

Adaptive learning

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In this series, we explore technology-related themes and topics. The series aims to discuss and demystify what may be new areas for some readers and to consider their relevance to English language teachers.

‘Adaptive learning’, in the context of language learning and teaching, means different things to different people. In the most general terms, it can be defined as a way of delivering learning materials online, in which the learner’s interaction with previous content determines (at least in part) the nature of materials delivered subsequently. The process is automated, dynamic, and interactive. Its purpose is to generate a personalized learning experience.

Personalization

‘Personalization’, however, is as slippery a term as ‘adaptive learning’ in educational contexts. Although there is widespread agreement that ‘learning in the future ought to be more personalized’ (Duncan 2013), there is no generally agreed single definition of what this means (UNESCO Institute for Information Technologies in Education 2012). The disambiguation by the US Department of Education Office of Educational Technology (2010: 11) is helpful as a way of understanding different kinds of adaptive learning:

Individualization	Differentiation	Personalization
Learning goals are the same for all students, but students can progress through the material at different speeds.	Learning goals are the same for all students, but the method or approach of instruction varies according to the preferences of each student or what research has found works best for students like them.	The learning objectives and content as well as the method and pace may all vary.

Adaptive learning is an educational technology, rather than a method. It can be used in the service of any of the three approaches described above. In English language learning until now, there have been more uses of adaptive learning for individualized approaches than for differentiated or personalized ones. It may prove to be the case that the affordances of

adaptive learning lend themselves more to the former than to the latter, but the current rarity of differentiated or personalized adaptive learning is more likely a reflection of the relative rarity of such courses in traditional face-to-face contexts.

Flashcards and related apps

The simplest form of online language instruction that can be called adaptive is a digital flashcard app (usually for vocabulary) which incorporates automated spaced repetition of the target language item. Algorithms determine the order, frequency, and number of times in which a learning target (typically a word) is presented, and this is based on the individual learner's response to their previous exposure, via the app, to this item. The particular set of target items can be determined by a teacher (or by the program itself), or by importing sets of words that are associated with other learning material (for example a coursebook), or by individual learners themselves. Programs of this kind are becoming increasingly popular and sophisticated. Recent developments include elements of gamification (for example badges, progress bars, leader boards), game-like practice of target items, the linking of target vocabulary items to authentic online texts (both written and video), and interactive flashcards (for example learners are presented with gapped sentences) with hints and automated intelligent feedback.

More complete language learning programs (usually centred around a combination of vocabulary and sentence-level grammar, but also offering some skills development) include, or soon will include, adaptive elements. One such learning program, [Duolingo \(2013\)](#) describes its approach as follows:

Every time you finish a Duolingo lesson, translation, test, or practice session, you provide valuable data about what you know and what you're struggling with. Our system uses this info to plan future lessons and select translation tasks specifically for your skills and needs.

Another uses adaptive learning in its review lessons. These are scheduled 'at optimal intervals [and] designed to help you efficiently retain what you learn without wasting time reviewing material that you already know well' (Rosetta Stone n.d.).

Although most apps like these allow learners some freedom in selecting the particular language items they want to learn (for example extra vocabulary items), the overall learning goals (for example reaching a previously defined 'level') remain fixed. The approach is individualized with some, usually minor, features of differentiation.

Big data and learning analytics

Individualized learning programs adapt to a relatively small amount of data generated by the learners. Essentially, this is the learner's responses to a given learning task. In order to offer a more *differentiated* approach, it is necessary to collect substantially greater amounts of data. This includes personal information (such as age, sex, home address, academic and course attendance records, disciplinary records) which can be obtained when the educational platforms that deliver the adaptive courses are integrated with administrative systems. It also includes the sort of information that is routinely collected for the purposes of

business analytics (for example to analyse and predict buying patterns for companies like Amazon)—such as page views, the length of time spent on a page, and click rates—not only when interacting with the learning material but also during other online activity. For this data to be valuable, i.e. for it to lead to actionable insights, it needs to be aggregated with that of other learners, and the greater the number of learners, the more valuable it is considered to be. These numbers can now be very large, as publishers strike deals with large educational institutions or acquire chains of language schools themselves. (In 2013, for example, Pearson bought the Brazilian chain of franchised language schools, Grupo Multi, with 800,000 students (Mance 2013).)

The analysis of such big data in education, it is claimed, makes it possible to recommend or modify personalized learning paths, to ‘create productive peer groups, and free up class time for creativity and problem solving’ (Ferreira 2013). Although the use of such big data and learning analytics is widespread in the United States in higher education, it has yet to make any documented impact in English language teaching. Contracts have been signed between Knewton, one of the largest companies to offer this technology, and major ELT publishers (including Pearson, Macmillan, and Cambridge University Press), but efficacy research is still largely unavailable in the public domain.

