The book of FLAX

A new approach to computer assisted language learning

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University of Waikato, New Zealand

New Zealand Māoris value the bountiful properties of Flax.
The nectar from its flowers makes a sweet drink.
Its roots can be crushed into medicine.
Its gum eases pains and heals wounds.
Its leaves serve as bandages.
Flax can be twisted, plaited and woven
into fishing nets, footwear, cords and ropes.

It can also help you learn English, and other languages too.

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Contents

1. Introducing FLAX

FLAX is both a vision and an authoring tool that you can use to create language learning exercises.[1]

The vision is to make language learning fun for students, yet enable teachers to design games easily and rapidly while retaining full control of what their students see. (This book speaks of "learners" and "teachers," yet FLAX supports self-instruction – students can produce games too.) The Web already contains innumerable language activities, quizzes, and games, but they are fixed: the activities are cast in stone and the material is chosen by others. Our vision is to put the control back where it belongs, in the teacher's hands.

The idea is to let teachers design stimulating games rapidly by capitalizing on existing material. FLAX is built upon digital library technology. Libraries contain the world's best, most exemplary prose. Digital libraries allow material to be manipulated, automatically, into games: solitary games, collaborative games, competitive games. In practice, teachers want to use their own material, focusing on language learning in a particular domain (e.g., business, geology) or motivating students by using text from a particular social context (e.g., country or region, common interests). FLAX allows teachers to build bespoke libraries very easily.

Automatic processing of language allows games to be created quickly, but is inevitably prone to occasional errors. One of FLAX's underlying principles is that teachers should retain full control. Although games are created automatically, you – the teacher – can review and discard incorrect or inappropriate items before letting students see them.

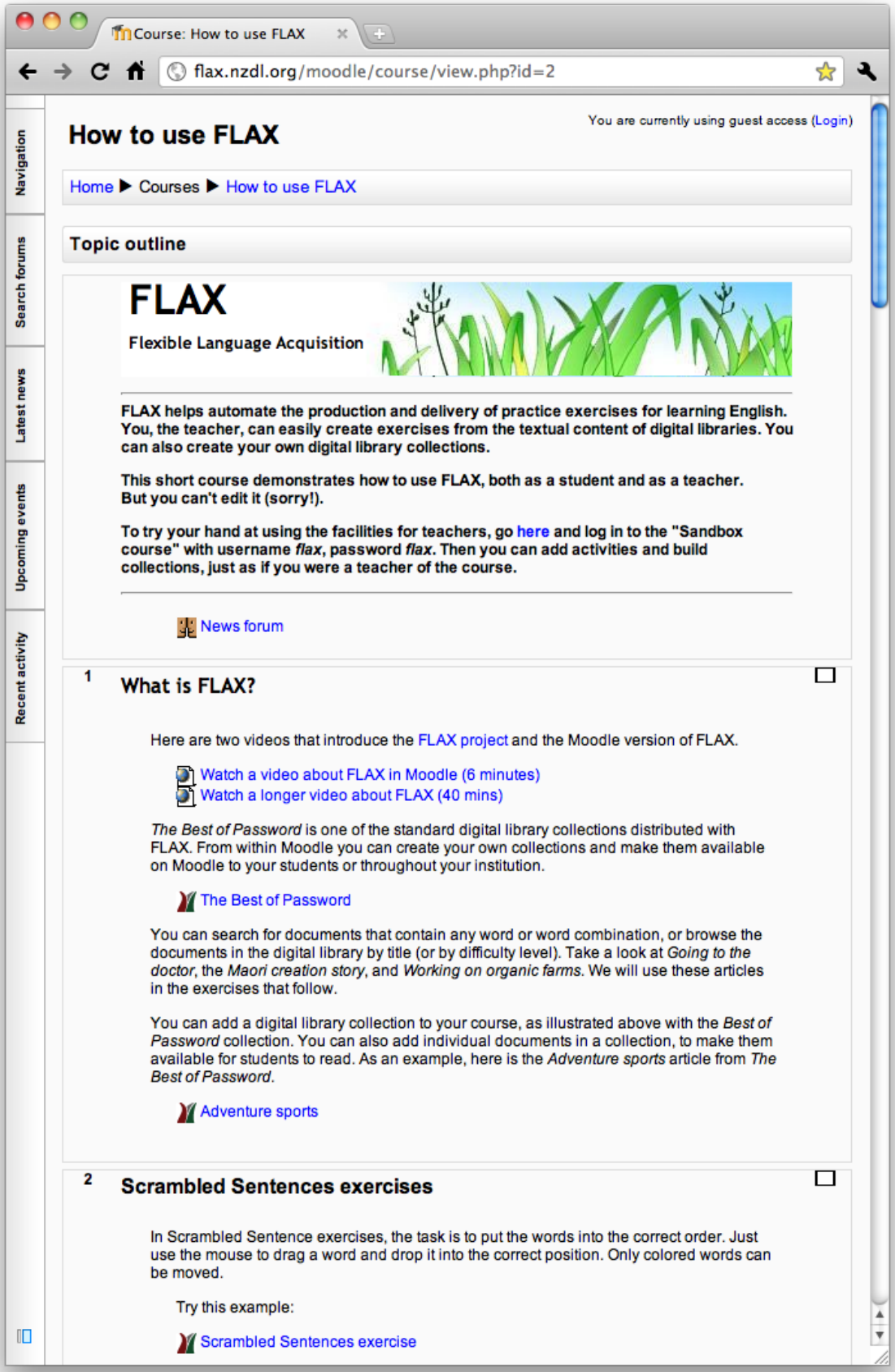
FLAX focuses on written language, and on learning English. However, audio can be incorporated into dictation-style activities, and some games use images to help conceptual understanding and foster descriptive power. Also, the underlying ideas are language independent: we have experimented with Spanish, German, and Chinese text, and envisage different language versions in the future. FLAX encourages group learning and communication – some games embody built-in chat facilities and real-time scoreboards. All interaction takes place using ordinary Web browsers.

Great emphasis is placed on collocations. You know words by the company they keep: which of the adjectives *strong* or *powerful* applies to *tea* and *computers*; or *big* or *heavy* to *rain* and *mistake*. Lacking an inadequate vocabulary of collocations, even students who know many individual words struggle to express ideas simply and precisely. FLAX contains collocation games and special facilities to help study and remember collocations.

FLAX is an open source project. You can use it on our demonstration site, or download the software and run it yourself. Please help yourself! – and help us by providing feedback, and, if you can, technical expertise to extend it in different ways and to other languages.

Through many examples, this book explains both the vision and the language learning system that embodies it.

[1] It's confession time. The name originated as a bad acronym: *Flexible Language Acquisition*. We prefer to think of it simply as FLAX.



The *How to use FLAX* Moodle course

What FLAX is …

FLAX is a tool for teachers to create language learning exercises for their students – or for motivated students to create language exercises for themselves. It is "authorable" software; teachers can adapt the material to their students' needs.

Using FLAX, you can create your own exercises very quickly. The exercise content is automatically drawn from a digital library and configured according to your specifications. This is far quicker than creating the content yourself. Moreover, before the exercises are presented to students you can check them to ensure that every item reaches your own standards, and discard any that do not.

We also envisage that you will build your own digital library collection from material suitable for your class. You can do this quickly and easily if you have documents in electronic form (e.g. Word files) or text that you can cut and paste from elsewhere (e.g. a Web page).

… and what it's not

FLAX is not a course for learning English (or any other language). And it does not by itself allow you to create such courses. With FLAX, you can individual exercises of different types. If you want to put them together into a course that learners proceed through in a predetermined sequence, you will need to use a learning management system. FLAX fits smoothly into the Moodle course management system. It also works stand-alone as a way of creating and presenting exercises – but it does not lead students through them.

What this book is …

This book describes how to use FLAX, including how its various exercise types look to students, how teachers create them, how to build a digital library collection from your own content, and a little bit about how it works. We cover both the Moodle and stand-alone versions of FLAX. The book is based on the Moodle course illustrated on the facing page.[2]

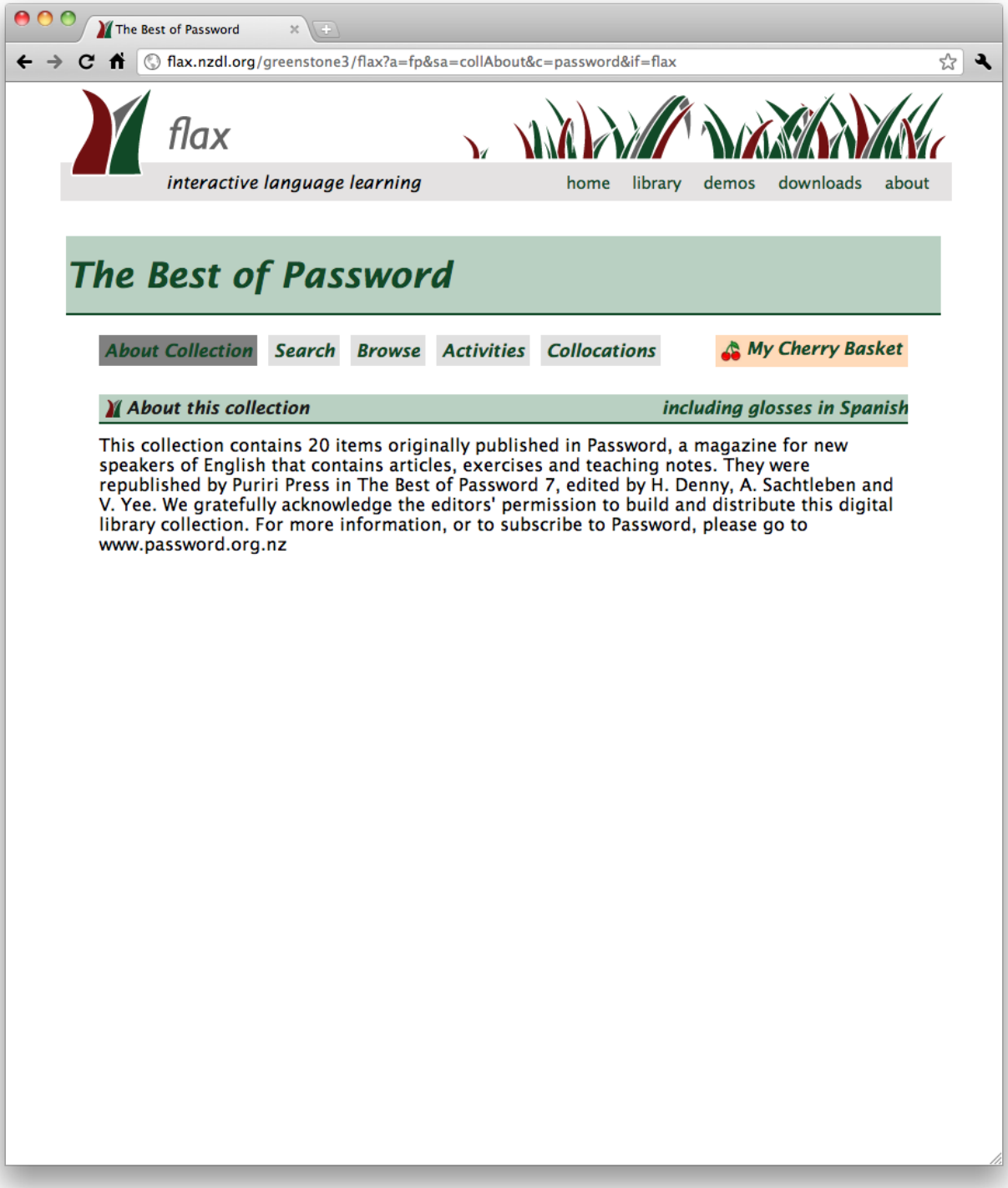
For pedagogical reasons we begin by looking at exercises made from the material in an existing digital library collection, in Chapter 4. Then Chapter 5 shows how to build your own collection. In practice you will work in the reverse order: first build a collection; then create exercises based on it. Chapter 6 shows what you can do with collocations.

… and what it's not

The examples in this book are chosen simply to illustrate how exercises of different types can be made, not because of their pedagogical value in a particular classroom situation. They are drawn from a particular example of a digital library collection, which reflects our context in New Zealand and is almost certainly not a suitable collection for teaching English in your own environment.

Our advice is to make a collection of your own material, and then design exercises!

[2] http://flax.nzdl.org/moodle/course/view.php?id=2



Home page of the *Best of Password* collection

2. Collections

FLAX organizes documents into *collections* ranging from one or two documents to millions of them. Typically, language teachers either build a small collection themselves with a handful of documents that they choose, or make use of collections that others have built or ones distributed with FLAX as samples. Collections need not be small, however: underpinning the FLAX system is digital library technology that can accommodate vast collections, including entire libraries. First we look at how collections are used – by both students and teachers. Later we will see how to create them (Chapter 5).

The picture opposite shows the home page of a FLAX collection entitled *The Best of Password* (this collection is distributed with the software). The home page is where you go when you click the *About Collection* button in the control bar near the top of the page. The other buttons let you access the documents in different ways. (Some of them do not always appear: it depends on how the collection was built.) This is what the buttons do:

- *Search* enables you to search the collection for particular documents, or documents containing particular words, or for particular collocations
- *Browse* lets you browse the documents by title
- *Activities* takes you to language games that have been built for the collection, and allows you to create new ones
- *Collocations* lets you study the collocations in the documents
- *My Cherry Basket* shows you the collocations ("cherries") that you have collected.

This particular collection includes glosses in Spanish, which means that you can see the Spanish translation of words and phrases that appear in the documents. These glosses are powered by Google: FLAX sends documents to Google Translate and receives a list of translations corresponding to the words and phrases in the text. The translation can be viewed by clicking the left mouse button on words while reading in FLAX (or by double-clicking).

As the home page shown opposite explains, this collection contains articles published in *Password*, a magazine for new speakers of English that contains articles, exercises and teaching notes.[3]

[3] Published by Puriri Press as *The Best of Password 7*, edited by H. Denny, A. Sachtleben and V. Yee. We gratefully acknowledge the editors' permission to build and distribute this collection. To subscribe to *Password*, please visit http://www.password.org.nz.

