

## The Perfect e-Storm: Repurposing Generative Learning Objects

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**Abstract:** Learning objects are often distributed in a static form that is unsuitable for modified reuse, and though certain Learning Management Systems such as LAMS do allow for repurposing, the authoring, adaptation and end user accessibility are all tied to the LAMS platform. The traditional model for reuse, furthermore, has been to focus on content at the expense of pedagogical design. With the generative learning objects (GLOs) authoring tool GLO-Maker, the primary focus of reuse is not the specific learning object itself but rather the pedagogical design that underpins the object. GLO-Maker, furthermore, makes these designs accessible to teachers and tutors for adaptation and saves them in packages that can be played from any location into which this package is moved – for example a computer desktop, a web server, a learning management system or an Android mobile phone. Building a repository of repurposable GLOs opens up a wide array of collaboration opportunities for teachers and tutors worldwide, not least in the Majority World. Examples are given on the creation and repurposing of GLO's on the use of historical method in Biblical exegesis as support for Scandinavian undergraduate and graduate education at the Fjellhaug International University College in Norway and Denmark and their reuse in a Majority World context.

**Keywords:** Learning objects; ontology; repurposing; repository; granularization; standardization; interoperability; captology; persuasive design; collaborative teaching; GLO-Maker; PLOT-Maker.

### Introduction

The purpose of this paper is to review the lessons learned in the production of first generation learning objects, and to point to a number of incentives for sharing and repurposing learning objects for majority world use.

In 2004 Curtis Bonk predicted that when the four fronts of emerging technology, escalating learner demand, enhanced pedagogy, and erased budgets converge, they would create the perfect e-Storm and swipe away many instructors, students, colleges, and universities entrenched in dated educational practices. “Others,” according to Bonk, “will be out ahead of the storm and lead the way towards revolutionary learning environments that simultaneously take advantage of the emerging technologies and innovative pedagogies.” And for those in the latter group, Bonk continues, “a cloudburst of opportunities for teaching online should appear. And when instructors begin designing online courses that better integrate emerging learning technologies with engaging pedagogy, innovative ideas will be flooding higher education” (Bonk 2004, 16). Ten years later it is clear that Bonk was absolutely right about the flooding but also that the materialized “cloudburst of opportunities” has created an untransparent, unnavigable and passivating ocean of learning technology to the effect that the anticipated rate of integration of computer supported learning has failed to materialize. Repositories are under-utilized, million dollar projects languish and die out when funding expires, and even the most accessible resources have failed to be widely adopted by the educational community and as a result have also failed to fulfill their considerable educational potential (Gunn, Woodgate, and O’Grady 2005, 189–190; Campbell 2003, 35; Koppi, Bogle, and Lavitt 2004, 449; Boyle 2009, 3).

A number of factors have contributed to this deadlock, and the identification of these factors is an important step in the efforts to take the first generation of computer assisted learning technologies to a new level and, importantly, to assist educators in choosing the best tools and repositories on the market.

## Definitions

Before we proceed to describe these factors, it is necessary to define the key terms “learning object” and “repurposing.” The term “learning object” was coined by Wayne Hodgins in 1994 when he named the CedMA working group “Learning Architectures, APIs and Learning Objects.” Hodgins defined a learning object as “a collection of content items, practice items, and assessment items that are combined based on a single learning objective.” In 2002 The Institute of Electrical and Electronics Engineers (IEEE) defined a learning object as “any entity, digital or non-digital, that may be used for learning, education or training” (Learning Technology Standards Committee 2002). Whereas the IEEE definition both includes digital and non-digital objects, the definition by David Wiley exclusively focuses on digital and reusable resources: “...a Learning Object... [is] any digital resource that can be reused to support learning” (Wiley 2002). In the following we will primarily focus on digital learning objects.

Another important term is “repurposing,” which must be clearly distinguished from “reuse.” Feldsteins description is useful: “By reuse we refer to using the activity or resource again in another context but with the same content, while repurposing refers to modifying the content or learning design” (Feldstein 2006). Repurposing, Feldstein continues, “can further be divided into (i) repurposing for reasons of localisation – e.g. translation to a different language, or minor changes to account for cultural differences, and (ii) repurposing to incorporate substantively new content – e.g. taking an activity used in an anthropology course, and adapting it for use in a language course” (Feldstein 2006). To this may be added a third subcategory for repurposing that satisfies different learning goals with or without incorporating the same content.

## Explanations and Implications

The literature is full of explanations for why integration of computer supported learning has failed to materialize. Among the factors mentioned is lack of quality control and ownership (Kortemeyer 2013), lack of targeted professional development for teachers, weak institutional and technical support for repurposing and local adaptation, etc. It is impossible within the frame of this paper to review all potential baddies, and we shall only focus, therefore, on some of the most important.

## Pedagogical Framework

One of the most important lessons learnt from the trial-and-error process of first generation computer assisted learning technologies is that a one-sided focus on the content of learning objects blinds both the producer and reuser of learning objects to the pedagogical considerations necessary for selecting and organizing the content. Since the content of a learning object always reflect an underlying pedagogical model, reuse of complete learning objects will necessarily – but often unconsciously – inherit the pedagogy to the effect that neither remediation by new learning technology nor changed learning goals and objectives are taken into consideration. If the context and medium is the same, reuse of complete learning objects with a fixed combination of structure, content and technical elements may very well facilitate the desired learning process, but as the context almost always changes, such a reuse will remain ignorant of critical issues of deep, conceptual understanding, ownership and wider

issues of cultural assimilation. And “these issues alone,” Gunn, Woodgate, and O’Grady argues, “can determine the success or failure of educational innovations, regardless of technical robustness, accessibility and quality of content (Gunn, Woodgate, og O’Grady 2005, 191). For the same reason Michael Feldman suggests that we abandon the term ‘learning object’ altogether: “I believe the term ‘learning object’ has become harmful. It hides the same old, bad lecture model behind a sexy buzz phrase. If we’re really serious about stimulating learning, then we should think in terms of something like a cognitive catalyst. Rather than just serving up digital content and assuming the students will absorb it, we should be creating artifacts that function like enzymes for the intellectual digestive system” (Feldstein 2006). Neil Butcher has the same complaint when he mourns, that “[a]t the moment we are primarily harnessing the innovation of OER [Open Educational Resources] predominantly to reproduce content-heavy, top-down models of education that were developed hundreds of years ago to meet the needs of societies in the aftermath of the industrial revolution, models in which the student is still primarily a passive ‘consumer’ of educational content whose main task is to complete standardized assessment tasks in order to receive accreditation” (Butcher 2013). Pedagogically mindless reuse of learning objects must, in other words, be replaced by a conscious repurposing of the content in which the repurposer lets the learning goals and objectives guide the selection of structure, content and technical elements and thus takes ownership for the teaching strategy underlying the learning object(s). “Pedagogy,” Tom Boyle argues, “is about the design of contexts to enable learners to achieve learning goals and objectives. From this perspective learning objects are of little pedagogical interest ... The design of these contexts involves pedagogical choices in the selection and organization of activity and content to facilitate the learning process” (Boyle 2006). In a European context such a pedagogical reorientation has become even more urgent after the implementation of the Bologna reform. Peter Baumgartner notices that “As a consequence of the Bologna reform, a shift from input orientation towards output orientation can be noticed in Higher Education. This has implications on the design of learning: It is not primarily the student who needs to be in the focus of learning design. Learning design needs to develop a better focus on real learning outcomes, when practical achievements and student engagement should be assured. This has implications on the design of the curriculum, educational programme and/or assessments” (Baumgartner 2012). Instead of deploying learning objects as “content chunks” or “information containers,” learning theorists push for more contextualized, real-world, authentic instruction, instructional strategies such as case-based scenarios or problem-based learning. Says Wiley: “When learning is understood in the context of problem solving, learning objects and other resources change from info-capsules that transfer inert knowledge from expert to novice, into semiotic tools that mediate and shape the learners actions” (Wiley 2003, 2–3).

