OPENING UP DIGITAL LEARNING RESOURCES TO SUPPORT AND ENHANCE UNIVERSITY STUDENTS’ LEARNING PROCESSES

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Abstract
The paper explores the concept of open-ended learning resources, which is rooted in sociocultural learning theory. This concept is related to two cases of digital learning resources, the Study Metro and Pages, and issues raised by these cases are used to discuss and further develop the concept of open-ended learning resources.

Keywords: Sociocultural learning theory, open-ended learning resources, digital media, learning and teaching innovations.

1 INTRODUCTION
Within a theoretical framework where learning is seen as a sociocultural practice, this paper discusses the potentials of using digital media as open-ended learning resources in higher education. The need for this discussion is raised by the development of new media technologies as well as new patterns of internet use inclining towards social interaction in networks and sharing of content among the younger generations. Recently this has been a subject to several empirical studies.

A quantitative study [1] among young Danes indicate that students are using digital media widely for a variety of learning and social purposes. Further the study concludes that the most common use of digital media is social: More than 70% of the sampled population use digital media to send text messages and visit social networking sites, and students in secondary or higher education visit social networking sites more frequently than non-students. Students in higher education furthermore constitute the most active producers of digital content, i.e. blog posts and videos. Another innovation is mobile technology, which within a short period of time has been widely distributed among the younger generations and gives great potentials to access learning materials everywhere and anytime. The development of new digital media, especially the services built on social software [2], and the patterns of use seen in the younger generations raise new questions in educational research. Within the theoretical framework this paper responds to this need of new research by pointing out new learning potentials and implications in using open-ended learning resources.

In doing so the paper introduces key concepts from sociocultural learning theory from which a set of guidelines for digital learning resources are inferred. It then proceeds to present and finally discuss two different cases of open-ended learning resources that both aim to support and enhance sociocultural learning among university students. The first of these cases, the Study Metro, is primarily a traditional consultative website and serves as an example of how the open-endedness of this type of learning resource may be strengthened. The other case, Pages, is a social media site that was created on the basis of ideas about open-ended learning resources. The difference of the cases serves to illustrate different ways to work with open-ended learning resources as well as to raise a broader range of questions that challenge the concept of open-ended learning resources. Furthermore the Study Metro can serve as an model of how to “open up” a traditional website, while Pages can be inspirational for developing new and innovative digital learning resources.

2 THEORETICAL FRAMEWORK
In the following we will present the concept of learning that will be related to the two cases. Our learning concept takes learning to be a sociocultural and reflective practice. Further we will discuss how this type of learning can be supported by digital media and especially by using open-ended

1 We assume that young people in Denmark are not all that different from young generations in other countries when it comes to using digital media, and therefore briefly present some of the findings of the study.
learning resources. Lastly in this section we will put forth a definition of open-ended learning resources.

2.1 Sociocultural learning

From a sociocultural theoretical perspective learning processes are embedded in social and cultural practices and cannot be managed but unfold as individuals in social communities engage in activities with the object of completing a task or solving a problem. According to John Dewey learning takes place through experience on the basis of goal-directed actions [3]. The learner plans and carries out activities directed at an object or goal in order to gain experiences that entail learning if and when “the change made by action is reflected back into a change made in us” [3: 139]. In a sociocultural theoretical framework actions are understood as social, which implies that the social or sociocultural contexts are seen as fundamental to learning, according to Roger Säljö [4].

Christian Dalsgaard, whom we will refer to in the following part about open-ended learning resources, argues that digital media may be especially well-suited to support individuals’ active learning processes, as they may hold content that is both open to multiple purposes and usages and are inherently social, evolving around social interaction and user involvement [5, 2].

2.2 Sociocultural learning and new digital media

The sociocultural perspective serves as a point of departure for Dalsgaard’s [6, 7] reflections on the learning potentials of new digital media. He argues that Web 2.0 services can facilitate sociocultural learning in formal learning settings by lending themselves to students’ problem solving. Web services for social interaction and cooperation may be used by students to solve problems or carry out goal-directed tasks. Presuming with Dewey and Säljö that human learning processes take place within sociocultural practices, Dalsgaard points out that learning processes can never be fully controlled but unfold as individuals perform self-regulated activities.