"Adventure sports," a document in the *Best of Password* collection

2.1 Documents

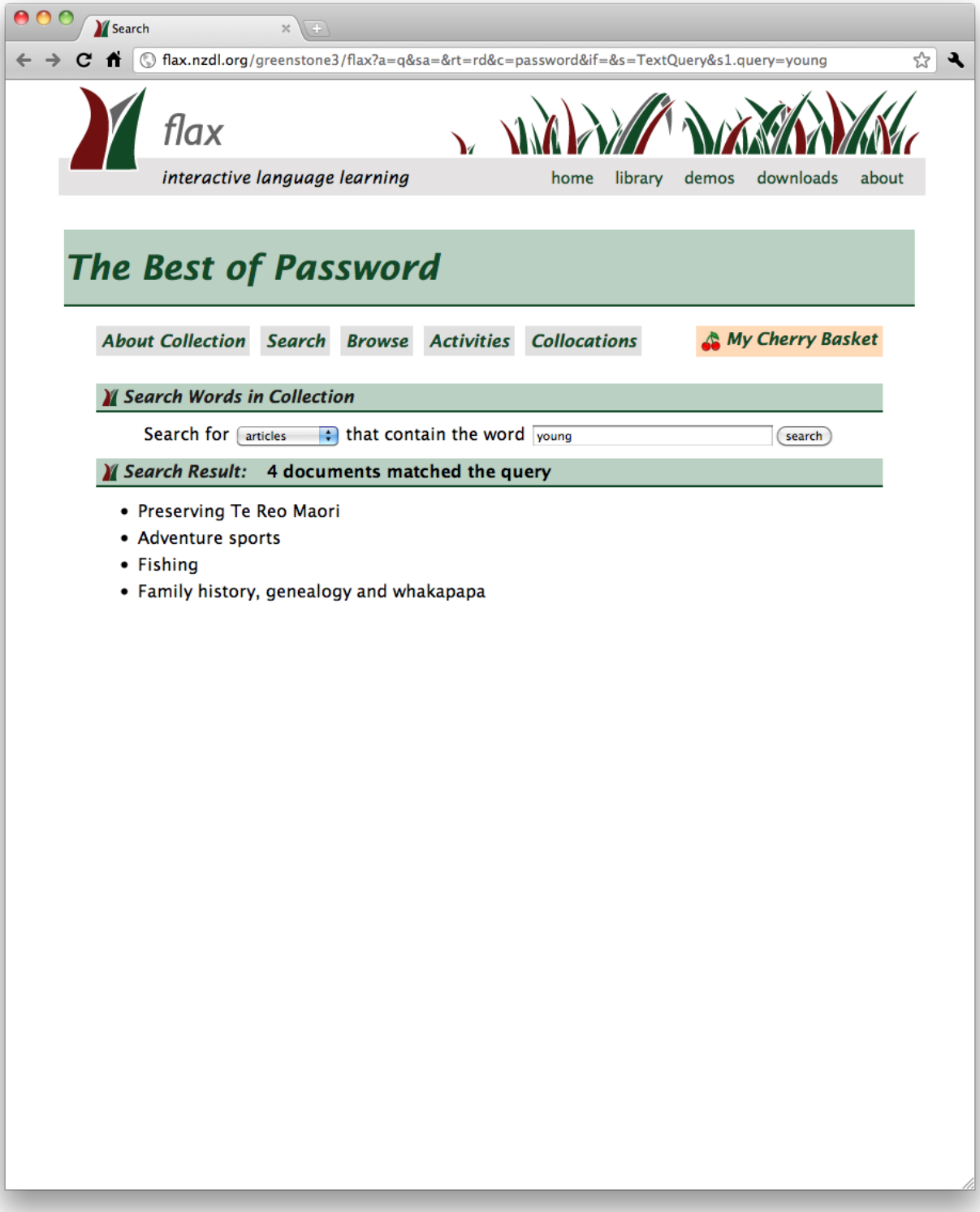
There are 20 documents in the *Best of Password* collection. Here is one of them, called "Adventure sports." Most documents in the collection address topics relevant to New Zealand, and this is no exception. It is often helpful for teachers to create their own collections that contain documents relevant in a local context, or focused on a particular topic area (such as business or geology). That way, students can work with documents they can easily relate to, and learn vocabulary and expressions used in that context. You will soon learn how to create collections of your own documents (Chapter 5).

The text talks about adventure sports in New Zealand. The illustration shows the original form of the document; you can also display a version in which collocations are highlighted. The tab labeled *noun* highlights collocations that begin with a noun (excluding preceding determiners, etc.). *Verb*, *preposition* and *adjective* do the same for other parts of speech. Not all such collocations are highlighted because part of speech detection is done automatically, and is not infallible. (For example, sentence-initial nouns are tagged as proper nouns and excluded from collocations.) We will learn more about collocations and how they are identified later (Chapter 6).

The accompanying image illustrates white-water rafting and rock-climbing. It is easy to associate images with documents when creating your own collections. Often just one image is associated with each document, and it is displayed at the beginning as an introductory illustration (as here). Sometimes people make collections where each "document" is an image, along with a caption or some explanatory text. It is possible to associate several images with a document, in which case they are equally spaced throughout it. The documents you include in FLAX collections are intended to be simple: controlled image placement is not possible.

Audio versions of the document are available too. If the player widget above the document image is activated, FLAX reads the document to you. In fact, there are two audio versions of documents in this collection: one in British English (as shown) and the other in New Zealand English (accessed by the menu). This facility allows students to listen to documents as well as read them – but you can include any audio accompaniment, not just a spoken version. Being able to listen to documents enables various "dictation" activities. When creating your own collections it is up to you to provide appropriate audio files, if you want.

Spanish translations of the words in the document are also included in this collection. In this example the user has left-clicked *fast-flowing* to bring up the Spanish translation, *de flujo rápido*, which is presented as a "gloss" in a pop-up window. Words are disambiguated according to their context by the Google Translate system (Section 5.2).



Searching the *Best of Password* collection for the word “young”

2.2 Searching

When you press the *Search* button you get a standard box into which you type a word (or words) to seek. The illustration shows a search for the word “young.” In this case four documents are returned, and their titles are shown. Clicking the second one, for example, leads to the “Adventure sports” article we saw earlier. The only difference is that (depending on your Web browser setup) the search term – the word “young” – is highlighted in yellow wherever it appears in the document.

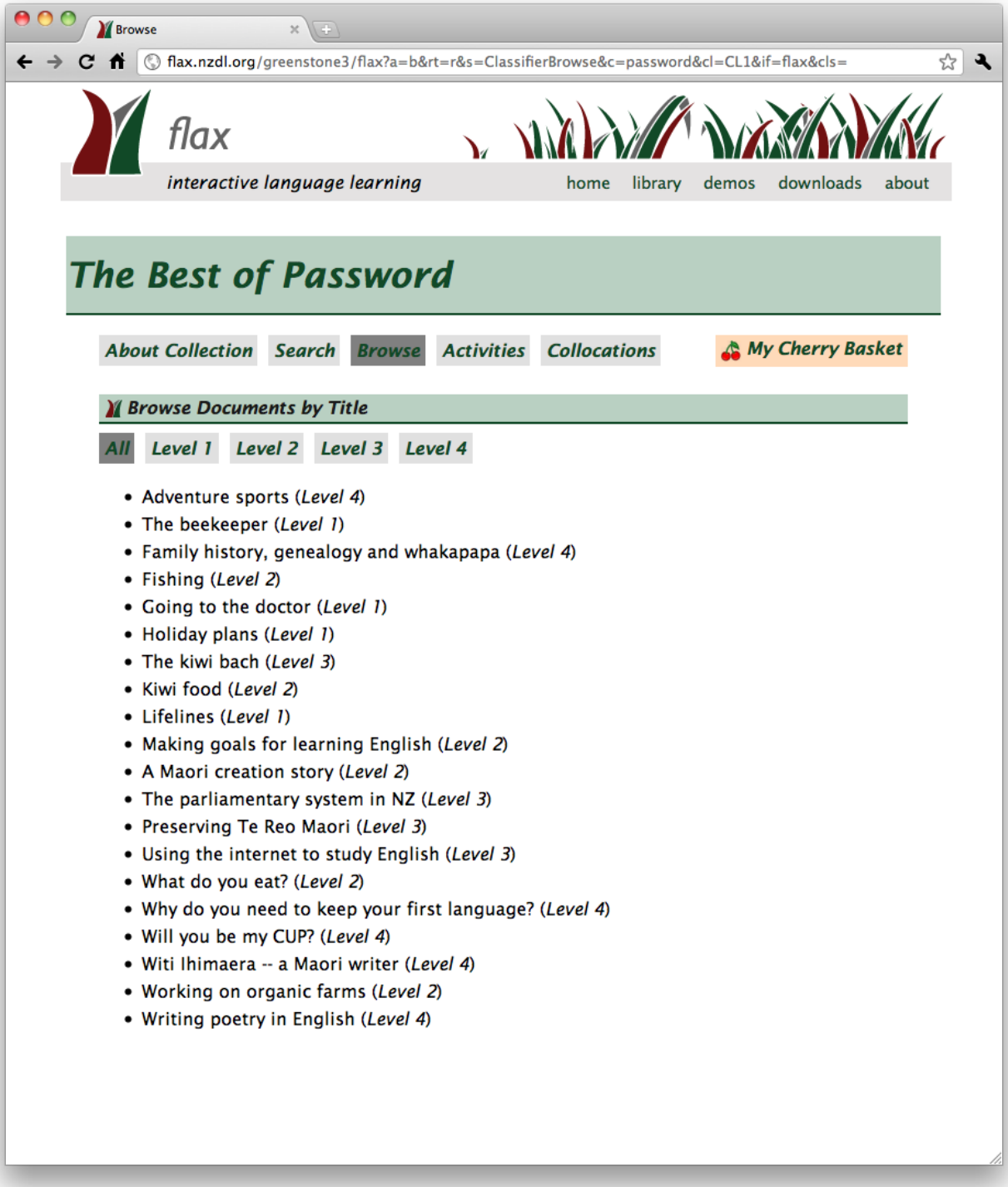
Searching is case-insensitive: the result is the same whether the query uses capital letters or small letters (*Young* is the same as *young*). However, you need to get the ending right – *computers* is *not* the same as *computer*. And if you specify more than one word, documents that contain any of them are returned. If you want to look for a phrase like *adventure sports* you need to put it in quotation marks.

Searching in FLAX is fast: even collections with millions of documents are searched almost instantly. If it seems slow for you, that’s because of the network connection, not the searching itself. FLAX is built on digital library technology that is extremely efficient for large collections.

As well as searching articles and titles, you can also search collocations. You do this by pulling down the menu labeled *Search for articles* and selecting *collocations*. For example, a search for *identity* returns three collocations:

- *keeping their identity*
- *retain their identity*
- *cultural identity.*

Each of these appears in an article in the collection, and alongside each is shown the context in which it appears. There are ways of exploring collocations further – e.g., clicking *retain* in the second example brings up many other collocations that use this word. There are ways of seeking documents that contain that particular collocation in a standard corpus of English writing, and on the Web. And there are ways of “picking” the collocation and putting it into your own basket of favorite collocations. We will learn more about these when we look at FLAX’s collocation facilities (Chapter 6).



Browsing the *Best of Password* collection

2.3 Browsing

The *Browse* button on the collection's home page lists all the documents in it. The illustration shows the twenty documents in the *Best of Password* collection. Clicking any one displays the document, just as before.

Each document is assigned a difficulty level by the user when the collection is created. In this example the levels range from 1 to 4, easy to hard. However, you can type in your own levels when you create a collection, so that instead of numbers the levels might be the words *easy*, *moderate*, and *hard*. When you create a collection it's up to you to decide what difficulty scale to use.

You can see just the documents at a particular difficulty level using the buttons on the browsing page above the list of document titles.

2.4 Activities, collocations, cherry basket

The remaining three navigation buttons on the collection's home page are discussed later.

- *Activities* takes you to language games that have been built for the collection, and allows you to create new ones.

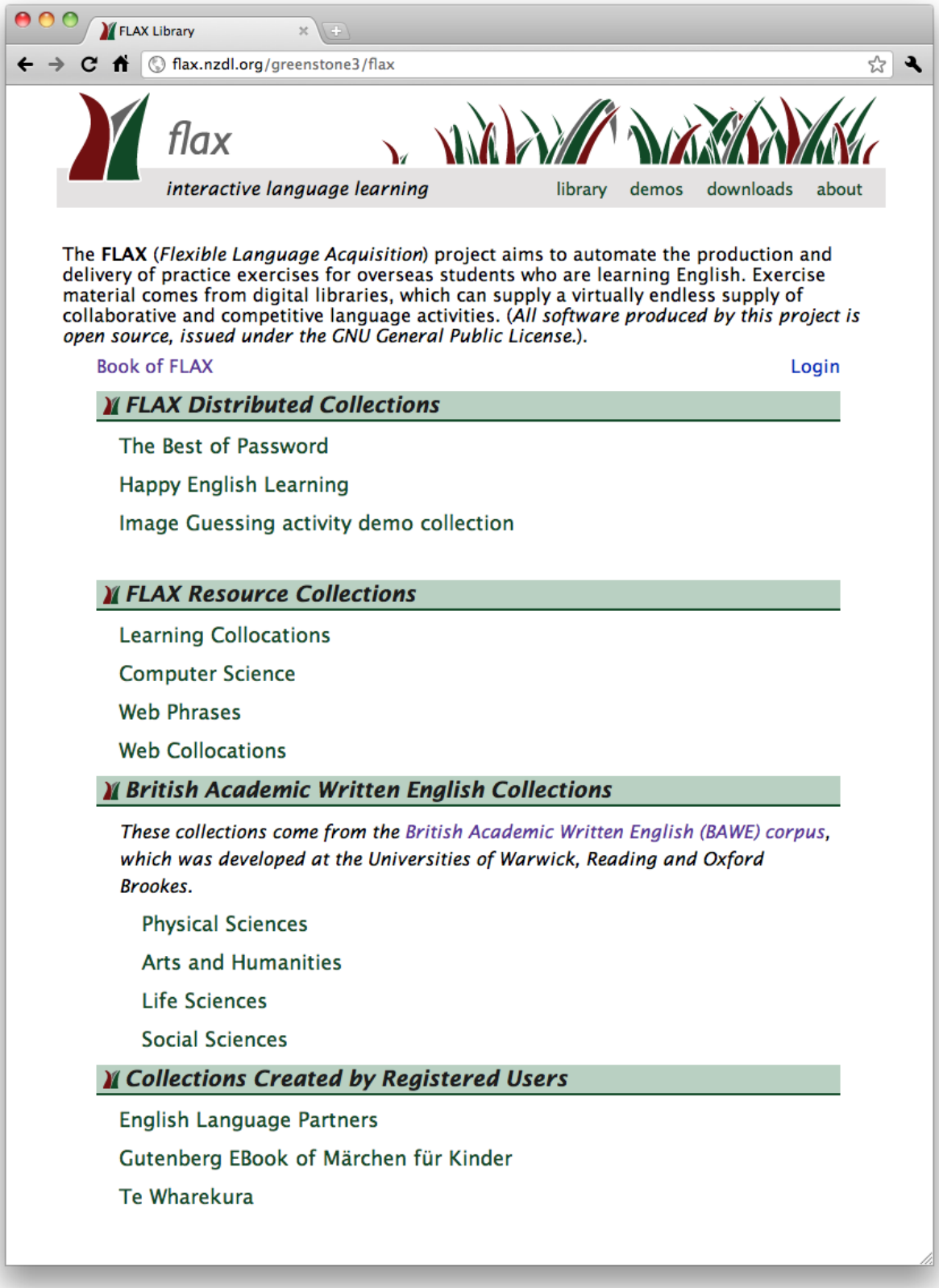
  FLAX activities are discussed in Chapter 4. This button does not appear if you are working in Moodle, where language games are instead integrated into the course and you create new ones using Moodle's *Add an activity* menu.