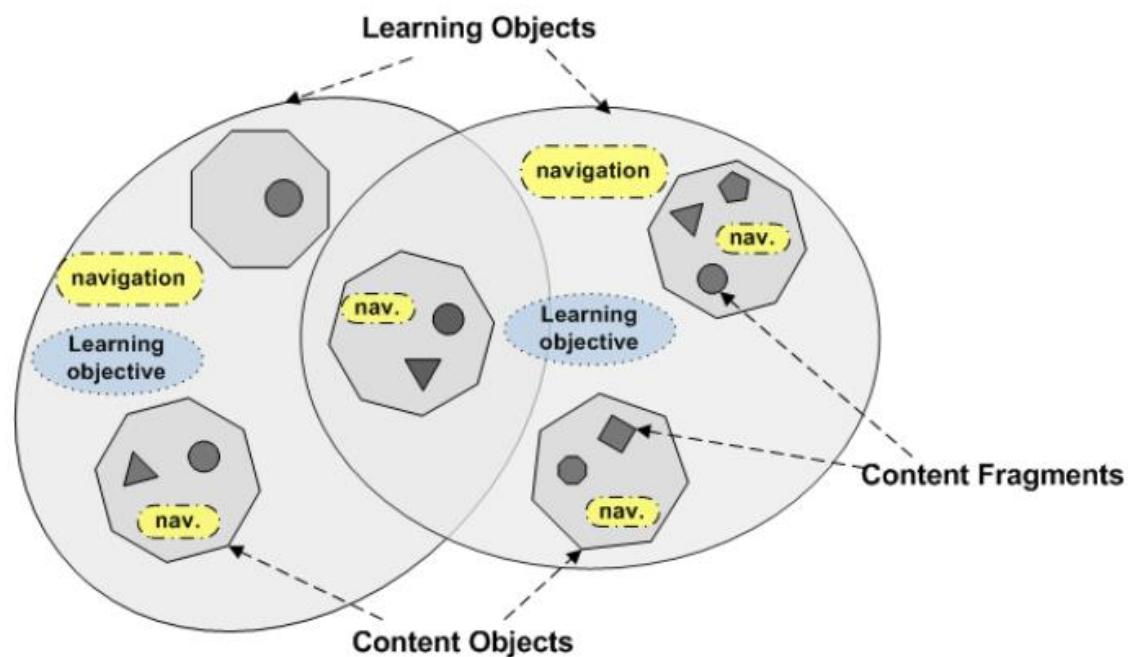
### **Granularization, Standardization, Interoperability and Discoverability**

In order for such a repurposing to take place, the *repurposer* not only needs to design the context that facilitates the learning process, but also a repository of high-granularity learning objects that may be located, retrieved, combined and incorporated into higher order learning designs *according* to the design. Complex learning objects with a fixed combination of structure, content and technical elements must be broken down into separate units that may be configured differently to serve new contexts. Granularization is crucial, not only for pedagogically based repurposing but also for the learning object economy. Says Charles Duncan:

Reuse is necessary to gain economic benefits from educational technology. Economic issues cannot be ignored. It may be possible for a single, well-funded project to produce superb, interactive, absorbing online learning material but the widespread use of such high-quality resources cannot depend on project funding. It must depend on a form of ‘learning object economy’ in which trading (sharing) occurs so that each contributor has access to a much larger pool of resources than

they can use and reuse. The effort and cost of production is then balanced by the benefits to a large number of implementers (Duncan 2003, 12).

This is precisely why the scholars behind the ALOCoM ontology developed an Abstract Learning Object Content Model (ALoCoM) in which final presentation learning objects may be decomposed into *Content Fragments*, *Content Objects*, and *Learning Objects* (Verbert, Jovanović, og Duval 2005; Verbert og Duval 2008, 53–55). Content Fragments are learning content in their most basic form (e.g., text, graphic, animation, audio, video). Content Objects aggregate Content Fragments and add navigation in order to structure the Content Fragments within the Content Objects. Learning Objects aggregate Content Objects around a learning objective.<sup>1</sup>



**Figure 1 The Abstract Learning Objects Content Model**

Though the ALOCoM framework not only supports the disaggregation of Learning Objects into their components but also an automatized aggregation of these components through a Microsoft PowerPoint add-in that allows searching for components in a learning objects repository from within the Microsoft PowerPoint application, this platform-specific feature is of less interest than the ontology itself, since the ontology is an important tool for decomposing *any* learning object and storing it in a repository. “The vast majority of existing digital educational resources cannot be reused in current learning objects systems supposedly designed specifically to support reusability,” David Wiley remarks, since platforms require designers to reformat all existing content before it can be “reused” in

<sup>1</sup> The ALOCoM ontology is not very different from the ontology used by the CANDLE project which distinguishes between a *C-course* consisting of *C-modules* containing *C-atoms* and *C-particles*. The difference between the *C-atom* and a *C-particle* is that an *atom* (similar to the *navigation* of the ALOCoM ontology’s *Content Object*), is described by metadata, whereas a *particle* (similar to the ALOCoM ontology’s *Content Particle*) is not (Wetterling og Collis 2003).

a given learning objects system (Wiley 2003, 4). Extremely low granularity, however, creates another problem described by David Wiley as “the reusability paradox”:

By designing “pre-deconstructed” instructional media, it is believed, greater development efficiency can be achieved as educators bypass the step of personally deconstructing media. However, Wiley, Recker, and Gibbons (2001) have argued that extremely decontextualized media are actually more costly and difficult to utilize in instructional development because of (a) difficulties in indexing extremely decontextualized media for human discovery and use, and (b) computers’ inability to make meaning, and therefore combine primitive media into instructionally meaningful units... Surprisingly, while the most decontextualized learning objects are reusable in the greatest number of learning contexts, they are also the most expensive and difficult for instructional designers to reuse.

Though the ALOCoM Framework is a useful tool for disaggregation of learning objects, Wiley reminds us, content fragments can be so decontextualised, that they simply are too time-consuming to repurpose. Another *caveat* is mentioned by Tom Boyle who acknowledges the ALOCoM approach as “quite a sophisticated approach to adapted reuse,” but also criticizes it for neglecting “the idea of pedagogical patterns and structures as providing the generative base for adaptive reuse.” It is the pedagogical pattern that potentially provides more opportunities for reuse than the content of learning objects themselves, and it would therefore be more useful, Boyle argues, if pedagogical commentaries accompanied learning objects, providing a contextualized rationale for the design of the resource, especially where learning outcomes expected from the use of a learning object are complex (Boyle 2006, 6; Philip og Cameron 2008, 454).

