

ALFA - Adaptive Learning For All.

CAPDM have developed a usable, low-cost Adaptive Learning methodology capable of scalable development of adaptive courses in all disciplines, and of being implemented on a range of delivery platforms. It is:

- based on open standards - as a methodology, rather than a closed system, there is no proprietary reliance or lock-in with ALFA
- developed initially on the open source Moodle platform - a holistic reference implementation, readily implementable on other platforms, and completely open and extensible.

We call it **ALFA – Adaptive Learning For All.**

To gauge where it sits in the Adaptive Learning spectrum, and for a fuller introduction to this topic, there is an excellent review of Adaptive Learning, from the DeVry Education Group, here: [Adaptive Learning White Paper](#)

Some Background

Adaptive Learning is of increasing interest at all levels of education, and a point will be reached soon where Adaptive Learning becomes a standard offering rather than an expensive frill. But what exactly is Adaptive Learning?

There is a very useful formal definition:

“Digital learning systems are considered adaptive when they can dynamically change to better suit the learning in response to information collected during the course of learning rather than on the basis of pre-existing information such as a learner’s gender, age, or achievement test score. Adaptive learning systems use information gained as the learner works with them to vary such features as the way a concept is represented, its difficulty, the sequencing of problems or tasks, and the nature of hints and feedback provided.”

(U.S. Department of Education, Office of Educational Technology, 2013)

So Adaptive Learning is about a learning process where the content presented changes, based on the responses of the individual student. This is not new. Good teachers have always adapted to students by understanding why a student is failing and what has to be done to alter the student’s understanding.

What form does Adaptive Learning take?

There tends to be two main types of system:

1. A Platform Model: where a provider's system provides a platform and some means for faculty or instructional designers to author the content on the platform
2. A Publisher Model: where the content, e.g. adaptive textbooks, is pre-built by the provider.

Neither is particularly suitable.

- The first introduces yet another system or platform to an institution which, nowadays, almost certainly has a fairly stable delivery environment of its own. There are some well-known offerings here (e.g. Knewton, Cogbooks, Smart Sparrow) but all seem opaque and it can be hard to see where and why they are adaptive. Most require a partnership with the service provider.
- The second pre-supposes how that content might be used which seems overly prescriptive and restrictive. Pre-built content cannot cover all possible contexts for the use of the materials.

Surely it is far better to introduce a scalable and repeatable methodology for Adaptive Learning, than be forced to comply with a proprietary system or use content in a pre-prescribed manner? ALFA is platform independent and can adapt content to the context it is used in. The nature of Adaptive Learning is not just a function of the system or content being used, but with the context in which it is used.

What is ALFA based on?

Raw content does not contain enough information to be the driver within an Adaptive Learning methodology - there has to be some linking metadata. This can be custom, highly specific and perhaps proprietary (as in the case of Knewton, Cogbooks, etc). It can also be based on some readily understood, widely used concept and captured within a standards-based content mark-up.

In ALFA the 'glue' for all of these linkages is the Learning Objective. This is a natural choice for this role, as they are generally very well understood, and they are ever-present in texts, study guides and other core materials. Learning Objectives form a natural backbone for the design and structure of a course and, crucially, they are also defined in the context in which they are used. They are therefore controlled by the teacher or course designer.

ALFA is really a layer of meta-data that sits above other content layers, so think of it as part of a layered stack of content.

Layer 1. **Learning Objective** definitions – a lowest level, optional layer though as the 'glue' for ALFA not an option for Adaptive Learning to function. These definitions can be surprisingly simple, and it is good practice to develop any course around Learning Objectives.

Layer 2. **Core content** middle layers, representing a variety of course components, e.g.

- i. Study Guides or Workbooks
- ii. Text books – own or publishers'