- *Collocations* lets you study the collocations in the documents.

  Collocations are small sequences of words that often appear together. They are discussed in Chapter 6.

- *My Cherry Basket* shows you the collocations ("cherries") that you have collected.

  FLAX provides a facility for "picking" favorite collocations and saving them in a kind of notebook that we call a cherry basket. These are discussed in Section 6.4.



The stand-alone FLAX website, showing the list of collections

3. Stand-alone FLAX or Moodle-FLAX?

FLAX runs both as a stand-alone software system and as a facility within the Moodle course management system.[4] The difference affects some operational details, but not the main core of FLAX's functionality. The process of creating language activities, using activities, and building collections does not depend on which way you are working. But the way you get started does.

Stand-alone FLAX ...

To use FLAX in stand-alone mode, go to the URL of the FLAX server.[5] This will show you the image on the opposite page. It gives a list of the standard collections that are available on the server, plus a list of collections created by users. Just click the name of any collection to go to its home page,

If you have installed the FLAX server on your own computer you will see just the collections at the top ("FLAX Distributed Collections") and bottom ("Collections Created by Registered Users"), but not the ones in between, which are specific to the FLAX project server. FLAX is open source software: the server is completely free, and easy to install (see Section 7.1).

To create your own collections, you need to register as a user.[6] After doing this you can log in using the button near the top right of the screen. Any collections you create will be available to all users. If you want to keep them private, you need to install your own server – which is what we recommend.

The way you create new collections is exactly the same for stand-alone FLAX as for Moodle-FLAX, and is described in Chapter 5.

[4] Moodle is at http://moodle.org.

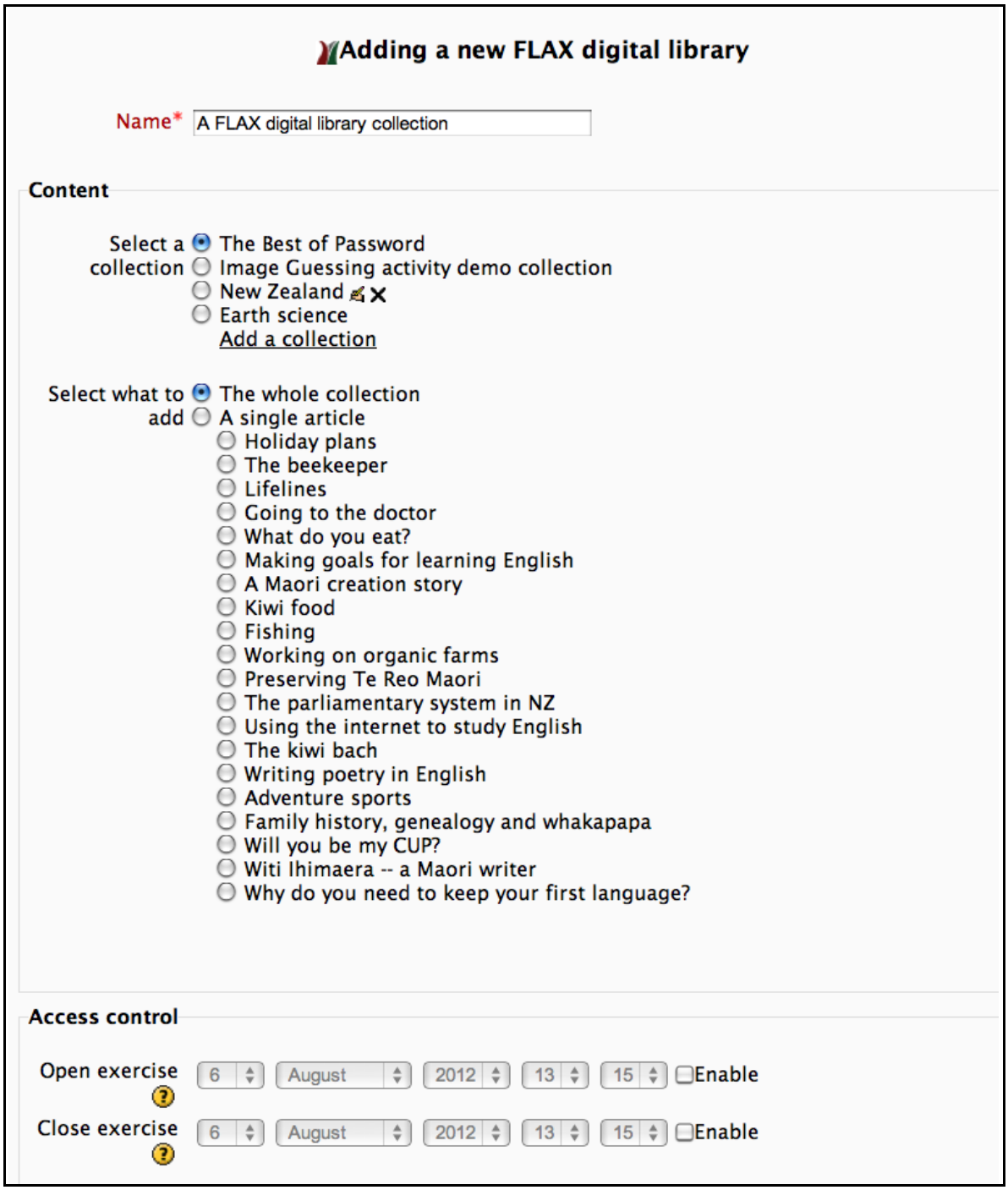
[5] The FLAX project demonstration server is at http://flax.nzdl.org. Anyone can use it.

[6] You can register as a user of the demonstration server by emailing your name and the name of the organization where you work or study to flax@cs.waikato.ac.nz.

The Best of Password is one of the standard digital library collections distributed with FLAX. From within Moodle you can create your own collections and make them available on Moodle to your students or throughout your institution.

The Best of Password

A FLAX collection in a Moodle course



Adding a FLAX collection or article to a Moodle course

… or Moodle-FLAX

For Moodle users, FLAX provides students in a class with convenient searching and browsing facilities that are accessed directly from their course. And for teachers, it lets them create new activities and new document collections without leaving the Moodle system.

Before you begin, the administrator of your Moodle system must first install the Moodle-FLAX module, which is available from both the FLAX and Moodle websites. Assuming that this module is installed in your system, a digital library collection is just another kind of Moodle resource. The small top picture opposite shows a fragment of a FLAX course that contains a digital library collection, whose name is preceded by the FLAX logo. Click it to enter the collection, exactly as shown in Chapter 2.[7]

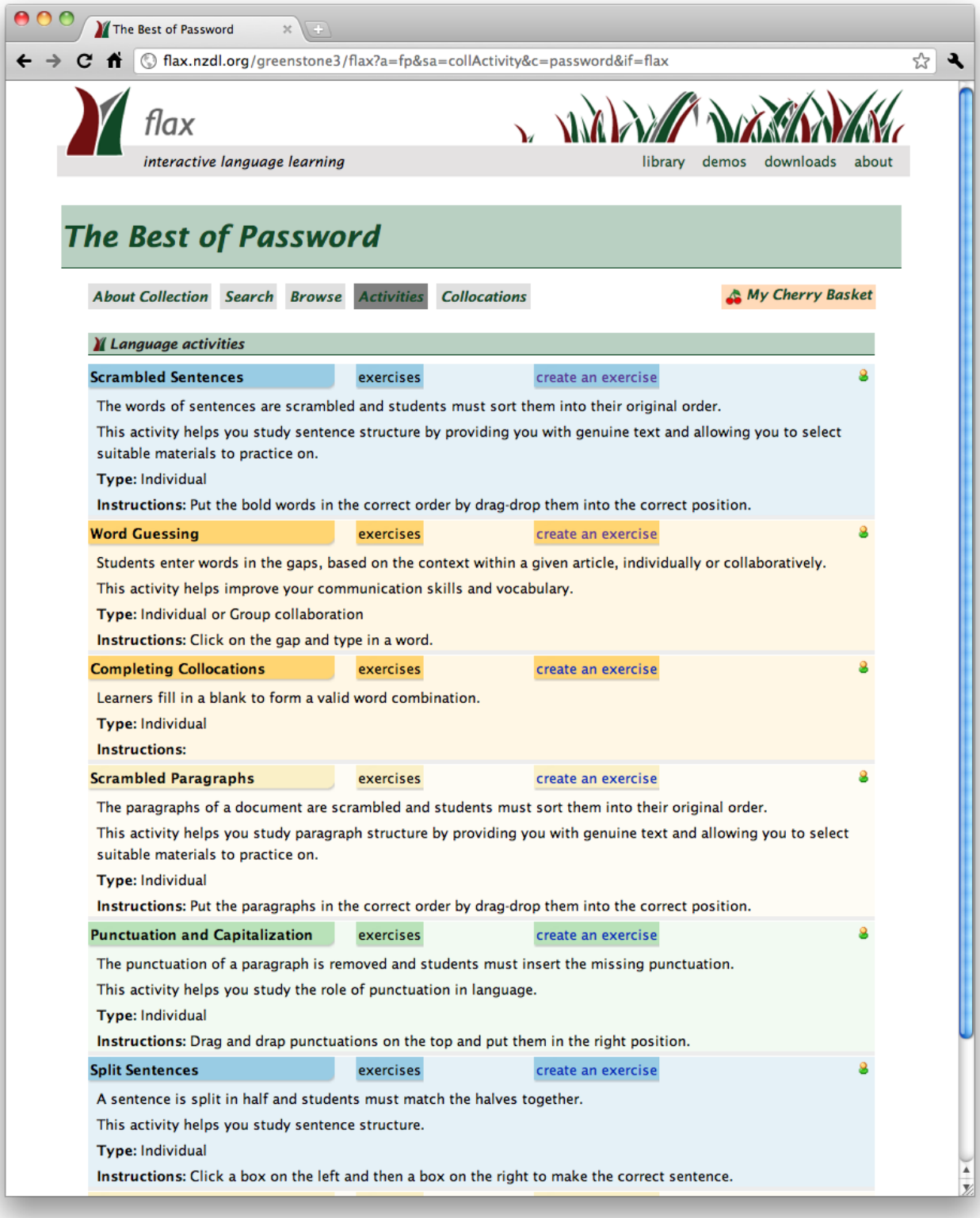
In order to add to a course a FLAX collection, or a single document in a collection, turn editing on and use the standard Moodle *Add an activity* menu. When the Moodle-FLAX module is installed, this contains two new items:

- FLAX digital library
- FLAX language exercise.

The first takes you to the page shown opposite, where you can select a collection or a single article in a collection. Here there are four collections, *The Best of Password*, *Image Guessing activity demo collection*, *New Zealand*, and *Earth science*. The third one, *New Zealand*, was added by the logged-in user, so he or she is able to delete or edit it via the two icons that appear beside its name. The *Best of Password* collection is selected, and the articles it contains appear in the list below.

There is also a link to *Add a collection* for when you want to build your own collection; this process is described in Chapter 5. The list of collections will contain any new ones you – or anyone else – has added to your Moodle installation, and the list of articles shows the contents of the collection you have selected.

[7] You can see this in the *How to use FLAX* course, which contains both the *Best of Password* collection and the single article "Adventure sports".



Language activities associated with the *Best of Password* collection

4. Language activities

The purpose of FLAX is to present language games to students to enhance their learning of a second language. The system is not, in fact, restricted to English, but some features work best if English is the target language – ones involving language parsing, for example (see Section 7.3 for a discussion of other languages).

Six activity types are associated with the *Best of Password* collection that we have used as an illustration. They are:

- Scrambled Sentences
- Scrambled Paragraphs
- Split Sentences
- Punctuation and Capitalization
- Word Guessing
- Completing Collocations

In the stand-alone FLAX system, they can be accessed from the collection's home page using the *Activities* button, as shown. In the Moodle FLAX system, the teacher builds individual activities into the course, which is where students invoke them.

There is a further activity type, specifically for collections of images:

- Image Guessing.

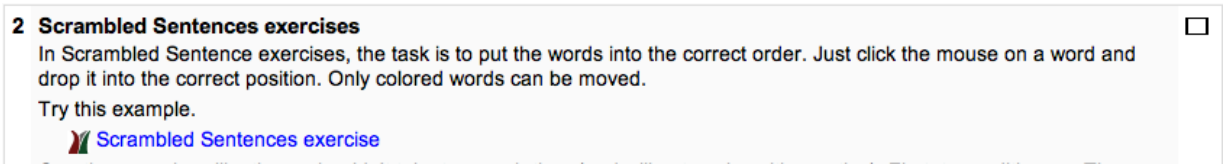
This section explains these activity types.

Beside each of the four exercise types in the illustration are two buttons, *exercises* and *create an exercise*. The first leads to a list of games that have been created for this collection. The second allows you to create your own game. Anyone can do this – including students. In fact, it is particularly instructive for students to create games to help reinforce something that they are learning.