Standardization and classification systems are crucial in order for repurposers to retrieve resources that fit their own needs and to share their own resources with other repurposers. The process of defining metadata, however, is notoriously problematic. Allison Littlejohn remarks: “[I]t is time-consuming for resource authors to carry out and there are problems in describing large resources with metadata. While teachers and students, as users, need not be aware of these metadata issues they do need to understand how resources are classified and the taxonomic terms that are used. Given that each discipline has its own language and discourse structure, and that resources will be shared transnationally (ie across cultures) this is a major challenge for developers of digital repositories” (Littlejohn 2003, 5–6). Bill Olivier and Oleg Liber remarked a decade ago (Olivier og Liber 2003, 148) that though there were no agreement on learning technology standards and taxonomy (at the time of writing), *de facto* standards and taxonomies are often produced by the leading companies, agencies, organizations or services in a given market sector (e.g. the SCORM standard developed by the US Secretary of Defense and later globally adopted as a collection of standards and specifications for web-based e-learning). A decade later it is still in the open whether the ALOCoM ontology or one of the other available ontologies (see, e.g., Knight, Gašević, og Richards 2006; Wang, Fang, og Fan 2008; Andres Soto 2009; Ramadhania 2013) will prevail, and the same is true of standardization in other categories of learning object metadata. There are literally hundreds of ongoing projects in the learning technology sector, and so far it seems – to borrow a Biblical phrase – that every project does what is right in its own eyes. Apart from the already mentioned SCORM standard, the currently most promising *de facto* standardizations are probably the interrelated ARIADNE repository services for the management of learning objects in an open and scalable architecture ([www.ariadne-eu.org](http://www.ariadne-eu.org)), the IMS Global Learning Consortium’s IMS interoperability standards ([www.imsproject.org](http://www.imsproject.org)), the Learning Object Metadata (IEEE LOM) developed by the IEEE Learning Technology Standards Committee ([www.ieeeltsc.org](http://www.ieeeltsc.org)), and the Dublin Core Metadata Initiative ([www.dublincore.org](http://www.dublincore.org)), but only time will tell whether these efforts become globally accepted. Until this happens, however, the many competing or overlapping standards and taxonomies will continue to function as tributaries to the untransparent, unnavigable and passivating river of teaching strategies.

Related to the problem of standardization and interoperability is the issue of discoverability. “Many of the repositories, even inside of unified efforts like the Open Courseware Consortium, remain disconnected from each other,” Gerd Kortemeyer complains. “Even if repositories are nominally connected through federated search, as in the National Science Digital Library, this frequently means finding the least common denominator of the available metadata. The resulting search results are frequently no better than a search on the open web — regrettable, since these projects house excellent content resources” (Kortemeyer 2013).

## Captology

Another important lesson learnt over the latest decade is that the remediation of analogue educational resources in interactive digital learning technology has the potential of changing human behavior through persuasive design of interaction systems. B. J. Fogg was the first scholar to use the term ‘captology’ to describe the overlap between persuasion and computers, and in his seminal introduction to the concept of persuasive technology identified seven persuasive design principles (Fogg 2003). The main elements of persuasive technology as described by Behringer et al (Behringer et al. 2013, 4–5) are:

1. **Reduction** refers to the design strategy of simplifying what would otherwise be a complex process. For example, Amazon’s 1-click purchase which allows you to skip a lot of time consuming navigations are tedious form filling, in order to make an instant purchase.
2. **Tunneling** is a design strategy which places the user inside a process that has a pre-determined direction. E.g. most installation processes require that the user completes several steps before the installations process is completed.
3. **Tailoring** is the degree to which a site or a program presents relevant content to individual users or user groups. Navigational options, filtering mechanisms and labeling systems can all be adapted to reflect user demographics.
4. **Suggestion** is the persuasive design strategy of delivering a message at the opportune moment. E.g. when Amazon suggests extra books which are closely related to the one you were just about to buy.
5. **Self-monitoring** is the design strategy which allows you to monitor progress. E.g. sites which require a log-in and then enables the user to monitor the progress of weight loss.
6. **Surveillance** is closely related to self-monitoring; however the monitoring is not done by the user but by the system or the owners of the system. E.g. when using a weight loss website, users may be motivated not only by monitoring their own progress, but also by sharing experience and receiving feedback from other users who are struggling with similar issues. By sharing statistics, diet-plans etc. users feel more related to each other and may be inspired by actions taken by others.
7. **Conditioning** refers to the strategy of embedding emotional feedback into a design. It is often expressed as praise and rewards, but in a slightly more subtle manner than the case with Persuasive Social Actors. E.g. when forums reward users with increasingly lofty titles (or user rights) in correlation to the number of posts made by the user.

As mentioned above, it is the learning goals and objectives that should guide the selection of structure, content and technical elements in the configuration of a learning object, and when this teaching strategy is combined with the captological insights of persuasive design, the final learning object greatly enhances the possibility of changing the learner’s cognitive behavior and speeding up the learning process.

## Incentives for repurposing

### Collaborative Learning and Teaching

It almost goes without saying that the Modernist “Pontius Pilate” mentality of *Quod scripsi, scripsi* ‘What I have written, I have written (and I won’t change my mind or add anything)!’ in the crossfields of teaching and production of educational resources is over and has been replaced by a much more dynamic, collaborative, provisional and aspectual approach to teaching and learning. Winston Churchill’s phrase “to improve is to change; to be perfect is to change often” is an almost prophetic description of the development from handwritten or printed copies of a static manuscripts over printed or digital editions and revisions of the original manuscript to the dynamic, open and constantly evolving digital “books” of today. Several factors contribute to this development. At the deep level of epistemology postmodern hermeneutics has demonstrated that as readers or “knowers” we participate in the construction of meaning, and that knowledge at least to a certain extent is subjective and constructed. In the field of history it has long been a commonplace that our knowledge of the past is provisional and that the (re)construction of history is coloured by the historians subjective bias. Whereas analogue learning objects in the Modernistic period were considered ‘monuments’, digital learning objects are more like the Catalan architect Antoni Gaudi’s Sagrada Familia Church in Barcelona: an ongoing, never ending construction following a provisional and dynamic plan. As mediators of such a subjective, aspectual and provisional knowledge scholars need the academic guts, therefore, to publish their teaching resources in a way that invites both peers and students to participate in the dynamic process of supplementation, elaboration and revision of the resource. This is not easy in a field where qualification and promotion is based on peer-review of one-author publications, and the point is not to argue for a replacement of such one-author publications by dynamic, collaborative, and ever-changing texts, but that such *meritating* publications should be complemented by collaborative work; especially in the production of disaggregateable learning objects, since it results in considerably more comprehensive, dynamic and updateable learning resources. The requirement is, of course, that the creator and “owner” of a given, disaggregateable learning object, is willing to share his work with others, just as it requires other repurposers to be willing to use another scholar’s work.

Another factor is the specialization of knowledge in the academy. Hundred years ago it was possible for a scholar to read everything written on a given subject, and a professor was expected to possess an encyclopedic knowledge in his field. Today, the academic disciplines have been split into numerous sub-disciplines and scholars have become so specialised that they resemble autistic savants who can memorize the national train timetable, or give you more than 60,000 digits of Pi, but can’t tie their shoes.<sup>2</sup> In the field of history, it has become impossible to write a “total history” because it would require expertise of the historiographer in a series of academic disciplines that are cumulatively unmanageable. The constructive and forward-looking response to this fragmentation is not to strive for the encyclopedic knowledge of past scholars but, as the historian Alan Megill argues, to engage in collaborative that allows the individual scholar to see both the forest as well as the trees: “[F]ragmentation – also known as ‘specialization’ – is essential to the advance of research, and the fragments produced by that research may well enter into productive, hybrid interactions with other fields and with practical concerns. The problem, rather, is narrowness, and theory of historiography—especially if practiced as a rhetoric of inquiry carried out in ways both interrogative and analytical—can help practitioners to see beyond their specialties, opening their minds to broader issues and improving

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<sup>2</sup> According to <http://www.guinnessworldrecords.com> the record for memorising Pi was achieved by Chinese Chao Lu who recited Pi from memory to 67,890 places, at the Northwest A&F University, Shaanxi province, China, on 20 November 2005.

