outcomes, pooling resources, exchanging perspectives, allocating complimentary roles and synthesising each person's input into a final product.

3. Interaction: Between student and teacher, student and resources, student and other students, resulting in the acquisition and application of new ideas and skills.

4. Cognitive structures: Internal processes by which we select and modify our strategies of attending, learning, remembering and thinking.

5. Learner-centredness: Focus on the facilitation of students constructing new meanings rather than on a teacher delivering a fixed set of instructional materials.

(Adapted from Gunawardena & Zittle, 1996)
SELECTED TECHNOLOGIES FOR THIS EVALUATION

The selected tools are: Mobile Learning (mLearning), Learning Management Systems (LMS), Wikis, Web Conferencing, and Podcasting/MP3. They were chosen for their particular relevance in the authors’ educational settings as well as their interest in the area. The tools are current, recognisable and considered for, or currently in, use in online learning.

1: HOW DOES MLEARNING SUPPORT EFFECTIVE ONLINE PEDAGOGY?

The concept of mLearning is that of a technology-reliant and communications-dependant means of delivering learning content whenever it is required “regardless of location and time” (Lehner & Nosekabel, 2002). Vavoula and Sharples (2002) further define this concept by stating that learning is mobile when considered from locational aspects, integrated with different areas of the learner’s life, and with respect to time. Freysen additionally notes that mLearning is the “use, both synchronously and asynchronously, of mobile communication technology” (2004). For the purposes of this paper, mLearning is explored primarily as a means of utilising mobile telecommunications to promote effective pedagogical principles.

As a concept, mLearning is not ‘new’. There are in fact numerous examples of forms of mLearning: consider language cassettes that were intended to be used whilst the learner was driving to work, or ‘self-help’ motivational packages that were intended to be used in the home or office. We are reminded by Watson and White that the “…first widespread mLearning device was the book…” (2006). What is new is the integration of new technologies into mLearning that allow both synchronous and asynchronous communications between the learner, the facilitator, and all other participants. New also is the ability for this technology to ‘locate’ geographically where the learner is situated, enabling site-specific learning opportunities.

There are a number of areas where mLearning can be utilised:
A. Learners can be provided with PDA devices or ‘smart’ phones loaded with learning material for language development purposes. The devices promote active engagement at a suitable time, provide immediate feedback, and enable the facilitator to monitor progress and modify individual programmes.

B. ESOL (English to Speakers of Other Languages) learners can be encouraged to move into communities, recording audio and visual materials onto their mLearning devices. This blog information can be automatically uploaded to classroom boards for ongoing review and feedback.

C. Learners with impaired mobility or with other difficulties for attending traditional learning institutions can be provided with mLearning devices that link them to the broader learning community.

D. Learners with a likelihood of low involvement in traditional learning environments can be re-engaged with mLearning devices. The “cool” factor of these devices along with the utilisation of interactive and relevant learning aims encourages learner participation.

E. Devices employing mLearning principles provide learners in a museum with information that is location-based. Materials can be targeted to match student skill levels. Feedback can be provided instantly.

The benefit that mLearning provides in each example is engagement. Previously, pedagogical tools have not always been available to maintain engagement, as reflected by Christine Armatas et al (2006) who note that “…the value of any online environment is limited by how accessible it is to students and the level of student engagement, such that if students can’t or don’t access the online environment they potentially miss out on information critical to their learning experience...”.

**2: HOW DO LMSs SUPPORT EFFECTIVE ONLINE PEDAGOGY?**

**DEFINITION**

*LMS (learning management system):* Software that automates the administration of training. The LMS registers users, tracks courses in a catalog, records data from
learners; and provides reports to management. An LMS is typically designed to handle courses by multiple publishers and providers. It usually doesn't include its own authoring capabilities; instead, it focuses on managing courses created by a variety of other sources. (ASTD, 2006)

This year’s ASTD survey of how organisations use their LMSs highlights a curious paradox (ASTD, 2006). The number of organisations using an LMS is rising but at the same time the number of respondents who reported being “very unsatisfied” with their LMS more than doubled over the 2005 result. Part of the survey asked respondents to rank the features they most valued. The results emphasise the “management” functions of the LMS (reporting, assessment, testing, compliance tracking) over collaboration tool integration and a learner-centred design. This survey reflects an emerging view – that although often viewed as a starting point for learning technology, LMSs are not delivering the “kind of flexible virtual classrooms that teachers need to provide quality education”(Feldstein & Masson, 2006).