The usefulness of a given digital service or learning resource is determined by the activities in which the students engage, and, therefore raises the questions: Is the resource useful in relation to solving the problems at hand, either in itself or combined with other digital or analogous tools? From a sociocultural point of view, digital learning resources should not present predefined learning processes or specific didactic objectives, but serve as tools for solving problems and tasks, that can be given out by the teacher or initiated by the students themselves. Dalsgaard [6] names resources that are open for use of any kind as open-ended learning resources.

Dalsgaard puts forward a set of guidelines for open-ended learning resources rooted in sociocultural theories of learning, which we will present in the following section.

2.3 Open-ended learning resources

In this paper open-ended learning resources are seen as open to multiple purposes in terms of usage. This also implies that they are not aimed at specific didactic objectives. Open-ended learning resources should moreover support the social aspect of learning, for instance by making the individual learners’ activities visible, so that they can be helpful and inspirational to others [7]. Furthermore an open-ended learning resource takes into consideration that the learning processes are determined by the students who themselves chooses what resources to use and how to use them in order to reach their learning objectives. Open-ended learning resources do not necessarily unfold as single systems that the students are using. Instead the students are given control to choose which activities and which tools they want to use to complete a task. Thus the learning goals can be defined by the teacher, while the students determine the learning processes. In doing so, the students may combine different tools and learn from other students. Learning from other students is more likely to happen if students as well as their work are visible to each other, e.g. in weblogs or on online social networks.

Another important aspect of open-ended learning resources is that the learning materials they contain can be used in different contexts. To attain this, it should be able to integrate the materials with other services, so they can be available in context outside of the universities, as Dalsgaard points out in the following quote:

“In order to make resources available in new contexts outside institutional borders, institutions must first of all develop resources in ways that allow them to be part of other services, communities and networks on the web. The resources should allow for embedding on websites outside the institution, meaning that the resources can be made visible on personal sites and in social networks” [7: 31].

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Considering the recent popularity and dissemination of mobile technologies, especially among the younger generations, we find it appropriate to add that open-ended learning resources should be accessible from a variety of technological platforms.

To sum up, open-ended learning resources are defined by the following characteristics:

- serve as tools for solving problems and tasks
- open to multiple purposes in terms of usage
- learning processes are determined by students/users and thus not predefined
- not aimed at specific didactic objectives
- support the social aspect of learning
- possible to integrate with different services and fora
- accessible from different technological platforms.

3 TWO CASES OF DIGITAL LEARNING RESOURCES

Above we identified a set of guidelines for open-ended learning resources rooted in sociocultural theory of learning. On this background we now proceed to presenting two cases of digital learning resources – the Study Metro and Pages – which we will relate to the guidelines for open-ended learning resources.

The Study Metro is a website about academic skills, and Pages is a social media. The resources are unlike in several ways. Firstly, the Study Metro has existed since the year 2002, while Pages was launched in 2012. Secondly, the Study Metro is primarily a traditional consultative website, offering and presenting an edited content consisting of texts and exercises, while Pages is a web 2.0 site structuring user-generated content.3

Both resources are developed and maintained at the Faculty of Arts’ Centre for Teaching Development and Digital Media, Aarhus University, Denmark.3

The presentation of the two cases leads to a further exploration and development of the concept of open-ended learning resources.

3.1 Case 1: The Study Metro

The Study Metro (http://studiemetro.au.dk) is a website about academic skills extending into the social networking site Facebook and the video sharing service YouTube. A Danish version of the Study Metro website was launched in 2002, and an English version for international students at Aarhus University was created in 2008.

Academic skills were chosen as the focal point for the Study Metro as teaching of academic skills is in Danish universities mainly located outside of the courses, creating a need for accessible learning materials on the subject. The Study Metro was developed to meet this need and contains material about academic writing, presenting, group work, feedback, finding and documenting sources as well as more general academic skills.