their work in the process” (Megill 1994, 57–58). Scholars are increasingly dependent on working together with other scholars who have the expertise in other sub-disciplines, and a natural corollary is that this is also true for the *mediation* of scholarship. More often than not, creating a learning object necessitates inclusion of content outside the individual scholar’s field of expertise. Access to a repository with relevant resources provides greater exposure to models of best practice and enable the mediator to repurpose learning objects or content fragments to facilitate the needed learning process in a way that wouldn’t have been possible without collaboratively minded colleagues. Frielick describes the key idea behind this approach to teaching and learning as “an ecosystemic process of transforming information into knowledge, in which teacher, subject and student relationships are embedded or situated in a context where complex interacting influences shape the quality of learning outcomes.” And this perspective, Frielick continues, “ventures into a new ecology of cognition and learning known as enactivism” (Frielick 2004, 328). Rejecting the Darwinian assumption “that mind is somehow contained within an individual, and learning can be reduced to quantified actions and behaviours such as keystrokes and ‘dwell time’ on a particular object,” Frielick suggest that we enter “the zone of confluence between the emergent ecological idea and networked information technologies” (Frielick 2004, 329). On the internet, Frielick continues, “we are encouraged to think of ourselves as fluid, emergent, decentralised, multiplicitous, flexible, and forever in process,” and “what we think of as an individual mind is but one part of a larger and interconnected web of mental processes” (Frielick 2004, 329). The most important implication, according to Frielick, is that

the teaching/learning setting (the classroom, the lecture theatre, the e-learning environment, the department, and even the institution itself) can be viewed as a system that is characterised by mental events. The dialogical processes of language and communication between teachers, students and the subject within these nested contexts can be seen as the pathways in which the processes of information exchange and transformation occur. Learning and the development of knowledge and understanding emerge from the complex interactions between the different parts as information travels around the physical and mental pathways that constitute the total ecology of mind or mental system (Frielick 2004, 330).

Whether or not we can conceive of a teaching/learning setting as such an ecosystem, Frielick is no doubt right, that digital teaching and learning is a collaborative enterprise of complex interactions. The learning object, consequently, must be designed to *reflect* such a setting and to facilitate an interactive and dialogical process.

### **Ecological Conscience**

A final incentive for repurposing learning objects is of a more *ethical* sort, namely the economic inequality between the so-called developed and wealthy minority and world and the undeveloped and poor majority world. According to the 2013 Multidimensional Poverty Index (MPI) published by the United Nations Development Programme (UNDP), about 1.7 billion people in the 109 countries covered by the MPI—a third of their population — live in multidimensional poverty — that is, with at least 33 percent of the 10 indicators reflecting acute deprivation in health, education and standard of living.<sup>3</sup> This exceeds the estimated 1.3 billion people in those countries who live on \$1.25 a day or

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<sup>3</sup> The Multidimensional Poverty Index (MPI) was developed in 2010 by Oxford Poverty & Human Development Initiative and the United Nations Development Programme and uses different factors to determine poverty beyond income-based lists. It replaced the previous Human Poverty Index. The MPI is an index of acute multidimensional poverty. It shows the number of people who are multidimensionally poor (suffering deprivations in 33.33% of weighted indicators) and the number of deprivations with which poor households typically contend. It reflects deprivations in very rudimentary services and core human functioning for people



less (United Nations Development Programme 2013). Of the 25 poorest countries in the MPI, 24 are located in Africa.

In the early 1990ies the consequences of this inequality in majority world higher education was a near collapse of African (especially sub-Saharan) university libraries to the effect that academic and research institutions were virtually getting cut off from current research and scholarly communication. The transfer of academic resources from traditional libraries to digital, internet-based platforms in the same period only worsened the situation, as many institutions in Africa had unstable or no access to the internet. A representative, sub-Saharan case is Madagascar. Between 1990 and 2008, Madagascar was completely isolated from the Internet because of total lack of competition and a connection of very poor quality. Positive developments in the internet and broadband sector have begun following the arrival of the first international submarine fiber optic cables, LION (the Lower Indian Ocean Network) and EASSy (the East African Submarine Cable System) on the island in 2009 and 2010. This ended the country's dependency on satellites for international connections, bringing down the cost of international bandwidth and making internet access more affordable to a wider part of the population. However, the reality on the ground is still grim. The prices have dropped, but in 2013 they are still exorbitant for the majority of the Malagasy. The average wages are approximately 100 to 200 dollars per month (in best of the cases) and an ADSL connection costs around 75 dollars per month. Being one of the sub-Saharan countries with the lowest score on the MPI, even state universities struggle with the costs of high-speed internet access. Add to this that when it comes to electricity, Africa remains the dark continent. There are a billion Africans, but they use only 4% of the world's electricity. Most of that is round the edges, in Egypt, the Maghreb and South Africa. The rest of Africa is unlit because either because electricity is unavailable or too expensive.

Several initiatives have been taken by minority world agencies, institutions, and organizations to increase the availability and thereby also the dissemination of scholarly research in Africa. The LIBLICENSE homepage (updated on March 7, 2013), e.g., lists 44 current developing nations initiatives.<sup>4</sup> One of the more significant examples is the 2008 JSTOR's African Access Initiative (<http://about.jstor.org/libraries/african-access-initiative>) in which JSTOR waives the standard participation fee for any non-profit African institution.

In addition to such efforts to make academic research available to majority world institutions, the production and sharing of repurposable learning objects is an important and less costly way to share the latest research, to expose majority world teachers/learners to best pedagogical practice, and to expose minority world teachers to majority world perspectives. Post-colonialism at its best, as it where!

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across 104 countries. Although deeply constrained by data limitations, MPI reveals a different pattern of poverty than income poverty, as it illuminates a different set of deprivations (Wikipedia 2013). A household is counted as "multidimensionally poor" if it is deprived of over 30 percent of the ten indicators used by the MPI."

<sup>4</sup> According to <http://liblicense.crl.edu> "the LIBLICENSE project has been hosted since November 2011 by the Center for Research Libraries. Founded in 1949, the Center for Research Libraries is a consortium of over 250 academic and independent research libraries in the U.S., Canada and Hong Kong. CRL supports advanced research and teaching in the humanities, sciences, and social sciences by preserving and making available to scholars primary source materials critical to those disciplines."

First, access to repositories of repurposable learning objects will have the potential of making it possible for majority world colleagues to become aware of the most recent and/or most important contributions within a field and thereby helping them to prioritize which text books to purchase on a tight personal or library budget.

Secondly, repurposable learning objects exemplify a pedagogical strategy with focus – not on the *input* – but on the *output* (i.e., the learning goals), and on learning as an ongoing and interactive process in which both learners and teachers are participants who share and reflect upon each other's knowledge and socio-cultural experiences. Instead of reducing the students to mere objects or empty bottles to be filled, repurposable learning objects have the potential of guiding teachers/learners to more dialogical methods of pedagogical practice where the teacher is the facilitator of the learner's own drive to self-development and inquiry. A view on teaching and learning, which is much more in line with insights from cognitive psychology and, importantly, with the way we act in an extreme complex reality where we must share our knowledge and work together to understand our situation and make meaningful, existential choices.

This is extremely important if a *post-colonial* exchange of learning objects between minority and majority world teachers shall take place. Paraphrasing Paulo Freire, Richard Shaull argues that “[t]here is no such thing as a neutral education process. Education either functions as an instrument which is used to facilitate the integration of generations into the logic of the present system and bring about conformity to it, or it becomes the 'practice of freedom', the means by which men and women deal critically with reality and discover how to participate in the transformation of their world” (Mayo 1999, 5).

Finally, *minority* world teachers/learners will benefit from being exposed to majority world production or repurposing of learning objects. Such learning objects will naturally reflect majority world perspectives otherwise unknown to majority world teachers/learners and thereby alert them to additional meanings and implications of a given subject.

## Implications

In the light of the lessons and incentives reviewed, a number of tools and platforms are immediately disqualified as tools for producing, sharing, and using repurposable learning objects.

First, expensive, licensed software is ruled out, not only because it would be economically impossible for *majority* world teachers and institutions to buy, but also because it would be too expensive for many potential *minority* world personal and institutional users. In other words, we are looking for open source or free software.