Siemens describes the contribution of an LMS as providing the means to sequence content and create a manageable structure for instructors/administrators (Siemens, 2004), but goes on to list glaring weaknesses including the fact that they are “designed as a learning management tool, not a learning environment creation tool”. In addition, Dalsgaard suggests that the rise in popularity of social constructivist pedagogy has found the current batch of LMS wanting (Dalsgaard, 2006). A response to this has been the popularity of independent stand-alone tools that do support social networking – wikis, blogs, podcasting, vlogging and others. Dalsgaard goes on to suggest that current LMSs need to evolve to either interoperate with these specialised tools, or offer the same functionality as an integral part of the LMS itself.

Moodle (described simply as a course management system on the website www.moodle.org) is gaining market share over proprietary LMSs and purports to be designed according to social constructivist pedagogy. Moodle’s founder Martin Dougiamas uses a five-point referent when designing:
All of us are potential teachers as well as learners, and in a true collaborative environment we are both.

We learn particularly well from the act of creating or expressing something for others to see.

We learn a lot by just observing the activity of our peers.

By understanding the contexts of others, we can teach in a more transformational way, and thus Moodle has lots of ‘social presence’ tools missing from other learning platforms.

A learning environment needs to be flexible and adaptable, so that it can quickly respond to the needs of participants – hence Moodle itself would really only make sense as an open source project.

Martin Dougiamas, Keynote Speech, Moodlemoot UK, July 2006

In conclusion, there are three possible paths for LMS development in the future:

1: LMSs meet the market. They develop and integrate proprietary versions of these new independent social constructivist tools into their own system. This would require a huge investment and the resulting cost of the finished product might put them out of reach.

2: LMSs become just a platform for managing courses, learners, learning interactions and content. If they do this very well, they may survive in this niche market.

3: LMSs evolve and are able to interoperate with and accommodate all specialised social constructivist tools. This is essentially an open source model. Moodle appears to be leading the way.
3: HOW DO WIKIS SUPPORT EFFECTIVE ONLINE PEDAGOGY?

DEFINITION

Leuf and Cunningham (2001, as quoted by Schwartz et al, 2004) define Wikis as follows: “a wiki is a freely expandable collection of interlinked web pages, a hypertext system for storing and modifying information – a database, where each page is easily edited by any user with a forms-capable Web browser client” (p. 14). Content can be directly linked to that found in other wikis (interwiki) and in Web documents.” Anyone can contribute to a Wiki without the need for special software or skills.

HOW CAN WIKIS SUPPORT EFFECTIVE ONLINE PEDAGOGY?

Educational institutions have slowly started to explore the use of Wikis to enhance online and computer-supported education. Whilst Wikis offer a myriad of features and strengths—easy access and sharing; everybody works on the same version (no version control); searching and archiving tools; easy to expand topics; ‘anyone can edit’ principle; option to restrict users, amongst others—the common strength of Wikis across the literature is their ability to build, maintain and enhance social constructivist learning environments (Bruns & Humphreys, n.d.; Désilets & Paquet, 2005).

Wikis are non-linear, constantly evolving and enable multiple users to work on the same project, thus allowing for student collaboration in a way rarely seen before. Learners can co-produce texts and documents, argue and interact (Bruns & Humphreys, n.d.). Désilets & Paquet (2005) believe the environment created by Wikis has caused a “shift in agency” – there is a more equal balance of power between learners and teachers, and more flexibility, therefore increasing student engagement and responsibility.

Although still in the exploration phase, several uses of Wikis in education have been identified. Désilets & Paquet (2005) mention the use of Wikis to develop storyboards and scripts, and to “collaboratively critique poems and essays”; their case study documents the success of Wikis in a collaborative story-writing project in primary school. Schwartz (2004) states that Wikis are “a natural tool for distance
education” listing, amongst others, the ability of teachers to create interactive activities, present course information and discover problem areas by monitoring discussions; universities have started to use Wikis as knowledge repositories. Godwin-Jones (2003) adds that Wikis could be ideal for building communities of practice. Finally, Augar et al (2004) describe the success of an icebreaker activity conducted at Deakin University, the goal of which was to “facilitate ongoing interaction between members of online learning groups”, and further agree that Wikis can “facilitate the dissemination of information, enable the exchange of ideas and facilitate group interaction.”

**CHALLENGES AND QUESTIONS**

There are, however, some challenges and questions about the use of Wikis in education. Bruns & Humphreys (n.d.) discuss a case at California State University, where a complex system of permissions and access protocols was built in order to quailm some of the concerns of the traditional education system, – the need for individual projects, individual assessment, restricted public access until the project is complete – which ultimately goes against the very nature of Wikis. Another case discussed was the use of a Wiki to deliver a course on pedagogy to high school teachers. Several problems were identified: participants did not interfere with others’ work, therefore there was little, or no, editing; participants did not want their work to be interfered with, mainly because pages were owned by individual students; participants did not want their work public whilst in progress. These are issues that need further investigating.