The resources included in the Study Metro are presented on the website’s front page as located on a metro map – thus the website’s name – illustrating what may be singled out as the key academic skills and how these skills may be seen as interconnected [8, 9]. The metro map is shown in Fig 1.

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2 In this case users refers to both teachers and students.
3 The authors of this paper are involved in this work as well as their colleagues Tine Wirenfeldt Jensen, Gry Sandholm Jensen, Christian Dalsgaard, Christian Winther Bech, Janus Holst Aaen and Hans Klysner.
How and to what extent the Study Metro is an open-ended learning resource is summarized in table 1 and is further explained in the following paragraphs.

Table 1: The Study Metro related to characteristics of open-ended learning resources

<table>
<thead>
<tr>
<th>Open-ended learning resources are defined by the following characteristics</th>
<th>The Study Metro is an open-ended learning resource in the sense that</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serve as tools for solving problems and tasks</td>
<td>Exercises, guides, handouts and other resources may be used to solve problems and carry out tasks related to one’s studies, i.e. academic writing, oral presentations, exams, group work or documentation of sources.</td>
</tr>
<tr>
<td>Open to multiple purposes in terms of usage</td>
<td>The Study Metro may be used freely by anyone, and its content may be relevant in many different contexts where academic skills are involved.</td>
</tr>
<tr>
<td>Learning processes are determined by students/users and thus not predefined</td>
<td>The content in the Study Metro are organised as stations or stops on a metro map. The user may visit any and as many stops as he likes and create his own path between stops.</td>
</tr>
<tr>
<td>Not aimed at specific didactic objectives</td>
<td>The website as such does not have one overall didactic purpose linked to e.g. a course. However, the site does rely on didactic insights related to academic skills.</td>
</tr>
<tr>
<td>Support the social aspect of learning</td>
<td>The social aspect of learning is supported by the possibility of easily sharing the content by e-mail, on other websites or blogs or on social networking services. On the Study Metro’s own page on Facebook, the social aspect of learning becomes central.</td>
</tr>
<tr>
<td>Possible to integrate with different services and fora</td>
<td>The content may be integrated with different services and fora through various possibilities of sharing it by e-mail, on other websites or blogs or on social networking services.</td>
</tr>
<tr>
<td>Accessible from different technological platforms</td>
<td>To an extent the content is accessible from different technological platforms. The Study Metro’s page on a social networking service is highly accessible from web and mobile platforms as is the content located on a video sharing service. The Study Metro website itself is widely accessible, but is optimized for larger screens, e.g. on laptop or desktop computers.</td>
</tr>
</tbody>
</table>
The Study Metro aims to support and enhance students’ learning by offering exercises, guides, handouts and other resources by means of which students may develop and enhance their academic skills. Underlying the website is the assumption that good practices regarding writing processes and working methods is a prerequisite for successful academic outcome, and that such practices are best learned through practical exercises and reflections on the outcome of such exercises. The Study Metro supports students in this process. For instance, students may practise a specific writing technique or building a solid academic argument by using the Study Metro’s interactive exercises designed for these purposes [9]. The presentations of these specific techniques or methods are based on didactic insights, and the implication of this will be discussed in a later section of this paper.

Fig. 2 depicts one of the website’s interactive exercises, an exercise in the free writing technique.

The content on the Study Metro may freely be cited and linked to from other websites and resources. To encourage the free usage of the site further, all pages on the Study Metro website can easily be printed, e-mailed and shared on Facebook and Twitter.

The logo of Facebook (which is currently by far the most popular social network in Denmark – see [10]) is placed on all pages and links to a page on this network created and edited by the Study Metro. Facebook users may freely join this page to share, receive, comment and discuss writing and study tips and study related themes of relevance to international students at Aarhus University. The page aims to reach out to international students by being present on a social networking service where many international students spend considerable time keeping in touch with family and friends at home as well as networking with new friends and classmates at their host university. A secondary purpose of the page is to create more direct two way communication between the Study Metro’s editors and its users.