Secondly, we are looking for tools and repositories that assist the producer in letting the learning goals guide the selection of structure, content and technical elements in a persuasive design, in which the insights from captology can be implemented. Software based on top-down pedagogical models and unable to implement the principles of persuasive design is irrelevant. This makes it pedagogically challenging, e.g., to use the Multimedia Educational Resource for Learning and Online Teaching (MERLOT), since it contains material created on the basis of all kinds of teaching strategies and leaves it entirely to the repurposer to design the new pedagogical context for repurposing the material downloaded from the database ([www.merlot.org](http://www.merlot.org)).

Thirdly, software used to produce and share repurposable learning objects, ideally, should not be tied too tightly to a particular platform. Internet access is a *sine qua non*, of course, if repurposable learning objects are to be shared trans-institutionally or globally, but a number of contenders go much

further than this. The ALOCoM plugin is linked to the ARIADNE's Knowledge Pool System and programmed for use in MS PowerPoint only (Verbert og Duval 2008; Verbert, Jovanović, og Duval 2005), the modified ALOCoM ontology is linked to portalCore (Ramadhanie 2013), and the LON-CAPA system is a full-featured course management, learning content management, and assessment system that runs on dedicated (local or external) server ([www.lon-capa.org](http://www.lon-capa.org)). And though the Learning Activity Management System ([www.lamsinternational.com](http://www.lamsinternational.com)) satisfy the abovementioned pedagogical and captological demands, LAMS is usually integrated with other LMS or VLEs like Moodle, Blackboard, Sakai, WebCT, SharePoint, etc. (Dalziel et al. 2011).

Fourthly, the author's institution must provide sufficient instruction and technical support in order for the author to be able to use the authoring tool or to outsource the actual design and production of the learning object. Philip and Cameron have demonstrated, e.g., that development time and the enthusiasm of the team members involved in creating and repurposing learning objects were key success factors impacting on the successful outcomes of the reuse project (Philip og Cameron 2008, 5).

Fifthly, the application used by the *learner* should be both available and affordable. From a majority world perspective this generally rules out the personal computer (understood as the personally *owned* computer whether PC or MAC) and all devices running iOS. Many majority world learners will have access to both computer and internet in institutional computerlabs, but very few can afford to buy one themselves. And since pressure on computerlabs often restricts the individual student's actual possibility of actually using the computers, the increasing penetration of mobile phones in majority world countries makes it an attractive option to focus on software that is able to produce learning objects for both computer and mobile use. Taking Madagascar as a case again, it is estimated by the largest independent telecommunications research and consultancy company BuddeComm ([www.budde.com.au/Research/Madagascar-Telecoms-Mobile-Broadband-and-Forecasts.html](http://www.budde.com.au/Research/Madagascar-Telecoms-Mobile-Broadband-and-Forecasts.html)) that the estimated market penetration of mobile phones ultimo 2013 will be 48% and it is estimated that 69% of mobiles in Africa will have internet access by 2014. The mobile phone, according to *The Economist's* Nairobi correspondent J. M. Ledgaard, "is a more potent communication tool than anything else in African history, because it is interactive, participatory, and to some degree democratic and anonymous" (Ledgard 2011). In spite of fundamental challenges as unreliable network coverage and the problem of keeping smartphones charged in areas that don't have electricity a number smartphone-based educational programmes in healthcare and agriculture appear to be working, and there is a great potential for expansion, therefore, into other educational areas. "If the digital divide is being bridged in some of Africa's poorest communities," *The Guardian* journalist Killian Fox asks, "why stop at farming?" (Fox 2011). Indeed, why not expand smartphone learning into theological education and pastoral training by creating and sharing repurposable learning objects that can be accessed and used by theological students in their campus homes or as distance learning by pastors in their parishes?!

## A Contender

The point is not to find the one and only solution in the enormous ocean of available contenders, but to learn the general lessons and to use them as a point of departure for the selection of tools and platforms. One contender that has clearly "learned the lessons" is the authoring tool GLOMaker/PLOTMaker originally developed by Centre for Excellence in Teaching and Learning (CETL) at the London Metropolitan University and further developed by the European Union funded Persuasive Learning Objects Technology project (EuroPLOT) and renamed PLOTMaker ([www.eplot.eu](http://www.eplot.eu)).

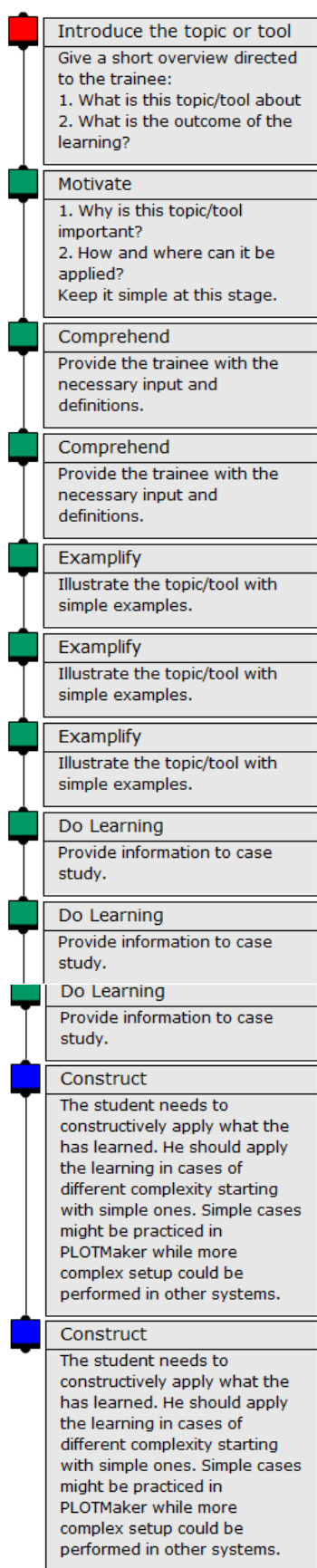


Figure 2

The reason why the GLOMaker/PLOTMaker authoring tool is an important contender is that the choice of structure of the learning object and of options within that structure of the learning object is based on pedagogical function, generates the learning object as an XML-file, and enables export to a number of different players. GLOMaker/PLOTMaker separates the surface structure of the learning object from the specific content and captures this as a template into which repurposers can load content. Using a linguistic analogy, the template consists of a “syntagmatic” series of structural components where each “syntactic” component functions as a placeholder for making a choice from a set of possible options in a generative approach, where the form of the learning object can be shaped and adapted on the basis of a pre-conceived pedagogical strategy through a generative process, rather than just being captured in a surface template form. Developer Tom Boyle explains:

There is a creative interplay between (syntagmatic) structure and (paradigmatic) choice in developing the structure of the artefact. The choice of a structure opens up certain possibilities. The selection of a certain option from the set of possibilities constrains the generative development in one direction rather than another. This choice, in turn, brings into play a further structure, or structure set, which acts as the placeholder for further options. The addition of the paradigmatic dimension moves us beyond a purely descriptive approach. We can generate many “well formed” instances of the base pattern, without knowing the precise form of the instance in advance. The two dimensions discussed so far, syntagmatic structure and paradigmatic choice, provide for a generative interweaving that leads to a specific instantiated learning object. They may answer the questions: what structures can be produced, and how they can be produced? But they do not answer the question why? Why should certain choices be made and not others? To make the generative architecture useful to tutors/designers we need to add a final component. This final component deals with pedagogical function: it provides a commentary explaining why a particular choice might be made. It does not make the choice for the tutor; it simply assists the tutor to make the choice that best meets their pedagogical requirements (Boyle 2006, 5).

The architecture of the Generative Learning Object (GLO), Boyd continues, “requires three components: a hierarchical structure that elucidates what can be developed [the left pane in the GLOMaker window in figure 3 and the sequence exemplified by figure 2], options which clarify the choices available at each structural choice point [the center pane in the GLOMaker window in figure 3], and pedagogical commentary which explains why one choice might be made rather than another [the right pane in the GLOMaker window in figure 3]” (Boyle 2006, 5).