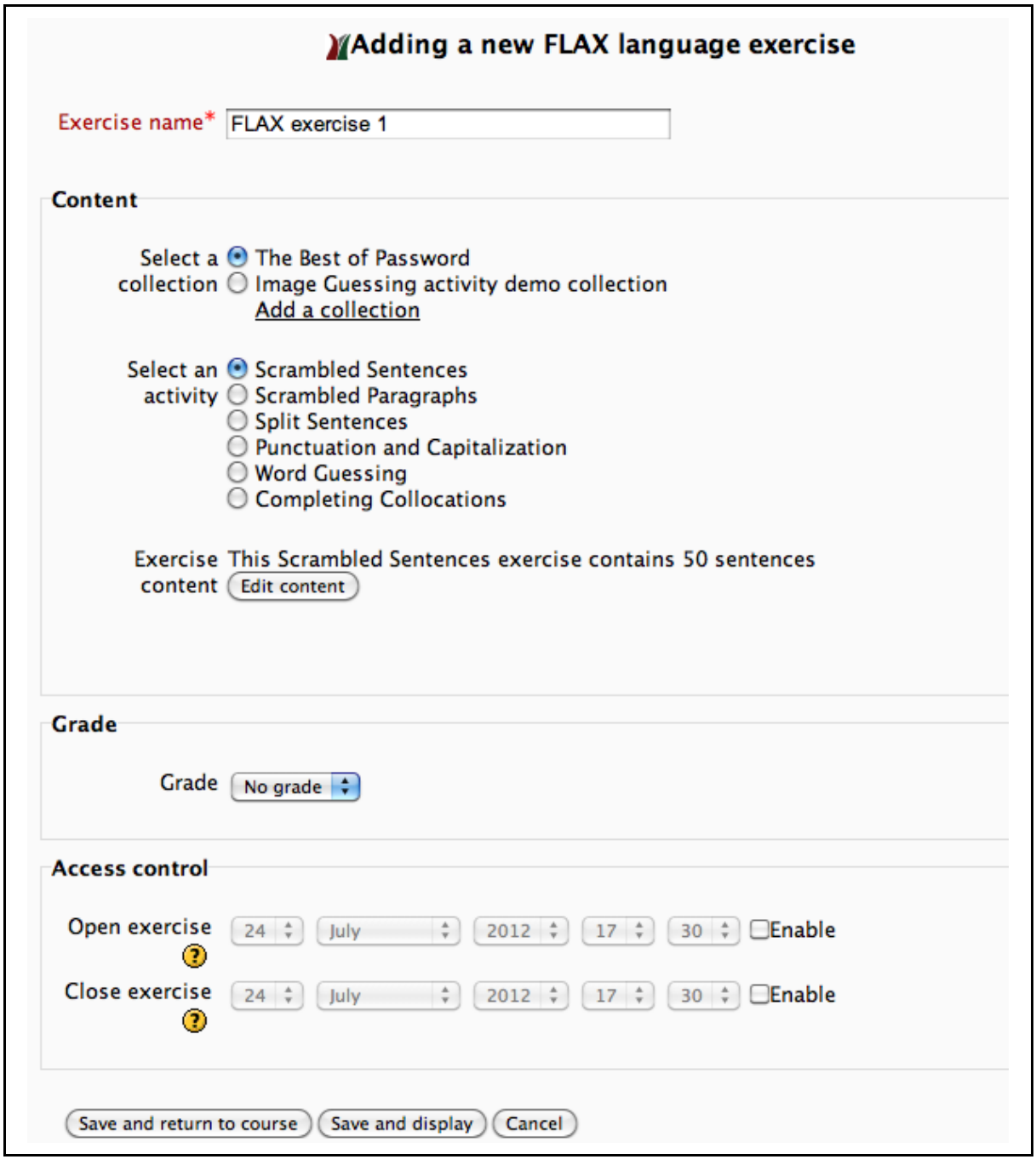
However, although anyone can *create* games, only registered teachers can *save* them. To do so, you log in with a username and password using the button near the top right of the screen.[8]

Before examining the individual exercise types, let's take a quick look at how language activities are created and accessed in Moodle.

[8] You can register as a user of the FLAX demonstration server at http://flax.nzdl.org by emailing your name and the name of the organization where you work or study to flax@cs.waikato.ac.nz.



A FLAX exercise in a Moodle course



Adding a FLAX exercise to a course

4.1 Language activities in Moodle

If you are using Moodle, language activities are incorporated directly into the course, whereas with stand-alone FLAX they are accessed through the collection itself. They appear as a resource in the course, just like any other resource, but preceded by the FLAX logo  . The accompanying image (at the top) shows a fragment of a course that contains a FLAX game called *Scrambled Sentences exercise*. Students click the link to play the game.

In order to add a language activity to a course, turn editing on and use the standard Moodle *Add an activity* menu. Click the second of the FLAX items, which is:

- FLAX language exercise.

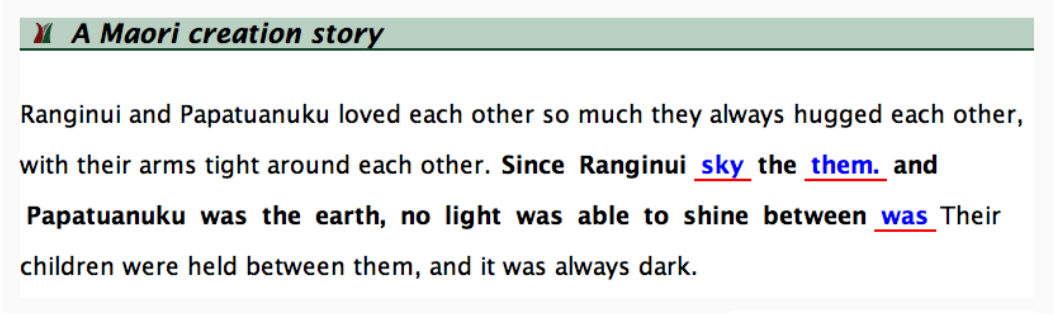
This takes you to the page shown opposite, where you can select a collection and then an activity type that belongs to the collection. (As before, it also contains a link to *Add a collection*, which is described in Chapter 5.) The list of collections is exactly the same as before. Different activities may be associated with different collections; for example, the *Image Guessing* activity mentioned above is not associated with the *Best of Password* collection.

Having selected a collection and an activity type, click *Save and return to course*. This creates an exercise with default parameters and puts it into your course.

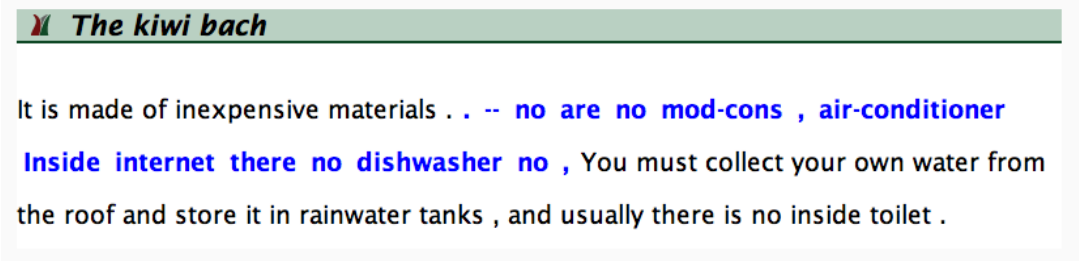
Probably, however, you will want to configure the activity first. In that case click *Edit content*. That takes you directly to a page that allows teachers to set parameters for the exercise, exactly the same as in stand-alone FLAX.

Before showing to design games, however, let's see how they look to the student. We start with the Scrambled Sentences exercise type.

A scrambled sentence from “Why do you need to keep your first language?”



A scrambled sentence from “A Māori creation story”



A more difficult scrambled sentence, from “The kiwi bach”

4.2 Scrambled Sentences

In a Scrambled Sentence game the words of sentences are permuted and students must put them into their original order. This helps the study of sentence structure. Students are provided with genuine text, and the teacher can select suitable material for them to practice on. You click the mouse on a word, drag it to the correct position, and drop it there. Only colored words can be moved.

The first illustration shows a game created from the article “Why do you need to keep your first language” in the *Best of Password* collection. Three words are misplaced (the ones in blue). The preceding and following sentences are given, to provide context (unless the chosen sentence is the first or last in a paragraph). The correct order here, of course, is *It seems to be even more important when they have children, to encourage the children to learn English quickly*. In general, complex structures or long sentences make the exercise more challenging – and perhaps frustrating.

If the words are moved into their correct positions and *Check answer* is clicked, an encouraging message is displayed. Any words that are out of place are underlined in red. Students proceed to the next question, or, if they wish, return to earlier ones, using the buttons at the bottom.

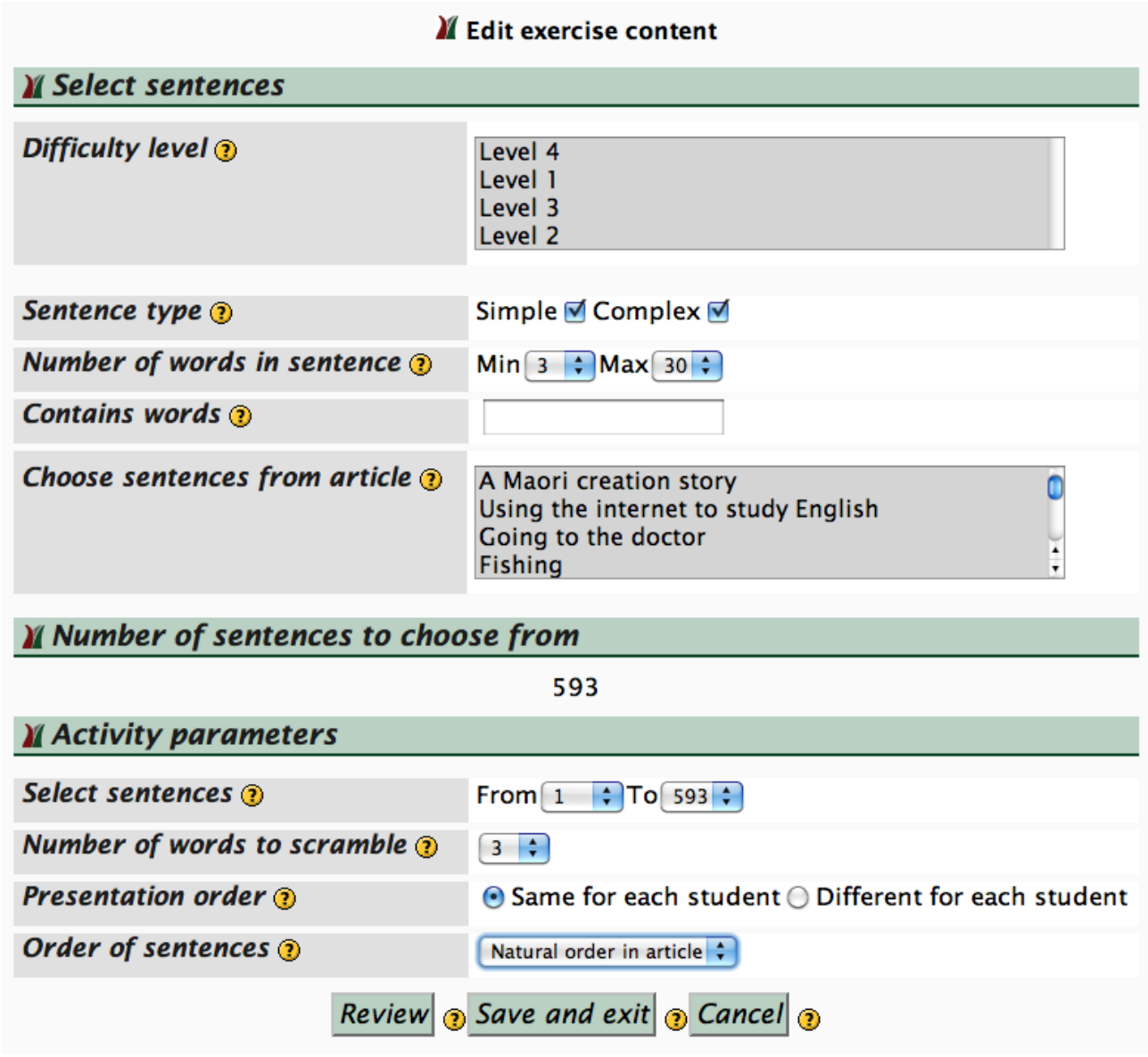
The second illustration is from the “Māori Creation Story” in the same collection, again with three words misplaced (the sentence is *Since Ranginui was the sky and Papatuanuku was the earth, no light was able to shine between them*). Had the proper nouns in a sentence like this been permuted, the task could be very difficult: teachers can avoid this when they create the exercise. A general principle that FLAX incorporates throughout is that the choices the system makes can always be overridden by the teacher – or not, at the teacher’s discretion.

The third example is much harder, because all the words in the sentence are misplaced (*Inside there are no mod-cons -- no dishwasher, no internet, no air-conditioner*).

The *Summary report* button at the top right gives the start time, end time, and the score and student’s final answer for each question.

This screenshot is from the Moodle version of FLAX. Everything looks identical in the stand-alone version, except that the first two lines – the Moodle header – are missing.

In the Moodle version, exercises can be graded or ungraded. This screenshot is from an ungraded exercise. If grading is switched on, the *Previous question* and *Check answer* buttons are grayed out and become inaccessible. Grades are recorded in the standard Moodle grading system, along with a detailed report that gives the student’s answer for each question.



Designing a Scrambled Sentences exercise

Teacher's interface for Scrambled Sentences

It is very easy to create games like these. As we explained in Section 4.1, in Moodle you turn editing on, go to *Add an activity* and select *FLAX language exercise*. Give it a name; ensure that the correct collection and exercise type is selected, and click *Edit content*. You will then see the configuration form shown opposite.

Alternatively, in stand-alone FLAX, go to the collection, click *Activities*, log in (if you haven't already done so) using the button near the top right of the screen, and click *create an exercise*. You will see exactly the same form, except that instead of the three buttons at the bottom – *Review*, *Save and exit*, *Cancel* – you get four buttons – *Review*, *Print*, *Display*, and *Save.* If you haven't logged in using the "person" icon, the *Save* button will be inactive, because although anyone can create games in the stand-alone interface, and play them, only registered teachers can save them.