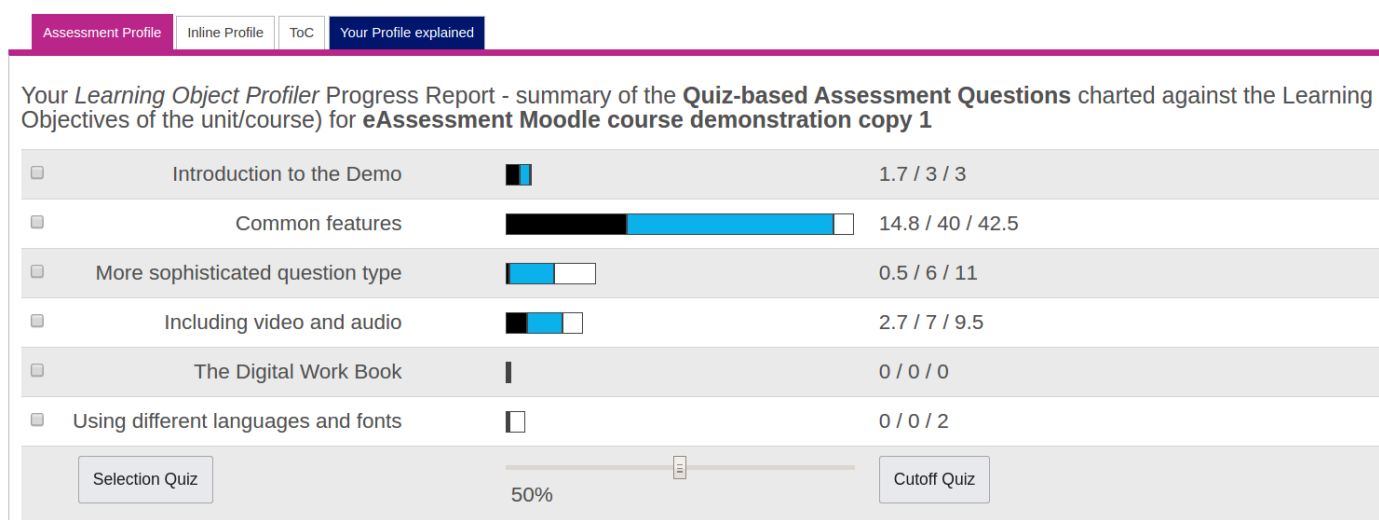
Layer 3. **Assessment** definitions and question banks – layers of practice and formal assessment

In an institutional content domain all this information should be single-source mastered in a semantically rich XML (CAPDM prefers DocBook though we integrate publisher texts from their own XML structures, e.g. WileyML). With content in these first three layers it is possible to develop and deliver highly integrated and functional courses in a learning environment.

However, with an additional extra layer, built on to the Learning Objective layer it is possible to add in a layer of student profiling – a first step en route to Adaptive Learning. This profiling allows dynamically created assessments to be generated for targeted Learning Objectives, so focussing on the weak points in a student's understanding.

Layer 4. **Learning Objective weightings** - adding minimal weightings to each quiz question, or inline task activity, makes it possible to start building up a profile of student performance as they undertake these activities. The weights relate questions and activities directly to one or more Learning Objective.

The Learning Objective Profiler



The final ALFA layer is the one that connects Learning Objectives to specific content elements. This can be drilled down to any level of detail, and to any content component. For example a teacher may write a Study Guide that exactly matches his/her definition of the Learning Objectives for a course, or he/she may interpret their mapping of the same Learning Objectives to the given structure of a standard publisher text, i.e. the teacher can provide the context for adaptivity. They control the level of detail.

Layer 5. **Content linkages** - This layer links Learning Objectives to content. As the student works through quiz questions and/or inline activities, their performance against each Learning Objective is calculated using the weightings to present dynamically generated content pathways to be followed.

These pathways are suggestive only. It would be dangerous to hide any particular content, but it is reasonable to suggest mastery or not.

There is no magic. ALFA is only as good as the content and linkages that drive it. However it is easy and quick to develop a delivery that exhibits true Adaptive Learning behaviour, and it is neither platform nor publisher driven.

Not a Prescription

ALFA is also as extensible as you care to make it. CAPDM provide a Moodle-based reference implementation, but the underlying methodology can be readily reworked on other platforms.

The content is all entirely standards-based, so it is entirely portable. Any work put in to develop fit for purpose learning materials is not lost over time as underlying technologies change. Such change can happen many times over the lifetime of high-value content, so with ALFA only the implementation of the methodology needs updating.

The minimal rule set of the reference implementation, and the use of individual student data can be replaced with complex algorithms and aggregated data abstracts as required, as a deeper understanding of how to adapt the feedback evolves. The capture of this understanding within the implementation of the methodology is also under the control of the teachers and course designers.

ALFA places control of adaptive content in the hands of the educators, not some distant corporation. With reference to the De Vry paper, above, ALFA is “adaptive at both the assessment and content level” (Scenario 4).

Postscript

Jose Ferreira, founder and CEO of Adaptive Learning company Knewton, said:



It is incredibly expensive to create adaptive engines. They’ve got to be gigantic to work well”

We disagree. ALFA may change your approach to learning, but you do not have to change your systems or bank balance to do so.

Suggested Reading/Revision Path

[Assessment Profile](#)
[Inline Profile](#)
[ToC](#)
[Your Profile explained](#)

Table of Contents

- [Introduction](#)
 - [The Subject Matter](#)
 - [XML, Interaction and Persistence](#)
 - [Study time](#)
- [1 Common types of question](#)
- [2 More sophisticated types of question](#)
- [3 Use of video, audio and more advanced features](#)
- [4 The Digital Work Book: standard features](#)
- [5 The Digital Work Book: graphics and complex features](#)
- [6 Foreign languages and fonts](#)