In conclusion, the collaborative learning that ensues through the use of Wikis is their most prominent strength. Whilst some issues need consideration, the potential of Wikis in education is great. Although they are not yet widely utilised by educational institutions, the uses and projects described here show how online educators can use Wikis to build and enhance true collaborative learning.

**4: HOW DOES WEB CONFERENCING SUPPORT EFFECTIVE ONLINE PEDAGOGY?**
DEFINITION

Web conferencing is a synchronous, two-way interaction online between multiple distant users. The environment provided by this technology is often referred to as a virtual classroom as it provides for communication and interaction between teachers and learners in a single environment and integrated interface (Clark, 2005). Interaction occurs via various tools for communication, presentation, feedback and session management.

- **Communication tools**: one/two-way audio, optional video and text chat.
- **Feedback tools**: polls, surveys and quizzes.
- **Participant indicators**: buttons to indicate their level of engagement, requests, questions, etc.
- **Presentation tools**: PowerPoint, multimedia, interactive/shared whiteboards, application sharing and web-tours.
- **Other features**: small-group rooms, session recording, session controls, and integration with calendaring, email and LMSs.

The distinctive feature of web conferencing is that all of this functionality is provided within a single integrated interface – as opposed to individual software tools.

HOW CAN WEB CONFERENCING SUPPORT ONLINE PEDAGOGY?

1. Interactive learning with multiple communication, feedback and content channels (Schullo et al, 2005; Elluminate, 2006).
2. Real-time interaction between presenters and participants – increased human element online (Rieber, 2004; Horizon-Wimba, 2005).
3. Increased levels of interaction/engagement over traditional distance learning (Schullo et al, 2005; Elluminate, 2006).
5. Users can participate anywhere, any time with an Internet-enabled computer (Horizon-Wimba, 2005).
6. Increased flexibility for learners – not place dependant and less time dependant (ELI, 2006; Elluminate, 2006).

7. No need for specialised rooms, hardware, software or networks (Horizon Wimba, 2005).

8. Reduced hardware and software costs – in comparison to alternatives (Foreman & Jenkins, 2005).

9. Reduced travel and physical infrastructure costs (Clark, 2005).

10. Reduced technical support – in comparison to alternatives (ELI, 2006).

The authors of this paper participated in a web conference using *Elluminate-Live* to simulate an authentic workshop in online teaching and to test as many of the tools as possible. Participants were then asked to reflect on their experiences.

All participants were initially intrigued by the interface and keen to try the various tools. After a short orientation they became comfortable with the interface and found it to be generally intuitive. There were some technical issues with disconnections and some loss of audio. If technical issues occur, this can be distracting for the facilitator and participants, as well as frustrating for those experiencing the issues. This appears to be the greatest area of risk.

Participants felt that the web conferencing experience highlighted its potential in online learning and demonstrated many of its advantages/possibilities. They were pleased with the level of interactivity and engagement, application sharing, interactive whiteboard, breakout rooms, multimedia, and presentation tools/controls.

Aspects which raised concerns were the ‘one-at-a-time’ audio controls and dealing with a multiplicity of communication channels. Some questioned the true level of flexibility and accessibility for learners – given the technical issues and variation in computer equipment, connectivity and technological competence of learners. The advantage of reduced cost was seen as a ‘maybe’ – given the increased learner support and technical support that may be required.

Most participants expressed an interest in using web conferencing in the future. Their thoughts on potential uses highlighted the core strength of this technology – i.e. bringing real-time interactivity into
online learning. The experience of this web conference, and the early/emerging literature, generally support this potential (Clark, 2005; ELI, 2006; Schullo et al, 2005; Rieber, 2004).

Key factors, then, in how web conferencing supports effective online pedagogy are the increased interactivity and engagement of participants in the environment, and, increased social presence for participants, which in turn supports collaboration and socially constructed learning (Jonassen, 1998). The actual effectiveness of web conferencing to support online pedagogy in practice can be realised when the tool is used to ‘play’ to these strengths as part of a learning design (Clark, 2005; Foreman & Jenkins, 2005), when used in an appropriate learning context (Foreman & Jenkins, 2005; Rieber, 2004), and when the supporting technology is stable and well-supported (Clark, 2005; ELI, 2006).