The simplest way to design a Scrambled Sentences game is to accept all the defaults on this form. Simply click *Save and exit* in Moodle, or *Save* in the stand-alone interface if it's enabled, or just *Display* in the stand-alone interface to play the game you've created.

There are many options that you can specify using this form.

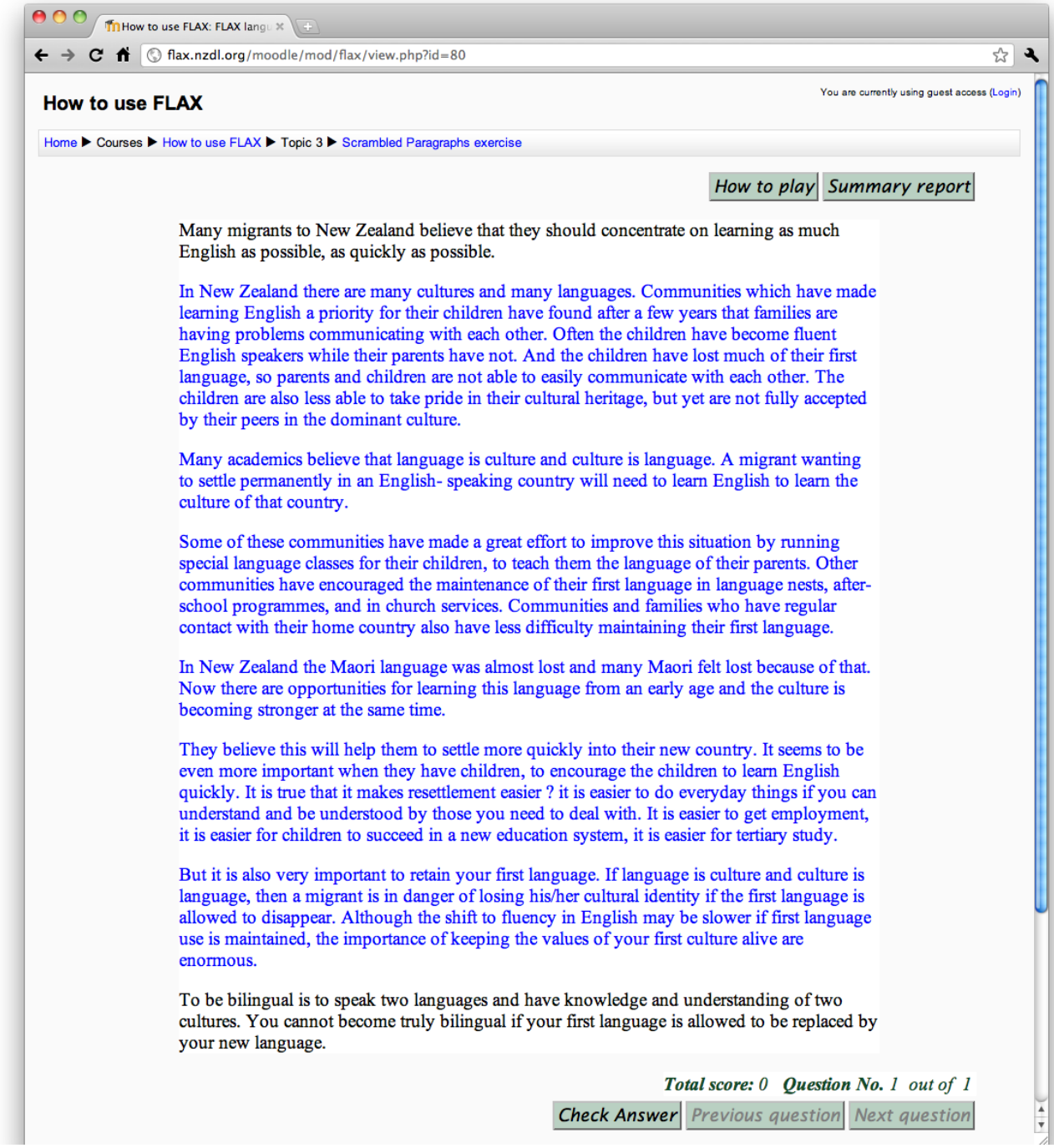
Select sentences. In the first section you can specify which document or documents the sentences are taken from, by either naming the articles or selecting a difficulty level. You can choose *Simple* (single clause) or *Complex* (multi-clause) sentences. You can specify how many words the sentences should contain (from 3 to 30 words by default). You can even give a word or words that the target sentences must contain. Click on any of the yellow question-mark icons to learn more about each option.

Number of sentences to choose from. This number, halfway down the form, changes dynamically to show how many sentences match the restrictions you have chosen.

Activity parameters. Here you can specify which sentences should be selected for the exercise: note that there is a limit of 50 on the number of sentences in an exercise. You can also specify the number of words to scramble, and whether the sentence order should be fixed or differ for each student. If they are presented in a fixed order, you can specify whether it should be the natural order in the article, shortest or longest first, or random.

Finally, you can look at the sentences that have been chosen and discard some of them if you like. To do this, click *Review* at the bottom of the form and the sentences proposed for the game will appear below. If some are unsuitable, deselect them using the checkbox beside them. It is often a good idea to specify more sentences than you need, so that you can reject unsuitable ones.

In stand-alone FLAX you can also make a printable version of the game using the *Print* button, yielding a paper form for students to complete offline.



A Scrambled Paragraphs exercise

4.3 Scrambled Paragraphs

Scrambled Paragraphs are just like Scrambled Sentences, but now you have to move entire paragraphs into their original order. This forces students to examine the structure of text and its coherence from one paragraph to the next. It draws attention to linking words ("connectors") that connect paragraphs or show relationships between very different ideas. Also, it teaches skimming skills: students learn to read only important words in order to grasp the main idea of a piece of text. As with other FLAX exercises, students work on authentic text, and the teacher can select suitable material for them to practice on.

In the illustration, blue paragraphs can be moved up and down with the mouse, but black ones are fixed. Here the teacher has chosen to fix the first and last paragraphs. When you click *Check Answer*, if everything is correct all paragraphs turn black, but if your answer is partially correct the incorrectly-placed paragraphs stay blue.

Each scrambled paragraph question is based on a single document. A single exercise can contain several questions based on different documents.

Designing and reviewing a Scrambled Paragraphs exercise

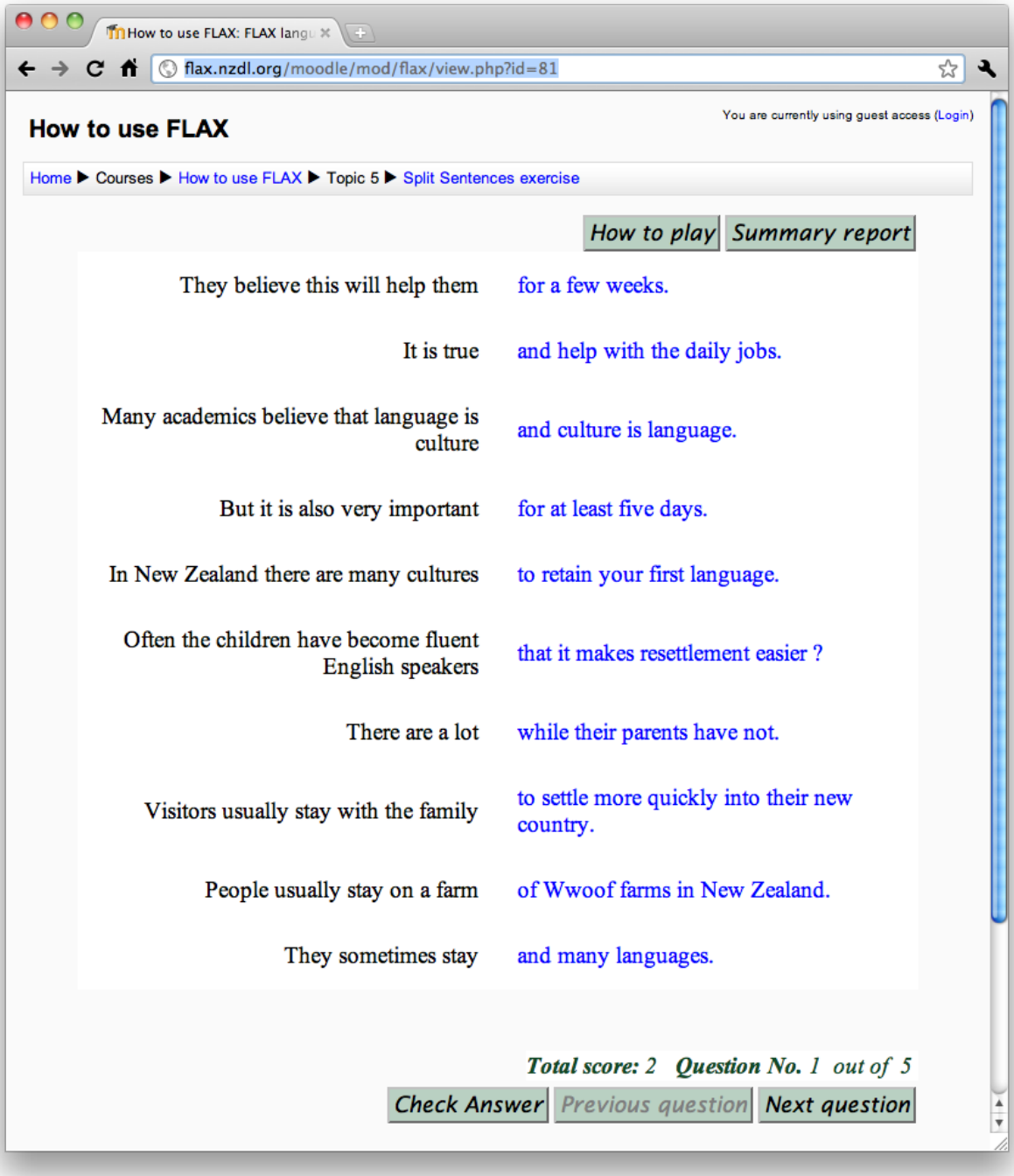
Teacher's interface for Scrambled Paragraphs

Again, these games can be created quickly. In Moodle, turn editing on; go to *Add an activity*; select *FLAX language exercise*; give it a name; ensure that the correct collection and exercise type is selected; and click *Edit content*. You will then see the configuration form shown opposite. In stand-alone FLAX, go to the collection, click *Activities*, log in (if you haven't already done so) using the button near the top right of the screen, and click *create an exercise*. In either case you will see the top part of the form shown.

There are not many controls here. You can select an article, or several articles (using the usual method of shift-clicking); each article will generate one question in the exercise. And you can select whether to fix the first and last paragraphs, or fix just the first or last paragraphs, or not fix any paragraphs at all. "Fixing" a paragraph means that it will appear in the right place on the student's screen.

In the form shown, the *Review* button has been pressed and this causes the exercise to be displayed in the lower part of the screen. This shows the paragraphs in the order in which students will see them; the numbers beside them indicate the correct order. You can move paragraphs around here to make the exercise easier; for example, you could put all paragraphs in the correct place except for two, whose order is switched.

In general, FLAX selects exercise material automatically, but the *Review* facility allows teachers to exercise some control over the content of the exercise to ensure that it is suitable for students.

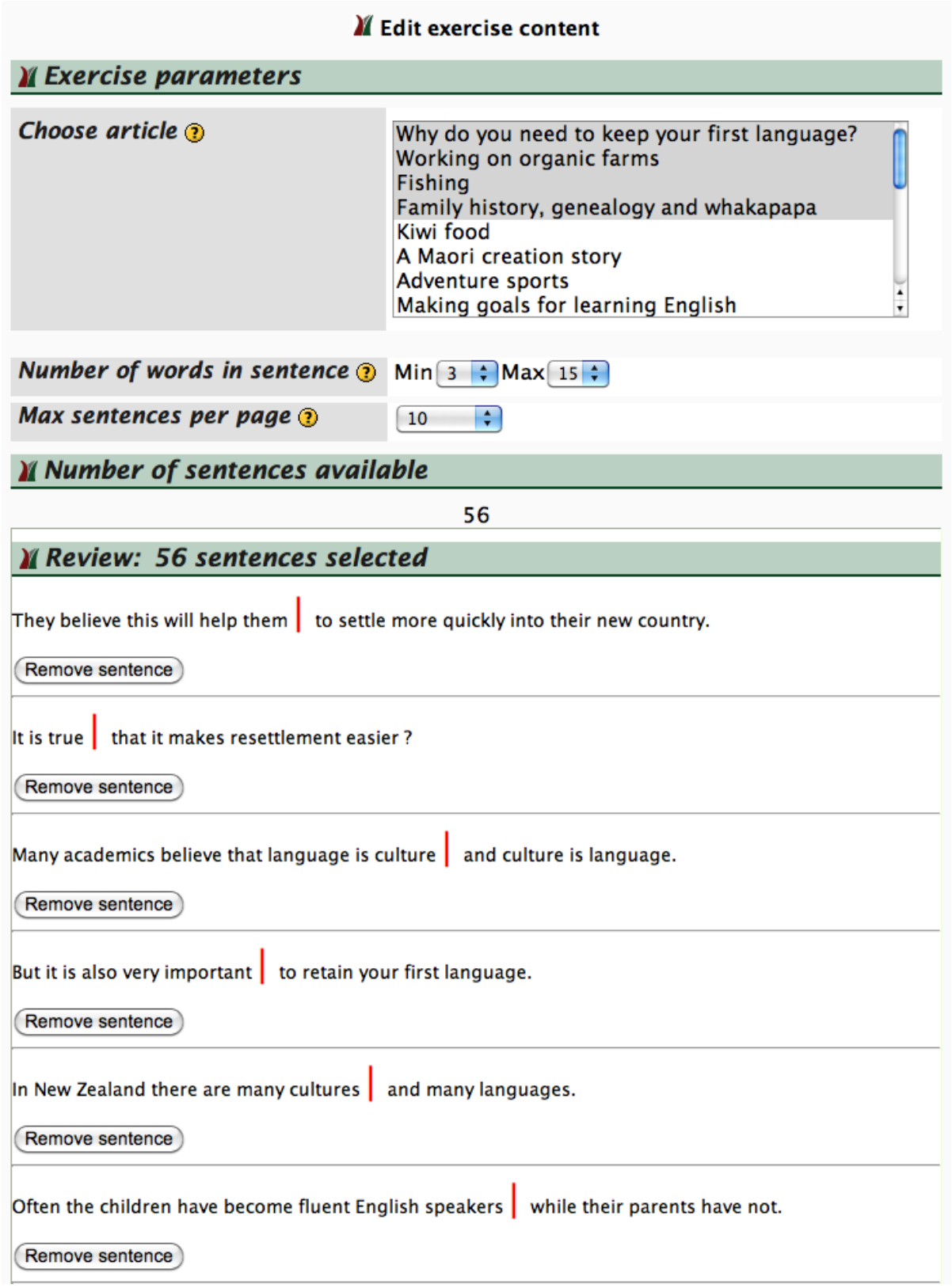


A Split Sentences exercise

4.4 Split Sentences

A Split Sentences exercise shows parts of sentences on the left and right, and students must match the second half of each sentence to its first half. Judiciously placed divisions give students experience with sentences of different structure: simple, compound or complex. They also learn how to join words or group of words together using conjunctions, and their attention is drawn to prepositions that show relationship among elements of a sentence.