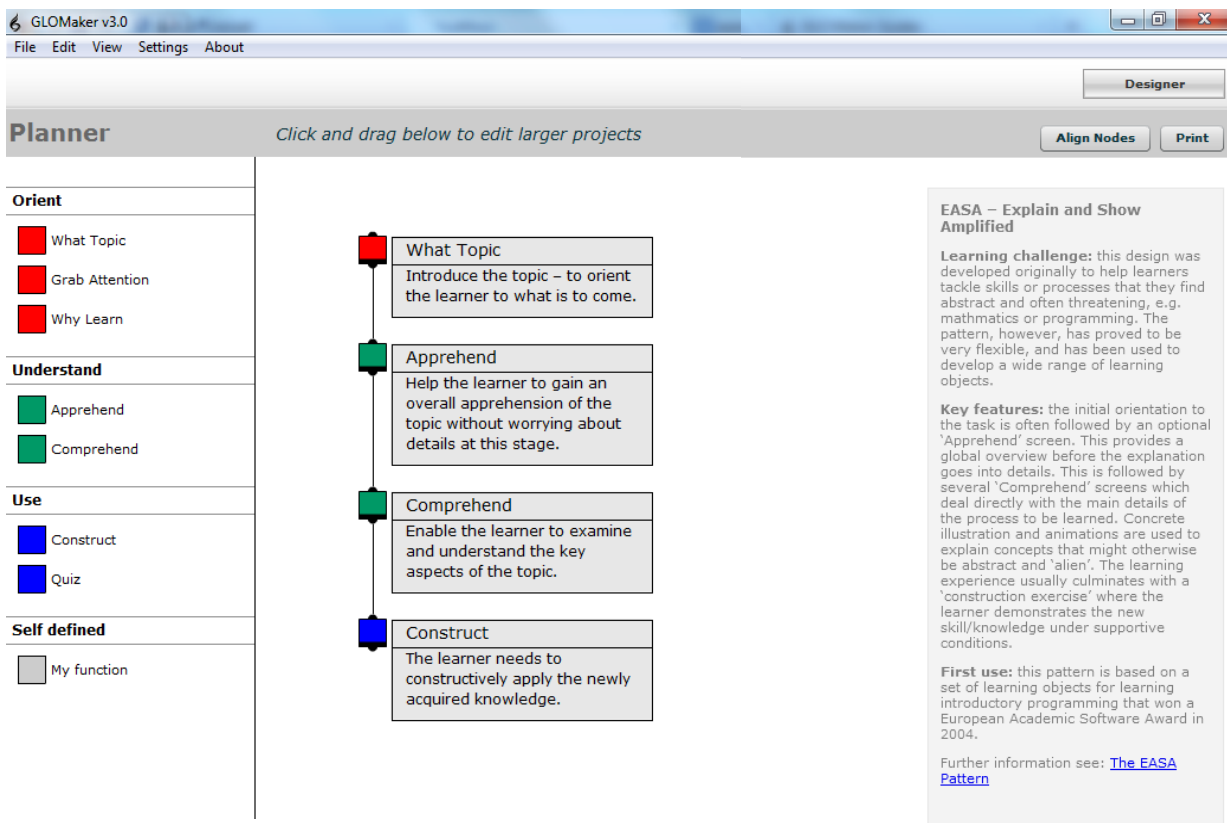


Figure 3

The authoring tool thus enables the *user* to create new objects based on pedagogical patterns, and the *repurposer* to easily and quickly adapt existing learning objects. The objects created or repurposed in the authoring tool GLOMaker/PLOTMaker are stored as XML files which can be read by a number of different player applications, including – importantly – Android mobile phones.<sup>5</sup>

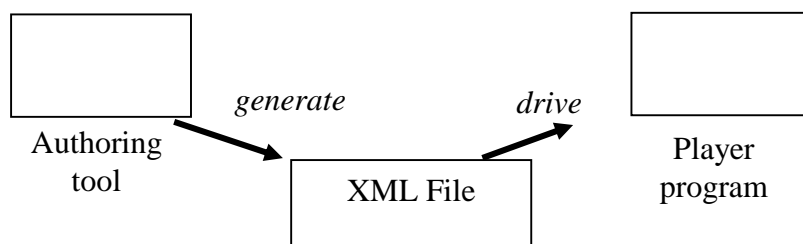


Figure 4

<sup>5</sup> Cf. <http://glomaker.wikifoundry.com/page/Mobile+GLOs> for details.

## Exemplification

In the example below, the pedagogical function outlined in figure 2 is applied to a learning object on the distinction between primary/secondary and firsthand/secondhand sources in a course on ancient Israel's history. The learning object gives a brief introduction to the heuristic method used in mainstream historical scholarship with the intended learning outcome that the student having viewed and interacted with the learning object will be familiar with the necessary steps in the critical weighing of sources and be able to apply the procedure to sources from the ancient Near East. The first step is to motivate the student to invest his or her resources in the learning process. This is done by explaining why the critical weighing of sources impacts the historian's credibility and authority. A further motivation could be to give an example where un-critical use of sources has compromised the historian's research. Motivation is followed by the input and exemplification that is necessary to form the student's comprehension of the subject. The input consists of a video downloaded from Youtube and embedded on the slide and a link to a text from the curriculum that explains the difference between primary/secondary and firsthand/secondhand sources *in extenso*. Finally, the student is presented with a case in order to test his or her ability to master this particular step in heuristic technique. Distinguishing between primary/secondary and firsthand/secondhand sources is only one step, however, in the critical weighing of sources, and in order for the student to master all the steps, he or she should, ideally, have access to learning objects on all the whole sequence of necessary steps.


### Introduce the Topic or Tool

## What is a Source?

### 1 | Primary/Secondary and Firsthand/Second Hand Sources

- In this session you will have a brief introduction to the heuristic method used in mainstream historical scholarship to distinguish between primary/secondary and firsthand/secondhand sources.
- After the session you will be familiar with an important step in the critical weighing of sources and be able to apply the procedure to sources from the ancient Near East.

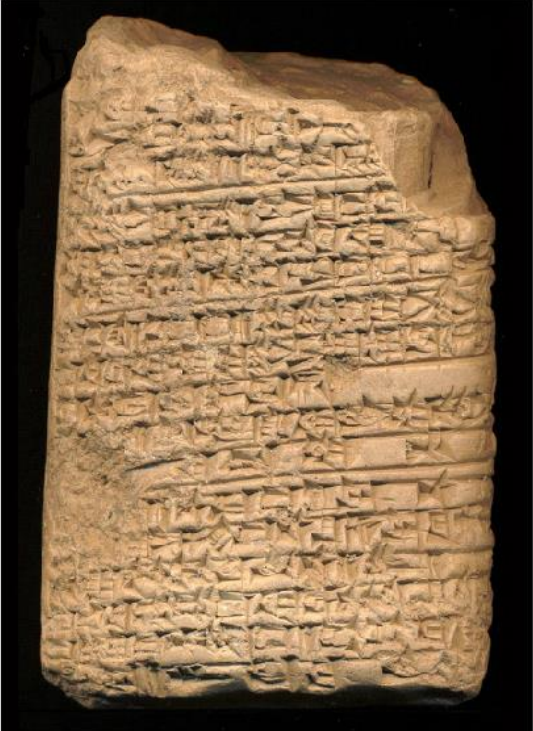
**Heuristics**  
From Greek *heuriskein* and Latin *heuristicus* "to find out, discover."



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## Motivate



### Why is it important?

Sources are the materials researchers gather to support their work, such as books, articles, original works, analyses, reviews, data, or evidence.

Sources may be either primary or secondary and firsthand or secondhands.

It is important to know which is which before citing a source in a paper. Research gains credibility and authority when it is founded on primary sources.

Researchers achieve stature by gaining readers' trust.