5: HOW DOES PODCASTING/MP3 SUPPORT EFFECTIVE ONLINE PEDAGOGY?

DEFINITION:

Podcasting is the method of distributing multimedia files, such as audio or video programs, over the Internet using syndication feeds, for playback on mobile devices and personal computers. The term gained wide popularity as a portmanteau of iPod and broadcasting, but was seen before that as an acronym for "portable on demand". (Wikipedia, 2006)

The Podcast (and accompanying file system MP3) is a relevant choice as a pedagogic tool because of its:

- Flexibility – Encouraging any time, any place study.
- Mobility – Ability to cross boarders in online education moving large quantities of information quickly.
- Affordability – Often available at no cost to the creator or user. Tools for development and usage are often on the computer already or available for download at no cost.
• Popularity – An accepted technology, many people know its name even if they have not experienced the Podcast. Much credit for the popularity of this technology can be attributed to the promotion of the iPod.

The popular MP3 is an abbreviation for Moving Picture Experts Group Audio Layer-3 and was originally developed as the audio portion of MPEG (see notes) for use in HDTV systems. Whilst most famous for handling music files, MP3 use also lends itself readily to the classroom and is especially useful for online learning assisting with timely delivery to the learner.

Since flexibility is one of the major benefits of MP3, emphasis here will be placed on portable units allowing autonomous study both in and outside of the classroom. Most MP3 players are found in stand-alone, solid state units (e.g. Rio) or with a hard disk (e.g. iPod) and others have removable or expandable memory cards and dual purpose units that can handle the MP3 format. These include mobile telephones, Personal Digital Assists (PDAs) and MD players, and even some cameras have MP3 capability (Casio, 2006). The format’s flexible nature and wide acceptance promote utilisation; the learner has the freedom to subscribe to lessons when they choose to, an extension of guided independent learning as discussed by Moodie (2000).

MOBILITY

Files recorded in MP3 format have the ability to be copied from source to source without losing quality. One example is the language classroom where source material is often already available. It can then be transferred to MP3 and posted on a web page for download (the podcast) or if the file is small enough, emailed directly to a student, who in turn listens immediately on the computer or transfers the file to their MP3 device. The student then has the opportunity to study any time or anywhere. This puts it squarely in the mobile learning definition as noted by Kinshuk (2003). Study while commuting or exercising, in their kitchen or walking down the street, learners have the freedom to go over material, tailored to their level, as many times as they wish. When the lesson has been mastered, they download the next one and move on.
A concern regarding mobility and flexibility is file size. Trends in computing continue towards bigger programs requiring new powerful equipment, larger drives and more memory. Speech oriented material may be compressed while retaining clarity (Johnson, 2002), thus promoting interaction.

Pedagogically speaking, the tools of podcasting and accompanying files, like any tool, are in the hands of the developer; how it is incorporated in learning holds the key. While the podcast alone does not support presence, the human voice it carries can provide that critical component to help establish affective and cohesive presence, necessary for success in online learning programs as noted by Pelz (2004). Podcasts can also support behaviourist learning delivering mildly interactive materials. The Pimsleur method of language study is an example utilising graduated interval recall and the principle of anticipation (Pimsleur, 1967). The podcast offers authentic and direct learning delivered to the students. Educational podcast material may be created originally or adapted for use. The material chosen by the developer may be tailored to the context of the learner.
The following table presents a synthesis of the five technologies selected for this paper by linking them to the five critical elements of effective online pedagogy— as described in the introduction.

<table>
<thead>
<tr>
<th>Social Presence</th>
<th>Interaction</th>
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</thead>
<tbody>
<tr>
<td>mLearning</td>
<td>The ease of interconnectedness of nLearning devices encourages discussions both within and outside of the immediate learning context.</td>
</tr>
<tr>
<td>LMS</td>
<td>All LMSs enable communication between learners/facilitators and learners/learners.</td>
</tr>
<tr>
<td>Web Conferencing</td>
<td>Highly interactive with multiple communication and feedback channels/tools available. When used effectively, the tool demotes passivity and promotes active, engaged participation across a group.</td>
</tr>
<tr>
<td>Wikis</td>
<td>Interaction is strong, due to the 'anyone can edit' principle, the barriers between teachers and students are softened. InterWiki (and other) links allow for excellent interaction with resources.</td>
</tr>
<tr>
<td>Podcasting/MP3</td>
<td>Immediate interaction with learners/resources and learners/facilitators may be recorded as an ongoing chat.</td>
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</tbody>
</table>

**mLearning**

- Interconnectedness of nLearning devices promotes a perception of personal interactivity.
- The ease of interconnectedness of nLearning devices encourages discussions both within and outside of the immediate learning context.