The left-hand parts are shown in black and the right-hand parts in blue. Students work by moving the blue text to the appropriate place. When *Check Answer* is clicked, the correct sentences turn black.



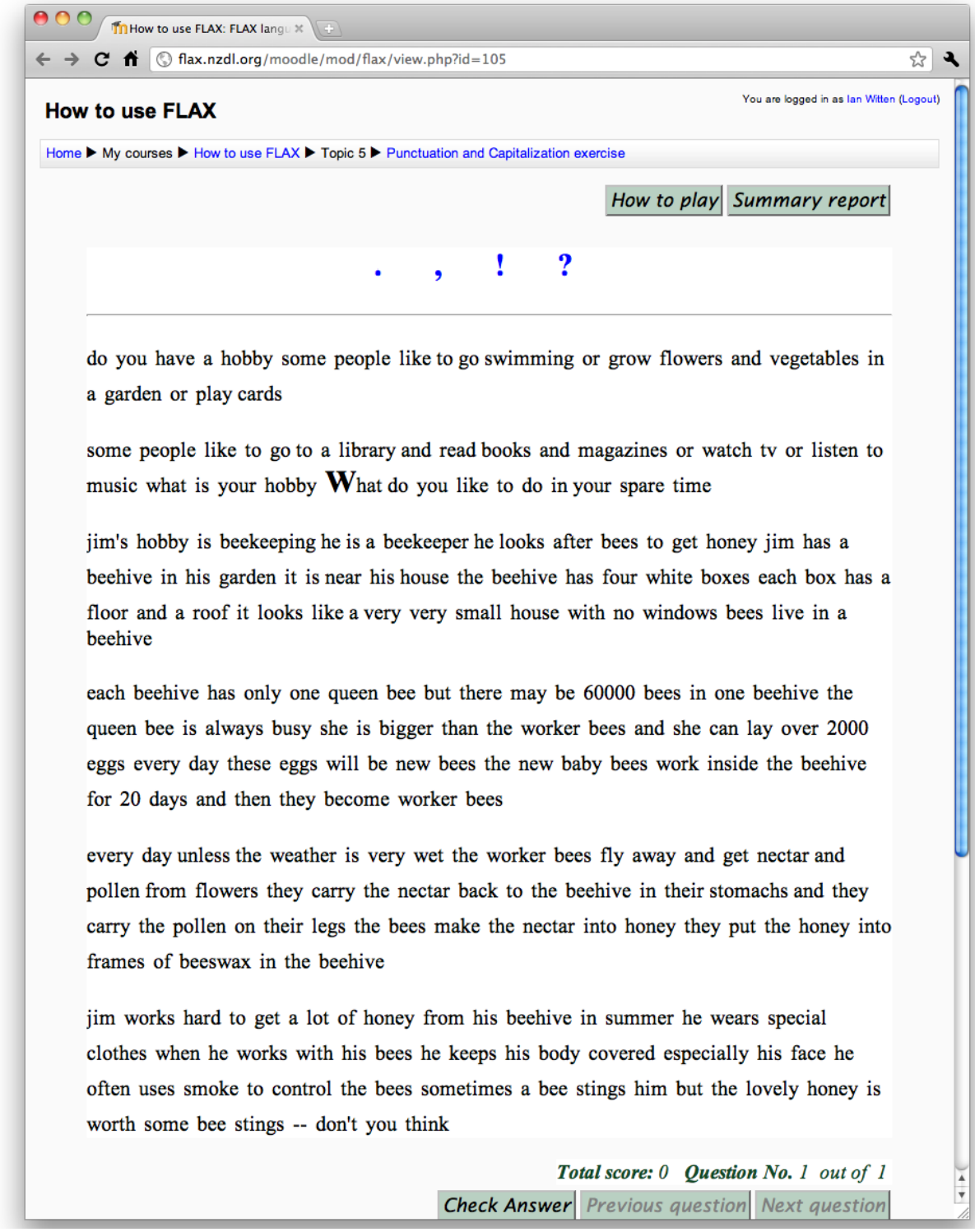
Designing and reviewing a Split Sentences exercise

Teacher's interface for Split Sentences

You already know how to create such exercises: it's just like the others. The *Edit content* form looks like this. Four articles have been selected (the first four), and they contain 56 sentences that match the "Number of words in sentence" criterion – here, between 3 and 15 words. These will be divided into groups of ten for presentation.

The *Review* button has been clicked to see how the sentences have been split. FLAX tries to place the split point in a sensible location, but if you want to adjust it you can pick up the red bar with your mouse and move it to a different position in the sentence.

The automatic splitting method first looks for prepositions and subordinating conjunctions ("if", "that", "because", "as", "since", etc.) and places a split before one of these. Otherwise it splits before coordinating conjunctions ("and", "or", "but"), or, failing that, wh-words ("where", "what", "when", "why", "which", "whose", …). Otherwise it splits before the word "to", or before a semicolon or comma. If none of these are found, the split is made at the halfway point of the sentence.



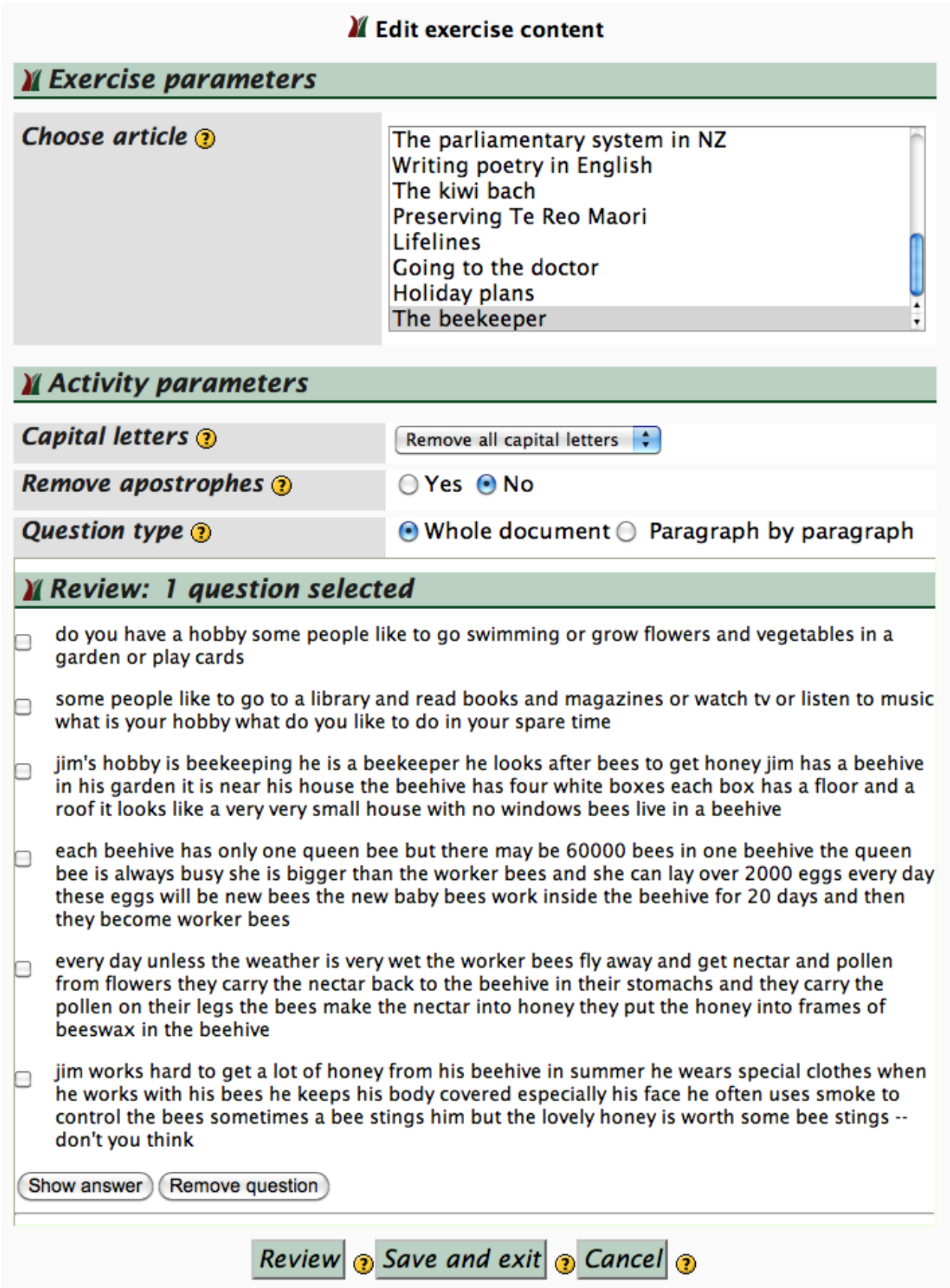
A Punctuation and Capitalization exercise

4.5 Punctuation and Capitalization

Punctuation and Capitalization exercises ask the user to place punctuation marks (. , ! and ?) in the correct positions, and to restore capitalization. In order to do this, students need to understand the flow of text and identify individual sentences. These exercises help them learn how to use punctuation correctly, and how to indicate a break or pause within a sentence. They also learn about capitalization and capitalization rules.

The facing page shows an example. You can grab the punctuation marks at the top with your mouse, drag them along the sentence word by word, and drop them wherever you want. (Click them to remove them.)

When you mouse over letters in the sentence they turn into large capitals, and if you click they stay like that. In the illustration the user has moused over the W of “What”, which is temporarily enlarged; if they were to click it would turn into an ordinary capital W. Of course, here they should do that, because this is the first word of a sentence. And they should add a question mark at the end of the same sentence.



Designing and reviewing a Punctuation and Capitalization exercise

Teacher's interface for Punctuation and Capitalization

All FLAX exercises are created the same way. As a reminder: in Moodle, turn editing on; go to *Add an activity*; select *FLAX language exercise*; give it a name; select any collection and the Punctuation and Capitalization type; and click *Edit content* to configure the exercise. In stand-alone FLAX, go to the collection, click *Activities*, log in (if you haven't already done so), and click *create an exercise*. In either case you will see the top part of the form shown opposite.

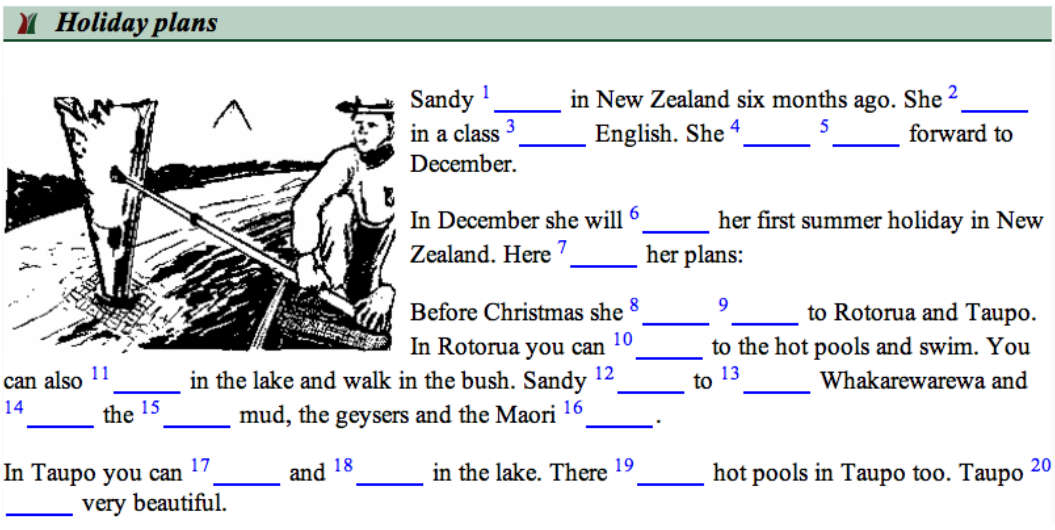
As usual, you can select one article or many.

You can choose to remove all the capital letters, or remove only sentence-initial capitals, or keep capitalization intact – in which case the exercise will simply test punctuation. You can decide whether or not apostrophes should be removed.

And you can decide whether, when the exercise is presented, the paragraphs of the documents are shown individually, or whether each entire document is shown at once, as a whole.

In the *Review* panel you can remove individual paragraphs, or first inspect the answer before deciding whether to keep the paragraph or not.

Word guessing, with hints provided



Guess the verbs!

4.6 Word Guessing

“Fill in the blanks” exercises are widely used for learning grammatical constructions. Words are excised from an article, and students must fill them in. Target words can be content words such as nouns, verbs, adjectives and adverbs, or function words such as prepositions, pronouns, conjunctions and auxiliaries.

The first illustration uses the “Working on organic farms” article in the *Best of Password* collection. The user has guessed four words correctly, corresponding to gaps number 1, 2, 4 and 5: you can see the small superscripts that precede the words the user has typed (“like”, “Wwoof”, “of” and “farms” respectively). Now the user has clicked on gap 3 (for which the correct word is “started”). The tab key moves to the next gap.

This difficult exercise is made easier because the teacher has included “hints.” At the top is a list of the words that fill the gaps. When the user enters a correct word, it disappears from the list. (Some words appear more than once because they fill different gaps.)

Another feature that makes this game easier is that the audio version is available and can be played using the player widget just above the story. In this collection, users can select either a British or New Zealand English version. As the number of words the teacher has omitted increases, the game gradually becomes a conventional dictation exercise.