Citing secondary sources demonstrates a researcher's knowledge of other scholars' work. Knowledge in a discipline builds upon precedent, adding new facts, data and original thinking. Disciplines vary when distinguishing between primary and secondary sources.

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## Comprehend

### Primary/secondary and firsthand/secondhand sources

<<click here to learn more>>

**A primary sources** is the oldest *extant* source available. Primary sources are direct outcomes of events or the records of eyewitnesses: Original documents, relics, remains, artifacts, or – importantly – sources that reliably relays information from a no longer extant source.

**A secondary source** is a source that does not provide more information than we could obtain from another, earlier source. Secondary sources contain information provided by a person who did not directly observe the event, object, or condition. That is, information created from a primary source or other secondary sources or some combination of primary and secondary sources: Historical accounts, textbooks, encyclopedias, newspapers, periodicals, review of research and other references.

**The distinction** between “primary” and “secondary” has to do, therefore, with the value or importance of the witness in relation to the historian’s question rather than its contemporaneousness with the person, event or period it purports to describe.

**Firsthand** means obtained directly from the original source, and **a firsthand source** is a source that stems directly from an eye- or earwitness or, importantly, a later account that *reliably* quotes an earlier non-extant, firsthand source.

**A secondhand source** is a representation of a firsthand source that involves interpretation.

A firsthand account will always be a primary source, but the opposite does not apply, because a secondhand account may or may not be the oldest extant witness and therefore a primary source.

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### Primary and Secondary Sources Tutorial

Source: Cooperative Library Instruction Project  
<http://www.youtube.com/watch?v=xFvEKQqcVW8>

Loading

The introduction to primary and secondary sources in the embedded video is first and foremost directed at analyzing sources from modern times.

When it comes to sources from the classical or pre-classical era it is important to be aware of an important qualification in the definition of a primary source. Since most of the original sources for classical or pre-classical history are no longer extant, the historian has to rely on copies of, quotations from or references to the original sources. A primary source in classical and pre-classical heuristics, therefore, is not necessarily a contemporary source, but the oldest *extant* source.

Click "Next" to learn more on this qualification.

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## Exemplify

### Example #1

#### The Death of Jeroboam (1 Kgs 14:19-20)

*Now the rest of the acts of Jeroboam, how he warred and how he reigned, behold, they are written in the Book of the Chronicles of the Kings of Israel.*

*And the time that Jeroboam reigned was twenty-two years. And he slept with his fathers, and Nadab his son reigned in his place.*

The source is a **primary source** because it is the first extant and explicit information we have on the length of Jeroboam's reign, and of his son and successor Nadab.

This is true despite the fact that the oldest extant manuscript of the passage is from the second century B.C.

Whether it is a **firsthand or a secondhand source** is debatable. It could be argued, on the one hand, that the author merely quotes a firsthand source in the form of "the Book of the Chronicles of the Kings of Israel," and that the text therefore also should be considered a firsthand source. It could also be argued, however, that the author very well may have used a firsthand hand source, namely "the Book of the Chronicles of the Kings of Israel," but that he has embedded it in his own biased account in a way that makes the text a secondhand source.

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**Example #2****The Death of Asa****1 Chr 16:11-13**

*The acts of Asa, from first to last, are written in the Book of the Kings of Judah and Israel. In the thirty-ninth year of his reign Asa was diseased in his feet, and his disease became severe. Yet even in his disease he did not seek the LORD, but sought help from physicians. And Asa slept with his fathers, dying in the forty-first year of his reign. They buried him in the tomb that he had cut for himself in the city of David. They laid him on a bier that had been filled with various kinds of spices prepared by the perfumer's art, and they made a very great fire in his honor.*

**1 Kgs 15:23-24**

*Now the rest of all the acts of Asa, all his might, and all that he did, and the cities that he built, are they not written in the Book of the Chronicles of the Kings of Judah? But in his old age he was diseased in his feet. And Asa slept with his fathers and was buried with his fathers in the city of David his father, and Jehoshaphat his son reigned in his place.*

Asa's "obituary" in 1 Chr 16:11-13 is an example on a source that is **both a primary and a secondary source** with information that may be **both firsthand and secondhand**.

The text is **a secondary source** to the extent it only *repeats* what is already known from the earlier source in 1 Kgs 15:23-24. The additional information, however, is **a primary source** because it is not known from earlier sources.

Since the author of the Books of Chronicles based his account on the Books of Kings + one or more other sources, his repetition of information already known from 1 Kgs 15 is **secondhand information**, whereas the additional information *may* be **firsthand information**, if he quotes *reliably* from the original chronicle, that is, the Book of the Kings of Judah and Israel. It is not likely, however, that this source survived to the time of the writing of 1-2 Chronicles, and the author probably found the information in a later, source, making the additional information in 1 Chr 16 **secondhand information**.

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**Example #3****The Tel Dan Stela**

Aramaic inscription, part of a stone monument commemorating the military victories of Hazael, King of Aram.

Found at Tel Dan. Dating to the beginning of the ninth century B.C.

Contains the earliest reference to the Davidic dynasty outside the Bible. In the inscription, the king boasts of killing Jehoram of Israel and Ahaziah of "the House of David" [highlighted in white on the image].

The Tel Dan Stela is **a primary source** because it contains the earliest extant information on the military victory of the Aramean king Hazael. The information is **firsthand evidence**, because it is obtained directly from the event. And being a contemporary source only increases its value as a witness.

The mentioning of the house of David is more tricky to determine source critically, however, since we have extensive information on it in the Bible, with a first explicit reference to the dynastic house of David in 1 Kgs 12:19. *If* the author or editor of 1 Kgs 12:19 quotes *reliably* from a primary source like "The Book of the Chronicles of the Kings of Judah" mentioned in 1 Kgs 14:29, then the information may be regarded as firsthand evidence. It is *not* a primary source, however, since the earliest *extant* manuscript of 1 Kgs 12:19 dates to the end of the second century B.C. (Qumran Cave 6), whereas the Tel Dan Stela dates to the beginning of the ninth century B.C.

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### Do Learning

**Case Study**  
**The Assyrian king Sennacherib's attack on Judah in 701 B.C.**

**Assyrian sources**

"As to Hezekiah, the Judean (Ha-za-qi-(i)ja-u Ia-u-da-ai), he did not submit to my yoke."

"I made (Hezekiah) a prisoner in Jerusalem, his royal residence, like a bird in a cage."

"Hezekiah himself, whom the terror-inspiring filendor of my lordship had overwhelmed . . . did send me, later, to Nineveh, my lordly city, together with 30 talents of gold, 800 talents of silver, precious stones . . . couches (inlaid) with ivory . . . elephants hides . . . and all kinds of valuable treasures, his own daughters, concubines, male and female musicians. In order to deliver the tribute and to do obeisance as a slave he sent his (personal) messenger."

**The Taylor Prism with Sennacherib's own account**



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**Case Study**  
**The Assyrian king Sennacherib's attack on Judah in 701 B.C.**

**Assyrian sources**

Relief from Sennacherib's palace in Nineveh featuring the siege on Lachish (image right).

**Archaeological sources**

Destruction layers at Beth-Shemesh and Arad

Remains of siege ramp at Lachish (image below).