Some of the content on the Study Metro website is audiovisual. This material is located on the popular video sharing service YouTube from where it is embedded into the website. The videos can thus be accessed from via the Study Metro or directly from the website’s channel on YouTube. On YouTube it can also be commented, shared on other sites or blogs etc.

To sum up, both the Facebook page and the YouTube channel constitute independent entry points to content and activities initiated by the Study Metro, and both invite users to engage with the material in various ways. By extending into these social services the Study Metro is open in the sense that its content and activities are not contained under a unifying URL (Uniform Resource Locator).
3.2 Case 2: Pages

Pages (http://pages-tdm.au.dk) can best be described as a social media, combining elements from blogs, fora and social networking sites. The idea behind the site is to open up for integration with the many different communication and collaboration tools on the internet and to make the students’ work visible to other students and the outside world. Further the site aims to be a supplement to traditional Learning Management Systems, which it can be differentiated from, in that it crosses the borders of the university in making the user generated content visible to the outside world and by establishing a non-hierarchical structure where students and teachers have the same possibilities and rights to communicate and create content. So far the site has been used in 17 university courses at the Faculty of Arts, Aarhus University. It is being used as the main communication platform in the graduate courses of IT Didactic Design, which are to a large extent based on distance teaching and taught by staff at the Centre for Teaching Development and Digital Media.

How Pages is an open learning resource is summarized in table 1 and further explained in the following paragraphs.

Table 1: Pages related to characteristics of open-ended learning resources

<table>
<thead>
<tr>
<th>Open-ended learning resources are defined by the following characteristics</th>
<th>Pages is an open-ended learning resource in the sense that</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serve as tools for solving problems and tasks</td>
<td>In pages the students can create blogs and groups, make/use social networks and access work of other students. They can also work with relevant external content and services within the system.</td>
</tr>
<tr>
<td>Open to multiple purposes in terms of usage</td>
<td>Everybody can use Pages, and the content created by users is visible and can freely be distributed on the internet.</td>
</tr>
<tr>
<td>Learning processes are determined by students/users and thus not predefined</td>
<td>Pages holds no restrictions on what the blogs and groups is used for and who creates them. Furthermore the content can be distributed to other platforms, the content is – by default – accessible to everybody, and the user can pull relevant content and services in and work with it/them inside the system.</td>
</tr>
<tr>
<td>Not aimed at specific didactic objectives</td>
<td>The site is an open platform and may be used by students and teachers according to their wishes and preferences.</td>
</tr>
<tr>
<td>Support the social aspect of learning</td>
<td>The social aspect of learning is supported by making the students and their work visible to each other and the outside world.</td>
</tr>
<tr>
<td>Possible to integrate with different services and fora</td>
<td>The content is open for sharing and syndication on other websites, blogging systems and social networking sites.</td>
</tr>
<tr>
<td>Accessible from different technological platforms</td>
<td>Wordpress, which is the backbone in Pages, is accessible from different technological platforms.</td>
</tr>
</tbody>
</table>
As mentioned Pages can be conceived of as a social media and it combines social networkssites, communication fora and blogging systems in one system (see Fig. 3). Our definition of social networks is similar to danah Boyd & Nicole Ellison’s [11] understanding of social network sites: Sites where the users may create and interact in networks, create public and semi-public profiles, share content, show a list of other users that they have some kind of network connection to within the system. Further social network sites often show a stream of activities from the user and his network in what is often called an “activity stream”. In Pages all of these features are present. The students can engage in and create “groups” (as known from Facebook and other social media sites – see Fig. 4), in which they can communicate in different social communities (for example courses or study groups). The groups in Pages are open in the default settings, so that everybody can be a member, while it is also possible to create closed or hidden groups.