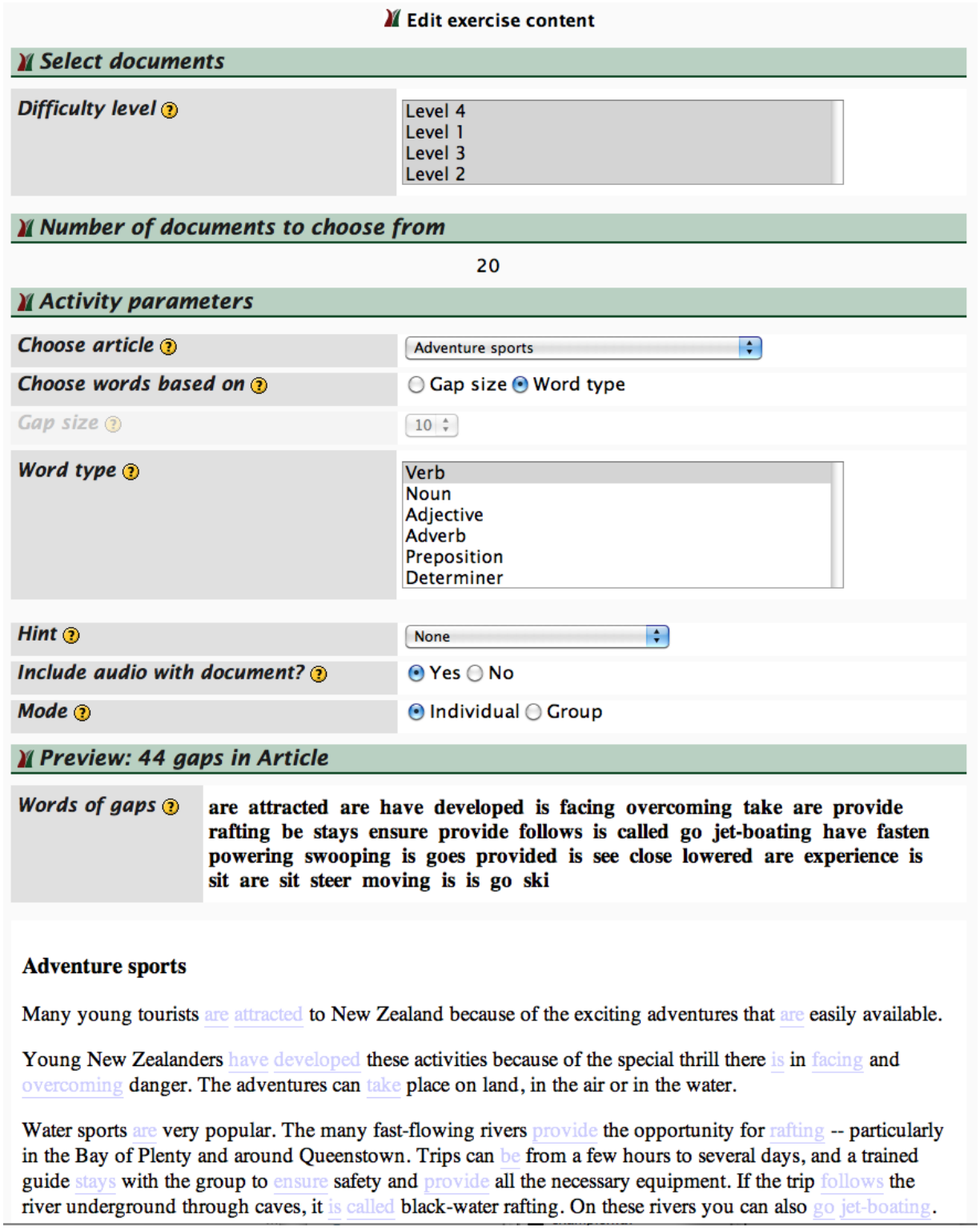
In this illustration, the system has randomly determined which words to omit, with a predetermined average gap size. Teachers can review the game and override the system’s choices. This is necessary in case, by chance, a proper name or foreign word has been omitted, which users could hardly be expected to guess (e.g., the word “Wwoof” here.)

As an alternative to random selection, the omitted words can be from a particular part of speech. FLAX determines parts of speech using a computer algorithm, which is not guaranteed to be completely correct – but again the teacher can override the choices if inappropriate ones are made. The second illustration, based on a different article, focuses on verbs, and the learner must enter the correct verb with the correct form. In this case the teacher has chosen not to provide any hints.

Again, the *Summary report* button at the top right gives the start time, end time, and the words that have been correctly guessed. This screenshot is from the Moodle version of FLAX, but the stand-alone version is identical except for the two-line Moodle header.

In the Moodle version, an activity report is produced that gives, for each user, the words that were correctly answered, and the order in which they were answered. In addition, if the exercise is graded, the results are recorded in the Moodle gradebook.

Also, in the Moodle version, Word Guessing games can take place in “group mode.” Here, FLAX updates every student’s screen any time someone in the class fills in a gap. A scoreboard at the bottom of the screen shows the top three students, and mousing over it shows how everyone is doing. This spurs competition – to score well, students must work fast! In group mode, participants can type messages to one another using a *Chat to others* button that appears beside the *Summary report* button at the top right.



Designing and reviewing a Word Guessing game

Teacher's interface for Word Guessing

To create a Word Guessing game, first select an article (if you like, you can specify a difficulty level first). You can either choose the words to omit based on the gap size, and specify the gap size; or choose certain parts of speech. In the latter case you can select one or more of these:

- Verb
- Noun
- Adjective
- Adverb
- Preposition
- Determiner

You can also choose what kind of hint to give:

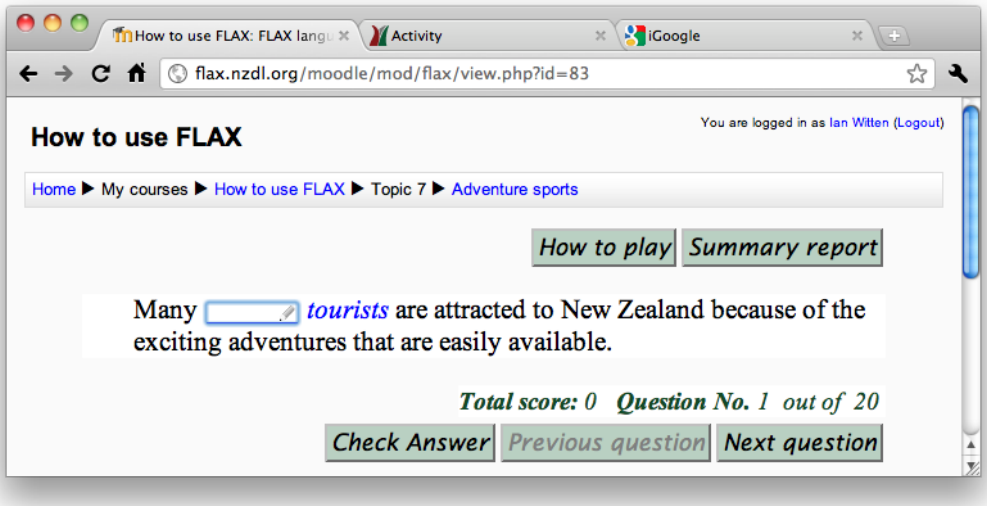
- None
- First letter
- First and last letter
- Word list
- Word list and first letter
- Word list and first and last letter.

If you are using Moodle you can choose Individual or Group mode, as described above.

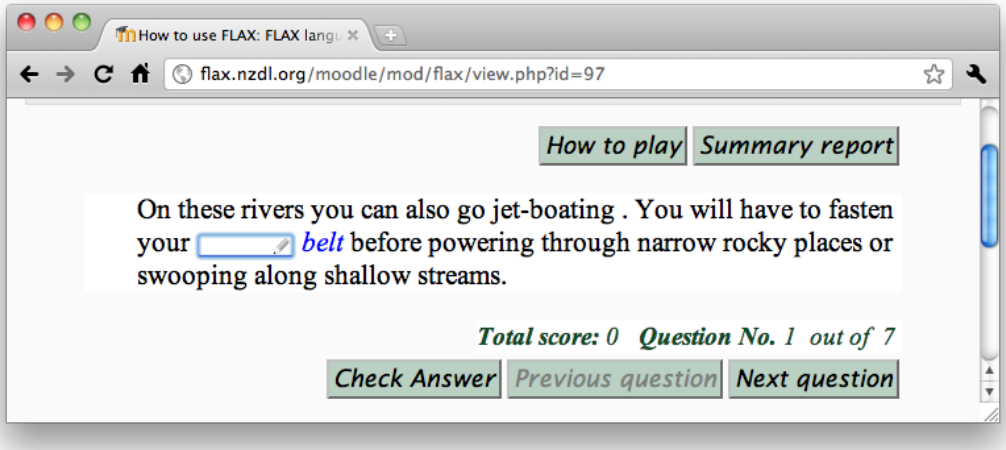
Finally, you can review the game and override the system's choices about which words to omit. It's a good idea to do this, otherwise you may be setting your students the impossible task of guessing arbitrary proper nouns, or exposing them to errors made by FLAX when identifying parts of speech.

Click the *Review* button at the bottom of the form and the game appears below, as shown in the accompanying illustration (towards the end, under the heading "Adventure sports"). Click any gap to return the word to the text – so that it won't be displayed as a gap after all. Click the word to reinstate the gap.

If you are using stand-alone FLAX you can make a printable version of the game using the Print button, yielding a paper form for students to complete offline.



A Completing Collocations exercise



A *noun + noun* Completing Collocations exercise

There is fresh healthy food for all these people in New Zealand shops. All food has a label, to _____ the *buyer* what is in the food.

For example you might help to cook dinner or do the washing up. You need to understand instructions in English and to have enough English to _____ *to* the *people* you are staying with.

The language is hard. They want to _____ *in* their *own language*. It is difficult to save money.

Completing Collocations: “speak” vs. “tell”?

4.7 Completing Collocations

In Completing Collocations exercises, as in Word Guessing, certain words are omitted from the document and users fill in the gaps. However, whereas in Word Guessing the words are omitted either randomly or according to their syntactic type, this exercise is more sophisticated in that the missing words are chosen from collocations that have been identified in the document. The fact that FLAX identifies collocations was mentioned in Section 2.1; in Chapter 6 we describe the mechanism by which this is done. In Completing Collocations, FLAX chooses sentences, and highlights (in blue) selected collocations. If the paragraph contains preceding and following sentences, they are shown as well to provide context.

The first illustration focuses on a particular article, “Adventure sports,” and includes collocations of all types. This particular question shows an *adjective + noun* combination, “young tourists”, but other questions will involve other collocation types.

Many teachers will prefer to focus on certain types of collocation, and in the second illustration only *noun + noun* collocations appear. This question shows “seat belt”; all the other questions in this exercise will also involve *noun + noun* combinations.

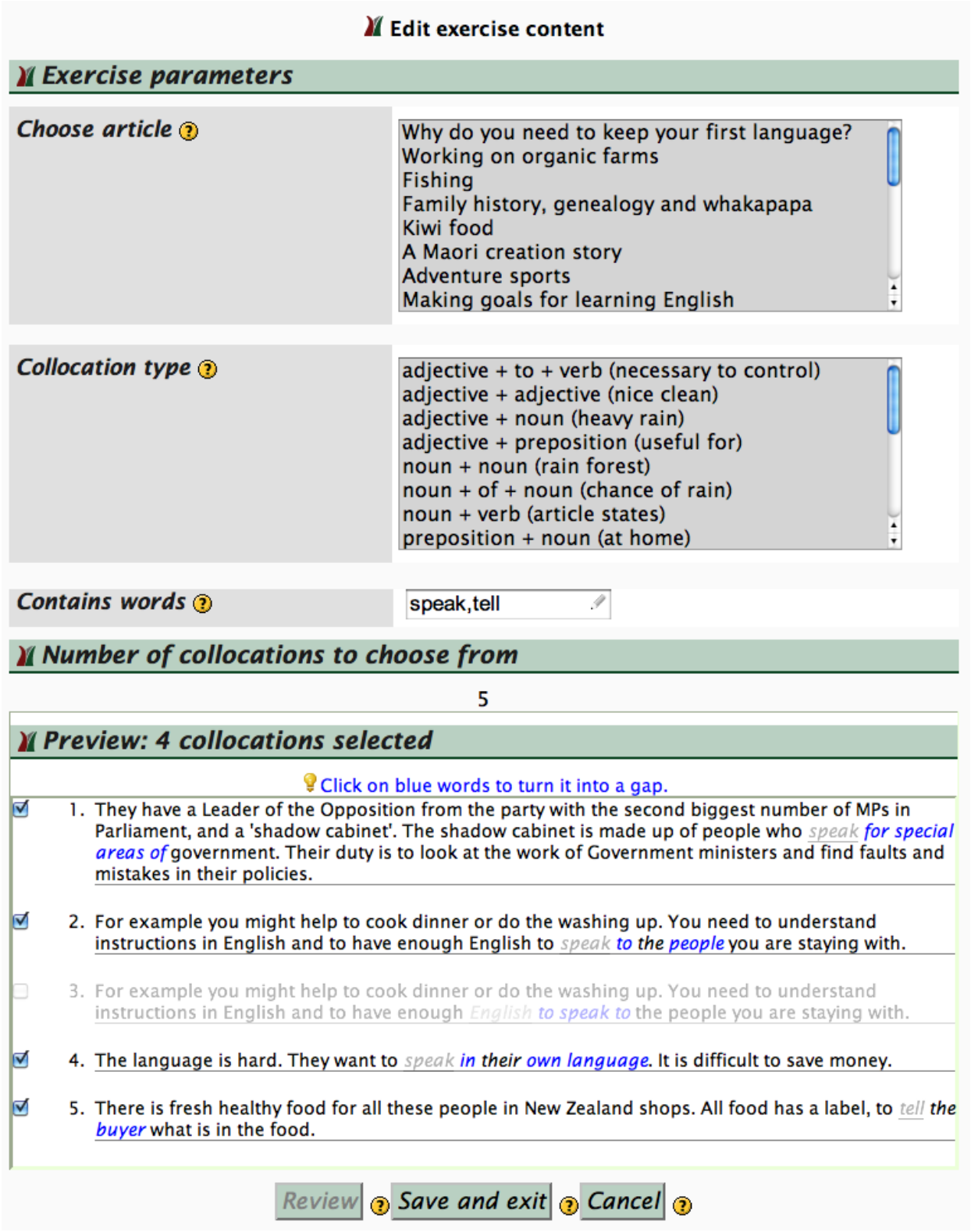
It is instructive to focus on sets of words that share similar meanings but have different usage. Learners are frequently confused by common words – “make” and “do”, “see” and “look” – and find it hard to understand their differences by consulting dictionaries. At the bottom, the illustration shows three questions from a third exercise, which focuses only on two words: “speak” and “tell”. These sentences are chosen from all the articles in the *Best of Password* collection.