Granularity and learning outcomes

Adaptive learning assumes that learning is linear and cumulative. It also assumes that what is to be learnt can be analysed and defined at a ‘granular’ level (it can be broken down into small ‘learning objects’ or ‘learning chunks’) and that these can be organized into a hierarchical ‘knowledge graph’, one granular piece of learning is a prerequisite for another. The acquisition of these learning objects needs to be measurable; adaptive learning presupposes largely predetermined learning outcomes. However, sophisticated adaptive learning systems are dynamic and allow for some modification of knowledge graphs as a learner interacts with the material.

Although these assumptions appear to be relatively unproblematic in the learning of some school subjects, such as mathematics, the ‘mastery learning’ approach is more contested in language learning. Larsen-Freeman (1997: 151), for example, argues that ‘learning linguistic items is not a linear process—learners do not master one item and then move on to another. In fact, the learning curve for a single item is not linear either’. Learning objects do not *need* to be linguistic items in adaptive language learning (they could, for example, be defined in terms of skills or a learner’s interaction with a text), but, in practice, they invariably are. That being the case, adaptive learning is often associated with discrete-item product-oriented syllabuses. Thornbury (2015) offers a succinct analysis of the problems associated with such an approach.

Evaluation

The Common European Framework of Reference for Languages (Council of Europe 2001) provided an evaluation framework for English language competence, consisting of a complex grid of skills, divided into six levels. More recent developments have attempted to offer more ‘precise’ numerical descriptions of English language competence. The

Cambridge English Scale, for example, has numerical values from 80 to 230, and the Pearson Global Scale of English ranges from 10 to 90. At the same time, there have been attempts to correlate linguistic items (especially vocabulary and grammatical structures) with points or bands on such frameworks. One example of this is the English Profile project, which describes itself as ‘setting industry standards for English language learners’ (see <http://www.englishprofile.org/>).

The tendency for adaptive courses to see language ‘learning objects’ within hierarchical ‘knowledge graphs’ as discrete items of vocabulary and grammar is reinforced by the ready availability of granular scales, such as those described above. The learner’s developing language knowledge (rather than competence in language use) is continuously evaluated and recorded. By comparing large data sets of learning outcomes with large data sets of learning variables, it is also possible to evaluate the instructional materials themselves and the effectiveness of both courses and teachers, when adaptive learning is a part of blended instruction. If the desirability of such evaluation is accepted (and it is accepted by most national governments and intergovernmental organizations, including the OECD and the World Bank), ‘technology-based learning and assessment systems [are seen to] be pivotal in improving student learning and generating data that can be used to continuously improve the education system at all levels’ (US Department of Education Office of Educational Technology op.cit.: ix).

Adaptive learning and the education industry

Adaptive learning has been described as a ‘hot concept’ that is ‘poised to reshape education’ (Webley 2013). Its appeal to educators comes primarily from the promise of personalized learning. Its appeal to policymakers comes from its promises of accountability, greater productivity, and economy. Despite very high initial investment costs, online adaptive instruction is cheaper than traditional alternatives such as face-to-face, classroom teaching (Spring 2012: 2).

Many publishers see adaptive learning as a powerful response to the business challenges they are facing. These include rampant pirating, spiralling development costs, and the growth of open educational resources. Adaptive learning services are sold on a subscription basis. As an interactive service, they cost learners/customers more than static (printed or digital) content and cannot easily be pirated. After development, production and distribution costs are much lower, and sales, marketing, and support services can be concentrated on large institutional customers.

It is unsurprising to find that ELT publishers are deploying increased resources to those parts of the world (South and Central America, the Middle East, and East Asia) where there is a concentration of large institutional customers and an interest in online courses with adaptive elements. Lower-level (CEFR levels A1–B1) language learning materials account for by far the highest volumes of sales in these markets. As we have seen, adaptive learning appears to lend itself most readily to content that is structured around discrete items of vocabulary and grammar. At the lower levels, it is easier to map out such ‘knowledge graphs’ (by

analysing the frequency of the items), than it is at higher levels, where there is likely to be more diversity of learning needs.

Big data, learning analytics, and adaptive learning have already transformed the educational landscape in the United States and other countries. They have been promoted by massively funded educational foundations (Ball 2012) and private business interests, as education is recast as an ‘industry’. But in English language teaching, change is proving to be rather slower. There is a clear, global shift away from traditional print-based classrooms towards the use of learning platforms and blended models of instruction. There are now materials (for example Doff, Thaine, Puchta, Stranks, and Lewis-Jones 2015) that offer a limited amount of differentiation in learning paths, and adaptive testing is becoming more commonplace. Spaced repetition apps are proving popular. However, truly personalized English language learning, facilitated by adaptive learning, remains in the experimental stages.

Because of the affordances of adaptive learning for the presentation of linear syllabuses of discrete items, there is a risk that this new technology will become no more than a sophisticated version of the various teaching machines offering ‘programmed instruction’ that were developed before modern computing. Adaptive learning does not necessarily entail either a linear syllabus or a behaviourist approach, but it may result in the reinforcement of both within the world of ELT.

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