Fig. 4. Example of a Pages group

Further all users may create blogs. In our understanding blogs (or weblogs) are websites, which are regularly updated with dated posts. The posts are visible in inverse chronological order with the latest post in the top of the site. Blogs typically consists of personal observations, but are also often used for other genres of writing as well – for example academic writing [12]. Blogs hold potentials as a tool for teaching because they can function as knowledge banks. Furthermore the systems of dating and tagging, often connected to blogging systems, make it easy for casual users to locate relevant and useful information.

Pages is open and non-hierarchical in the sense that all users have the same rights and possibilities. All users can create their own blogs and groups. This non-hierarchical structure makes it possible to make relations and thus break the traditional structures such as the course unit. Pages is created with Wordress, an open source system, and there are no economical drivers behind. In that way everybody may use and develop the concept.

As pointed out in Table 1, Pages can support the sociocultural practice of solving problems and tasks. It allows students to create blogs and groups for the purposes they like as well as for different kinds of peer work defined by their teacher. Furthermore the site is open for integration with other services – for example, Diigo has been used for sharing of bookmarks and references – and they can use content from different sites and services in the systems.4

4 A common use among the students is embedding video from YouTube in their posts in the Groups and Blogs.
Pages is open to multiple purposes in terms of usage. There are no restrictions on who can use the system, and one does not have to study at Aarhus University – or any other university for that matter – to use Pages. In that way everybody can use Pages as a knowledge resource and even contribute with insights from other fields than academia. Furthermore the content may freely be distributed on the internet. One way to do this is via RSS (Rich Site Summary) feeds, and another way is to use the possibilities for syndicating and sharing the content on popular social network sites.

The learning processes are determined by users and thus not predefined. The tasks on the other hand can be given out by a teacher of a given course or be initiated by the students. To support student initiated activities, Pages holds no restrictions on what the blogs and groups is used for and who creates them. As pointed out above, anyone can join Pages and use the system and the content for the purposes they like. So far we have seen one example where a student uses a Pages blog to keep a log for his Master's thesis. This type of use is possible because Pages not aims for a specific didactic purpose, but can be used as a tool that can support different didactic purposes.

The social aspect of learning is supported by making the students and their work visible to each other and the outside world. In that way the work of the students can be beneficial in any given context on the internet and thus contribute to the massive knowledge resource that the internet is. Furthermore Wordpress can be accessed from different technological platforms, and with – for example Apple and Android apps the students can write blog posts and access the groups from their smartphones and tablets.

4 EXPLORING THE CONCEPT OF OPEN-ENDED LEARNING RESOURCES THROUGH THE INTRODUCED CASES

In the sections above we have related the Study Metro and Pages to the concept of open-ended learning resources. However, both sites include aspects that oppose the ideas behind open-ended learning resources. In the following we point out and discuss how these aspects can challenge and potentially expand the concept of open-ended learning resources.

4.1 When is a digital learning resource open-ended?

Is the Study Metro truly an open-ended learning resource, or is it only partly so? Defining open-ended learning resources, Dalsgaard states that "development of learning resources should not as a starting point structure content of a certain subject matter. Instead, the starting point should be the activities that students use the resources to carry out" [6: vi].

As formerly mentioned, the Study Metro was created in 2002, which is at this moment ten years ago. Some of its content dates ten years back, while other content is quite new, and the site has undergone major design changes during its existence. The core structure of the site has, however, remained stable: a metro map with four lines. The content is ordered within this structure, and in that sense the Study Metro does take a certain subject matter as its starting point – contrary to Dalsgaard’s recommendation in the quote above. At the same time, interactive exercises such as the free writing exercise have been a cornerstone of the site from the beginning, and these exercises may be used by students to carry out activities, to use the wording in Dalsgaard’s quote.

As formerly mentioned, open-ended learning resources should not be directed at specific didactic goals. The Study Metro does not have one overall didactic purpose linked to e.g. a course. However, the site does rely on didactic insights related to building academic skills.