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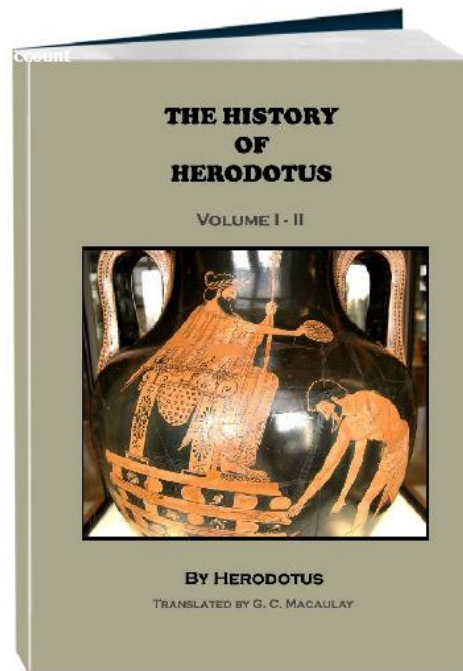




**Case Study****The Assyrian king  
Sennacherib's attack on  
Judah in 701 B.C.****Egyptian sources**

As the Ethiopian (Egyptian) crown prince Tirhaqah was involved (cf. 2 Kgs 19:9 and Isa 37:9) the campaign was also recorded in Egyptian (non-extant) sources (quoted by Herodotus in Histories 2.141, and mentioned in a quote from Berosus by Josephus in Antiquitates 10.1.4-5).

- The Greek historian Herodotus lived from c. 484-425 B.C.
- The Babylonian priest and writer Berosus was active in the beginning of the 3rd century B.C.
- The Jewish historian Josephus lived from 37-c.100 A.D.



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**Case Study****The Assyrian king  
Sennacherib's attack on  
Judah in 701 B.C.****Biblical sources**

- 2 Kings 18-19 and 20,20-21
- 2 Chronicles 32
- Isaiah 1 (the general destruction);
- Isaiah 36-39
- Micah 1

The earliest *extant* copy of the Biblical sources has been found at Qumran and dated to the 2nd century B.C.



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**Construct**

## Test your learning!

You are writing an essay on the Assyrian king Sennacherib's siege of Jerusalem in 701 B.C. and use the account in Isaiah 36-37 as a

firsthand information  
 secondhand information

Is Isaiah 36-37 a

primary source  
 secondary source  
 primary AND secondary source

**Sources on Sennacherib's attack on Judah in 701 B.C.**

- The Taylor Prism
- Reliefs in Sennacherib's palace in Nineveh
- Archaeological remains at Lachish, Beth Shemesh, and Arad.
- The Egyptian account embedded in the works of Herodotus, Berosus, and Josephus.
- The Biblical accounts in 2 Kings 17-18; 20:20-21, 2 Chronicles 32, Isaiah 1; 36-37, and Micah 1.

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## Test your learning!

How would you describe the sources in relation to the proposition "Sennacherib attacked Judah and laid siege to Jerusalem in 701 B.C."? Match the sources with the descriptions by connecting the dots and test your answers by clicking the Submit button!


The Taylor Prism	●	●	Primary source
The Egyptian Account referred to by Herodotus, Berosus, and Josephus	●	●	Secondhand information
Isaiah 36-37	●	●	Firsthand information
2 Chronicles 32	●	●	Secondary source

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## Repurposing

The example given above has been created for use in a MA course on ancient Israel's history, but may be repurposed for a variety of other purposes. The high granularization of the GLO makes it possible for GLOMaker with very little effort from the creator to replace course-specific examples and case studies with examples and cases from other courses, fields, and/or academic levels. In the example below one of the course-specific examples has been replaced with an example from ancient Axum for use by a colleague in a BA course on Non-Western Church History. And the same GLO could with relatively little effort be translated into another language for use in a different linguistic context, e.g., in Francophone Africa as in the example below. It is also possible, of course, to modify the pedagogical function and reconfigure the sequence to serve other needs.


**Example #1**  
The Adoption of Christianity in Ethiopia



The Ezana Stone Trilingual inscription in Geez, Greek, and Sabaeen documenting the conversion of king Ezana to Christianity.

'Ezana of Axum (Ge'ez ኃዘን 'Ezānā unvocalized ḥw' zn. also spelled Aezana or Alzan) was ruler of the Axumite Kingdom (320s – c.360AD) located in present-day Ethiopia, Eritrea, Yemen, southern Saudi Arabia, northern Somalia, Djibouti, northern Sudan, and southern Egypt.

The Ezana Stone is a **primary source** because it is the earliest extant source that informs us of King Ezana's conversion to Christianity.




Fourth century A.D. Byzantine and Roman historians chronicle how a Syrian Christian named Frumentius, called *Abba Salama* in Ethiopian versions, came to be captured and later hosted by the Aksumite court, whose king he ultimately converted. Following his conversion, King Ezana (r. 320–50) had the crescent-and-disk of South Arabian polytheism removed from his coins and replaced with the Christian cross.

The Byzantine and Roman chronicles are **secondary sources** because the information they provide on King Ezana's conversion is already known from an earlier extant source, namely the Ezana


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**Exemple #1**  
L'adoption du christianisme en Éthiopie



La pierre d'Ezana Trilingual en guéze, le grec et Sabaeen documenter la conversion du roi Ezana au christianisme. 'Ezana d'Axoum était chef de la Axumite Uni (c.320-c.360 après J.-C.) situé en Ethiopie aujourd'hui, l'Érythrée, le Yémen, le sud de l'Arabie saoudite, nord de la Somalie, Djibouti, le nord du Soudan et le sud de l'Égypte.

La pierre d'Ezana est une **source primaire**, car il est la source existante la plus ancienne qui nous informe de la conversion du roi Ezana au christianisme.



Quatrième siècle de notre ère byzantine et romaine chronique des historiens comment un chrétien syrien nommé Frumentius, appelé *Abba Salama* dans les versions éthiopiennes, est venu à être capturé, puis accueilli par le tribunal de Axoum, dont le roi a finalement converti. Après sa conversion, le roi Ezana (c. 320-c360) a eu le croissant et le disque de polythéisme l'Arabie du Sud retiré de ses pièces et remplacée par la croix chrétienne.

Les chroniques byzantines et romaines sont des **sources secondaires**, car les informations qu'ils fournissent sur la conversion du roi Ezana est déjà connu depuis une source plus tôt existant, à savoir la pierre Ezana.

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## Roundup

The purpose of this paper has been to review the lessons learned in the production of first generation learning objects in order to aid the creator and repurposer of learning objects to identify the best tools and platforms on the market so that the learners may be exposed to best pedagogical practice. Among the many challenges mentioned, special focus was given to pedagogical framework, granularization, standardization, interoperability, discoverability, and captology. The findings demonstrated that it is the learning goals and objectives that should guide the selection of structure, content and technical elements in the configuration of a learning object, and that a combination of teaching strategy with captological insights of persuasive design greatly enhances the possibility of changing the learner's cognitive behavior thereby speeding up the learning process.

Among the incentives for *repurposing* learning objects, particular emphasis was given to collaborative learning/teaching and ecological conscience. Since digital teaching and learning is a collaborative enterprise of complex interactions, the learning object must be designed to *reflect* such a setting and to facilitate an interactive and dialogical process. Furthermore, the economic inequality between the so-called developed and wealthy minority and world and the undeveloped and poor majority world should urge creators of learning objects in the former world to make academic research available to majority world institutions, to expose majority world teachers/learners to best pedagogical practice, and to expose minority world teachers to majority world perspectives.

Though the authoring tool GLOMaker/PLOTMaker was mentioned as *one* important contender, it has been emphasized throughout the paper that the *criteria* for catching the best tools and platforms in the vast ocean of contenders are more important than finding the one and only. GLOMaker/PLOTMaker definitely meets the criteria discussed, but the pedagogical framework/structure in GLOMaker/PLOTMaker may also be implemented in other tools and platforms (e.g., LAMS, Prezi, etc.).

One of the more prospective suggestions in the paper is that smartphone technology is a potent – and in Africa maybe the *most* potent – communication tool for teaching and learning. It has already been deployed in a number of educational programmes in healthcare and agriculture, and since the teething troubles seem to have been overcome in these programmes, it is high time that theological programmes go smart by creating and sharing repurposable learning objects that can be accessed and used by theological students anywhere outside campus or as distance learning by pastors in their parishes.

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