**LMS**

- Modality allows learners to create an online identity, perhaps with photos and a biography. Some LMSs indicate who else is working concurrently in the same space in the environment.
- All LMSs enable communication between learners/facilitators and learners/learners.

**Web Conferencing**

- An immediate, real-time presence with all participants interacting in a singular virtual room. Provides a strong sense of place on the Internet. Identities of each participant and their respective input into conversations are clearly identified.
- Highly interactive with multiple communication and feedback channels/tools available. When used effectively, the tool demotes passivity and promotes active, engaged participation across a group.

**Wikis**

- Social presence is high even though posts/edits are not usually signed. When a group works on a specific project, social presence is enhanced.
- Social presence is high even though posts/edits are not usually signed. When a group works on a specific project, social presence is enhanced.

**Podcasting/MP3**

- A voice file carries presence to the learner since it includes voice tone and inflection. These elements of communication may establish social presence quickly.
- Immediate interaction with learners/resources and learners/facilitators may be recorded as an ongoing chat.
<table>
<thead>
<tr>
<th>Cognitive structures</th>
<th>mLearning</th>
<th>LMS</th>
<th>Web Conferencing</th>
<th>Wikis</th>
<th>Podcasting/MP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated mLearning systems enable learners to create a personalised and relevant learning experience and provide the immediate opportunity to apply, test, and modify knowledge regardless of time and location.</td>
<td>Proprietary LMS environments are standardised and offer a limited range of learning strategies to learners. Open source LMS can be more responsive to learner/teacher needs.</td>
<td>Some possibilities for small-group work, individual contributions, and immediate contextualisation for learners. This is limited to how much the facilitator designs/allows these opportunities in a session. Also limited by the synchronous nature of the tool.</td>
<td>Depends on purpose; some projects have shown excellent learning outcomes. Probably not the preferred tool for individualised learning/assessment.</td>
<td>Depends on delivered media. It can carry tools to challenge the learner cognitively and instruction for doing so.</td>
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</tr>
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<p>| Collaborative learning | Mobile devices provide connectivity to people and systems both within the immediate learning context and outside of it. Social interaction and collaboration – both formal and informal – is enhanced from the ease of such connectivity. | Moodle incorporates specialised collaboration tools (wiki, blogging, group work spaces). Proprietary LMSs support individual interaction with the content but are less able to support group collaboration. | Synchronous collaboration well-supported with file and application sharing, shared electronic whiteboards and small-group work areas. | Collaborative learning is at the heart of using Wikis, its biggest strength. Suited for group projects of all types. | Creation of sound files for podcasts can be done within teams encouraging collaboration. The ease of recording promotes and encourages the enhancement of projects through collaboration. |</p>
<table>
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<tr>
<td><strong>Learner-centredness</strong></td>
<td>Mobile devices enable the learner to establish a personally suitable schedule and method of learning.</td>
<td>Most LMSs have a tool for learner reflection but no ability to share them. Moodle has more “blog” functionality. Proprietary LMS environments are standardised and less able to be personalised. Moodle better enables the environment to reflect the learners' context but there is still limited ability for the learner to personalise it.</td>
<td>Similar to teaching in general – there is potential for learner-centred activities but this is directly governed by the learning design and the pedagogical approach of the facilitator in a given session. The synchronous nature of the tool can limit opportunities due to time constraints and the number of learners in the group.</td>
<td>Depends on the facilitator; Wikis can be extremely learner-centred. Students do not “need” the teacher to add to or edit the Wiki (although restrictions might apply in some cases).</td>
<td>Podcast has a personal quality similar to radio broadcast. The material chosen by the developer or learner may be tailored to the context of the learner.</td>
</tr>
<tr>
<td><strong>Adoption horizon</strong></td>
<td>Early implementations trialled, with rates of acceptance expected to grow in next 1-2 years.</td>
<td>Currently in use, but open source LMSs moving faster.</td>
<td>Adoption currently growing rapidly. Mainstream adoption within 2-3 years.</td>
<td>Currently in some use and experimental use. Mainstream adoption 1-3 years.</td>
<td>Currently in use and expanding.</td>
</tr>
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</table>
NOTES

MPEG (pronounced M-peg), which stands for Moving Picture Experts Group, is the nickname given to a family of International Standards used for coding audio-visual information in a digital compressed format. The MPEG family of standards includes MPEG-1, MPEG-2 and MPEG-4, formally known as ISO/IEC-11172, ISO/IEC-13818 and ISO/IEC-14496 (Savatier, 2000).

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