Therefore, due to its structure and its partly didactic points of departure, the Study Metro is not entirely an open-ended learning resource. However, as shown in the presentation of the case of the Study Metro, it has a number of features pertaining to open-ended learning resources, and recent developments, which include content in social networking and sharing sites, serve towards underpinning the Study Metro’s status as an open-ended learning resource. The case of the Study Metro indicates that the open-endedness of a digital learning resource is as a matter of trait or quality rather than a constitutive factor. A website may have traits that denote an open-ended learning resource without really being an open-ended learning resource.

Pages was conceived as an open-ended learning resource from the very beginning. The site was in fact created as an experiment to demonstrate and test how open-ended learning resources may function. However, a consequence of the site’s openness to multiple uses is that it is fully possible for users to use it contrary to the developers’ intention and work against the very openness of the site.
For instance, a teacher who has formed a group for a class of students in Pages experienced that hierarchical structures from the classroom also shaped the communication pattern of the online group, as the teacher tended to be the one to initiate discussions and answer questions. It seems that habits and expectations from the offline communication between the teacher and his students affect communication and undermine the non-hierarchical ideal behind Pages.

In the same way it is indeed possible to add didactical purposes to the use of Pages, even though Pages as an open-ended learning resource was intended not to support predefined didactical purposes. When students are encouraged to write and comment on blog posts in Pages by their teachers in courses about social media and digital communication, the teachers are using the site to a didactic end. In this case, the students are using Pages to practise (and maybe also reflect upon their practice of) what they are being taught.

We have included these two examples of intention-contrary use of Pages to demonstrate that Pages is an open-ended learning resource, but that its use can be in line with or contrary to sociocultural learning theory which is the basis of open-ended learning resources. In all cases we will like to stress, that the actual use to which a website is put must be taken into consideration when one wants to determine the open-endedness of digital learning resource.

4.2 Who is learning?

In his presentation of the concept of open-ended resources, Dalsgaard focuses on how these resources may contribute to students’ learning, and this has also been the perspective taken in this paper. However, open-ended resources may contribute to web developers’, web editors’, researchers’, teachers’ and other non-students’ learning as well.

Digital learning resources yield an output, namely quantitative data about the students’ use of the resources, which may be analyzed and used for various purposes. For example, data about students’ use of the Study Metro gives insight into which specific academic skills the users search for information about, how they navigate on the website, and how long they spend on looking at specific pages. It is natural that this knowledge should be used in the ongoing development of the website in question. Moreover, knowledge of students’ needs for support in building academic skills may be of use to researchers, teachers, educational developers, administrative staff and others. As to Pages, data about the use of the site is also used as way to gain knowledge of the way that the students engage in new internet technologies. Furthermore Pages is used to explore sociocultural learning theory from a practical perspective; what happens when the theory is applied and its concepts and ideas put to practical use as in the case of Pages?

Lastly it is also worth to notice that content Pages via its tags can be accessed from other Wordpress sites. This is due to the fact that the site is built upon Wordpress and thereby uses the same system of tags as the blogging tool. By being accessible from other Wordpress sites, Pages contributes to the larger, open-ended learning resource that is Wordpress, whereby all Wordpress users may potentially learn and benefit from the content of Pages.

5 CONCLUSION

In this paper we have explored the concept of open-ended learning resources and pointed to how it is rooted in sociocultural theory on learning. We then presented two cases of digital learning resources – the Study Metro and Pages – pointing out how they relate to the concept of open-ended learning resources. The Study Metro can be conceived of as a model for how a traditional website may be opened up for multiple uses, while Pages represents an intention of creating a truly and completely open-ended learning resource as well as a way to test the sociocultural learning theory in practice.

Finally we have discussed some issues raised by the two cases that challenge and develop the concept of open-ended resources. This has led us to conclude that the open-endedness of a digital learning resource is a matter of trait rather than a constitutive factor, as exemplified by the Study Metro, and that the actual use to which a website is put must be taken into consideration when one wants to determine the open-endedness of digital learning resource. In addition, we established that not only students’ learning is supported and enhanced by open-ended learning resources. The resource may also contribute to the knowledge of web developers, web editors, teachers and other non-students.
REFERENCES


