<title>

BRIEFING PAPER

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Content Engineering for Learning

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Introduction

The Internet and web-based technologies have changed forever the way we teach and learn. The catalyst for this has been faster and easier communications, based on the new infrastructure of connected machines and common information standards. This extra degree of connectivity has enabled wider and easier access to information resources and has allowed greater collaboration between people, applications and those resources.

New developments in learning such as games-based or adaptive learning have emerged, as have new software applications to support them. Many education providers are exploring alternative forms of programme delivery, student support and revenue generation based on them. Most have invested in virtual learning environments or learning management systems, and some are looking again at scalable programmes of distance learning employing flexible delivery.

Along with these new applications however, there has emerged a greater expectation in what can be done with existing learning resources. The harnessing of these resources is proving problematic, and many sets of learning materials are still isolated in 'data islands' via proprietary structures, formats and software. Recovering valuable legacy learning materials from data islands, and making them more reusable is a significant technical and financial challenge.

Taking a content engineering approach is the solution.

What is content engineering

Content Engineering is an engineering speciality that deals with the issues around the use of content - content production, content management, content modelling, content conversion, and content use and repurposing.

It is not widely known of, but it is beginning to be recognised as a necessary function in any complex content-centric project such as distance or eLearning programme development, that involves both content production as well as online learning environment development.

Based on adoption of XML/SGML standards and the use of efficient batch production tools, content engineering techniques enable richer, more accessible content exchange between teaching and learning systems.

It is also key to improving the efficiency and productivity of learning support teams and processes. Consider for example whether your materials production team are:

- hand-crafted design oriented rather than batch, efficient-production oriented;
- dedicated to working with one delivery medium only e.g. print or Web;
- dedicated to working with one tool and format only e.g. MS Word; Acrobat; Flash or Dreamweaver;
- required to work with no guiding content strategy or pedagogic guidelines;

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- proving too expensive to recruit, equip, maintain, retain and manage.

While some design is essential, investing in efficient production is critical in delivering high-quality programmes of education sustainably, and in a scalable way. Efficient production processes include, for example, batch production tools that can generate 3500 HTML web pages in seconds without hand-editing them in Dreamweaver, or that can generate a 700-page printed module text automatically in minutes without hand-editing them in MS Word.

But it is not only about improving the productivity of materials preparation teams. Content engineering also bridges the gap between all the groups involved in the production and the delivery of entire subject domains of learning materials, allowing better management and quality assurance. Take the content engineering test below to see some examples of this wider sphere of influence.

The content engineering confidence test

1. We always know where the master versions of our learning materials are, who has them, and what changes have been made to them.
2. We are no longer hand-editing the bulk of our web and printed pages.
3. We have single master versions for all our learning materials, and we produce all our print and online programme materials from our single masters.
4. We use batch production tools for generating our learning materials.
5. We hold all our materials outside our VLE, and can easily migrate to and support any VLE.
6. We are happy that we have a healthy independence of our systems and vendors.
7. We are delivering innovative online course materials at a cost we can sustain.
8. We have predictable materials preparation and updating costs.
9. We can translate our materials into other languages efficiently in the same solution.
10. We share production work collaboratively, worldwide, using the Internet.
11. We have trusted relationships with professional production specialists who we can call in to help when we need them.
12. We can take on any new print and eLearning development task confidently.

Content Management Systems (CMS) are often a key technology quoted in this context, but frequently content engineering fills the gap where no formal CMS has been put into place. Many CMS systems are not optimised to cope with large volume, batch publishing tasks, existing simply to make the management of individual pages of dynamic website content easier. Instead, content engineering copes with streaming large volumes of content efficiently from one format into another, processing it intelligently to add new value to your ever evolving print and online teaching and learning uses for it.

Finally, content engineering works best when applied within a unified content strategy - a strategy for learning materials that ensures that they are fit for the purpose of effective teaching and learning in any delivery mode. It includes identifying the key elements that are used (e.g. learning objectives, questions, etc), and describing how they can be applied to best effect for the chosen mode of delivery.

Batch processing the 20 million words and 10,000 diagrams that comprised the 4400 study hours of the Edinburgh Business School eMBA learning domain, the World's largest fully online eMBA programme, was undertaken regularly to update all learning objectives and assessments across all 42+ modules in four different languages, keeping this programme fit for its global education purpose.

Conclusion

"The reduced view of isolated applications of content in limited periods of education has to be replaced by the systematic understanding of using contents in a complex product life cycle, embedded in the globalised educational market with special conditions and requirements."

Schumann, Tittmann, Weber. 2007"

Tomorrow's learning contents will be much more complex than today's, but will still, at the very least, be the main carrier of fixed, organisational knowledge. Properly developed and maintained content greatly supports any face-to-face, blended and pure distance learning programme delivery modes.

Content engineering methods when applied within a unified content strategy is the only long term, scalable solution to managing educational content sustainably. It is technically challenging for individuals and institutions to do themselves, but if undertaken with a content engineering partner, at least to start with, it is an essential, capability building step.

Acknowledgements

The following paper was used in the preparation of this briefing paper.

"Challenges Of The Market-Driven Modelling By Content Engineering In The Content Life Cycle"

Authors - Christian-Andreas Schumann, Central Institute for New Methods of Higher Education of the Zwickau University, Claudia Tittmann, Institute for Management and Information of the Zwickau University, Jana Weber, Academic Headquarter of the Zwickau University, Germany. 2007.

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Are you content engineering already?

If you can answer yes to most of the following questions, you are already content engineering:

1. Our Department and Organisation has made the one-off investment into XML and open standards, and we have a unified content strategy.
2. We have an information architecture that applies our pedagogic models, and serves our authors, tutors and students well.
3. We have recovered our most valued legacy learning materials into this architecture.
4. We have an efficient production capability built around our materials and our architecture.
5. We have a coherent repository of all our learning materials, giving us the ability to reorganise and regroup quickly to meet new market opportunities.
6. We own and control our learning materials, and have print and electronic rights to use all of the elements in them.
7. We are now producing our learning materials cheaper, faster and with better quality than we ever have before.

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