One dictionary defines “speak” and “tell” as

- *Speak* – say something in order to convey information, an opinion, or a feeling
- *Tell* – communicate information, facts, or news to someone in spoken or written words.

No wonder learners don’t know which to use! Studying collocations is an effective way to help learners distinguish a word‘s various shades of meaning.

Another game might focus on finding the right verb for a noun. In the teacher’s interface described next, collocations can be restricted to those that contain a certain word, and also by syntactic pattern, so one could design a *verb + noun* exercise for a particular noun. As usual, the teacher can vet the collocations identified by the system to discard ones that are unsuitable.



Designing a Completing Collocations game

Teacher's interface for Completing Collocations

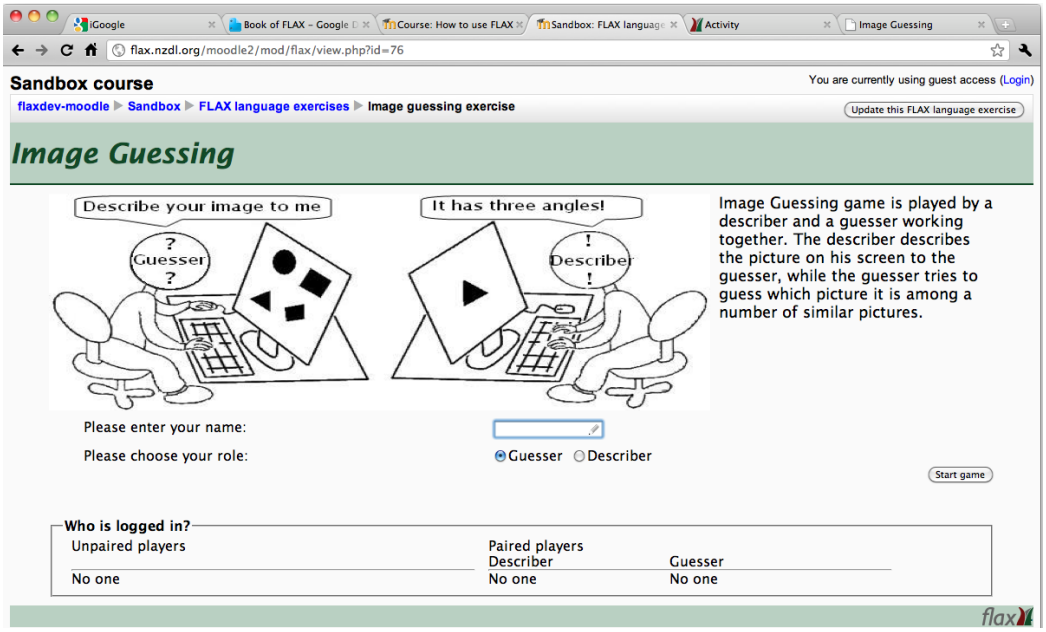
Completing Collocations exercises are created by filling out a form, just like the other language games. You can select a particular article or set of articles, and a particular collocation type or types. You can specify a word or words that the collocations should contain. The *Number of collocations to choose from* field updates automatically when these parameters are entered.

In the illustration, 959 collocations were identified initially for all the documents in the *Best of Password* collection, but this immediately reduced to five when the target words "speak" and "tell" were entered. For such a specific exercise it might have been better to give the teacher more choice by basing it on a larger collection.

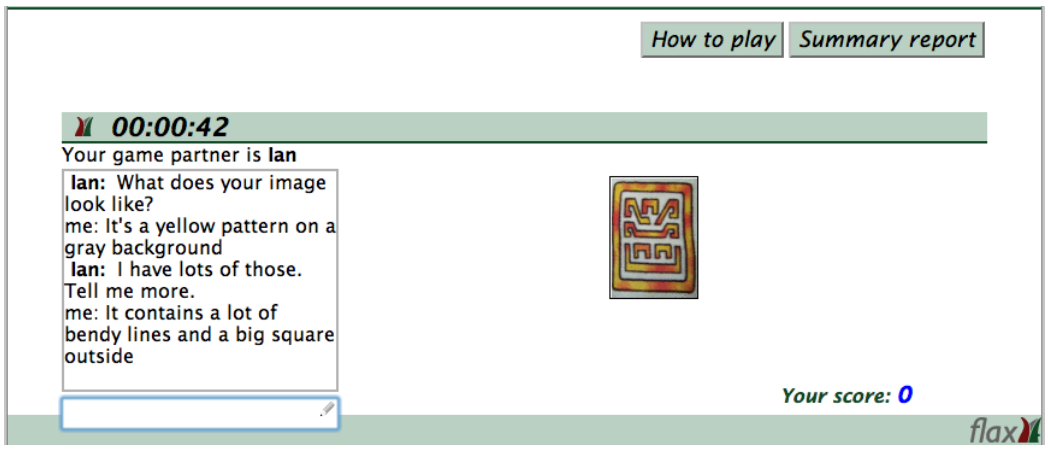
The *Review* button shows the collocations that the system has selected. In general, a single sentence may contain several collocations, each of which involves more than one word. FLAX generates all the examples but deselects, and grays out, subsequent ones involving the same sentence. You can select these individually if you wish; you can also click the blue words to turn them into gaps too.

In the illustration, the five "speak" and "tell" collocations are being reviewed, and one has been grayed out by the system. (Usually there are far more collocations, many of which are grayed out.) In this sentence the system has identified two collocations – "English to speak to" and "speak to the people" – using the collocation patterns listed in Chapter 6. These can be selected or deselected using the tick boxes.

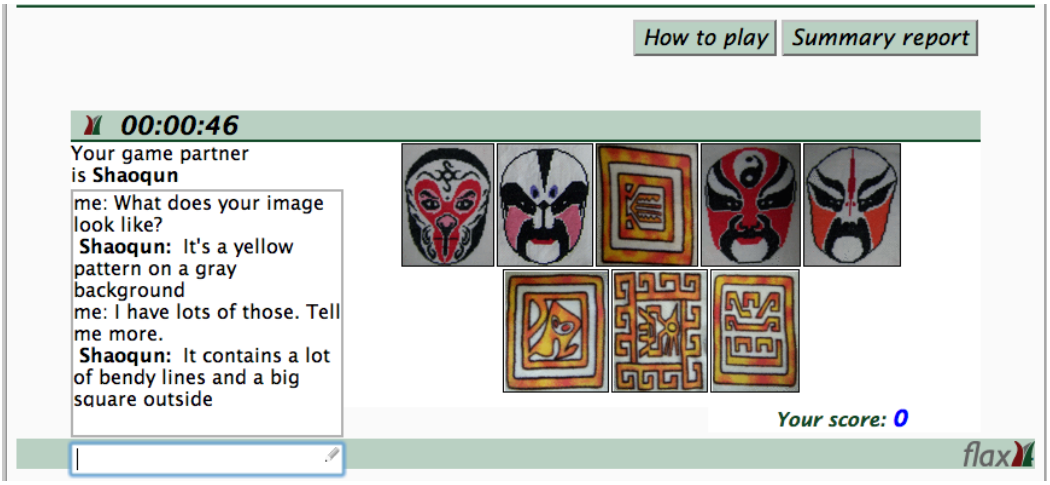
In future, FLAX will include a further form of hint, shown as a light bulb beside each incomplete collocation. This will show more collocations, retrieved using the target collocation's first and last words. For example, if the mystery collocation was "young children", the learner would be shown as hints the most frequent adjectival collocates preceding "children" – "small children", "many children", "other children" and so on (see Section 6.1) if the first word had been removed, and the most frequent noun collocates following "young" – "young people", "young girls", "young men", "young women" and so on if the second word had been removed.



Signing in for Image Guessing



What the describer sees



What the guesser sees

4.8 Image Guessing

Describing and guessing objects is a popular classroom activity. One student describes something and the others try to guess what it is, as in “twenty questions,” which forces participants to formulate yes-or-no questions. Guessing games are suitable for all ages and levels, and are fun for students. As well as making students practice communication skills, this activity can help improve their writing.

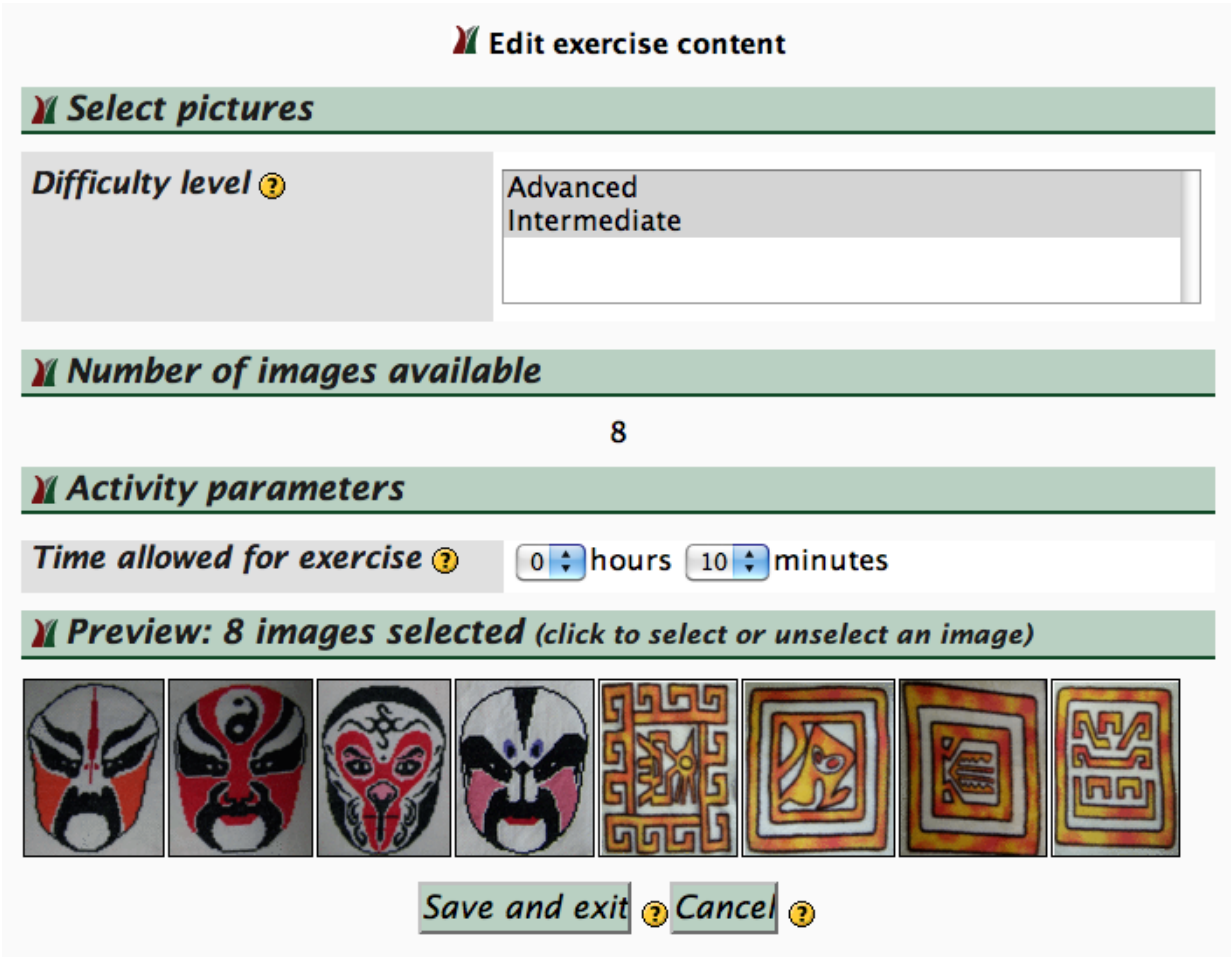
Image Guessing is a cooperative game for two players, called the *describer* and the *guesser*. It is based on an image collection. The players see different things. The describer sees a single image, while the guesser sees thumbnails of all images in the collection. The guesser’s aim is to determine which is the one the describer sees. Players communicate through chat: the guesser can ask questions about which image it is, and the describer can try to articulate what it is that they see. To make themselves understood, they must express ideas unambiguously. Because they cannot use gestures or body language to hint at what they mean as in face-to-face communication, students must use more complex structures, produce longer sentences and order the words correctly.

These games help improve communication skills, descriptive power, and domain-specific vocabulary. Teachers can build an image collection in a particular domain that will reinforce the kind of vocabulary they are trying to teach.

The illustration shows what learners see when they enter the game. The system pairs up students on a first come, first served basis. At any time there may be several student pairs playing, and one or more “singles” waiting to play. Students choose whether to sign up as guesser or describer. If there is another single who has chosen the opposite role, the game starts immediately. Otherwise the student receives a message asking them to wait until someone else enters the game and chooses the opposite role.

As soon as a match is made, the game begins. The describer and guesser see the second and third accompanying image, respectively. They type into the text box (beneath the list of messages), and when they press *return* the new message appears on their partner’s screen as well. In the conversation shown, Ian (the describer) asks his partner Shaoqun (the guesser) what she sees. She responds that her image is a yellow pattern on a gray background. Ian responds that he can see lots of those, and requests more information. Shaoqun is then pressed into describing the image in more specific terms.

All the while, the clock is ticking (shown towards the top left of each image). The game ends when the guesser clicks the correct image, or when time expires.



Designing an Image Guessing game

Teacher's interface for Image Guessing

For Image Guessing, the teacher selects the images that will be used in the game and determines how much time to allow when it is played.

The difficulty of the exercise is governed by the content of the particular image collection used, which teachers can build for their student population. Simple images – for example, animals or cartoons – are easy for lower level students to describe. More complex ones – for example, landscapes or abstract patterns – are more suitable for advanced students.

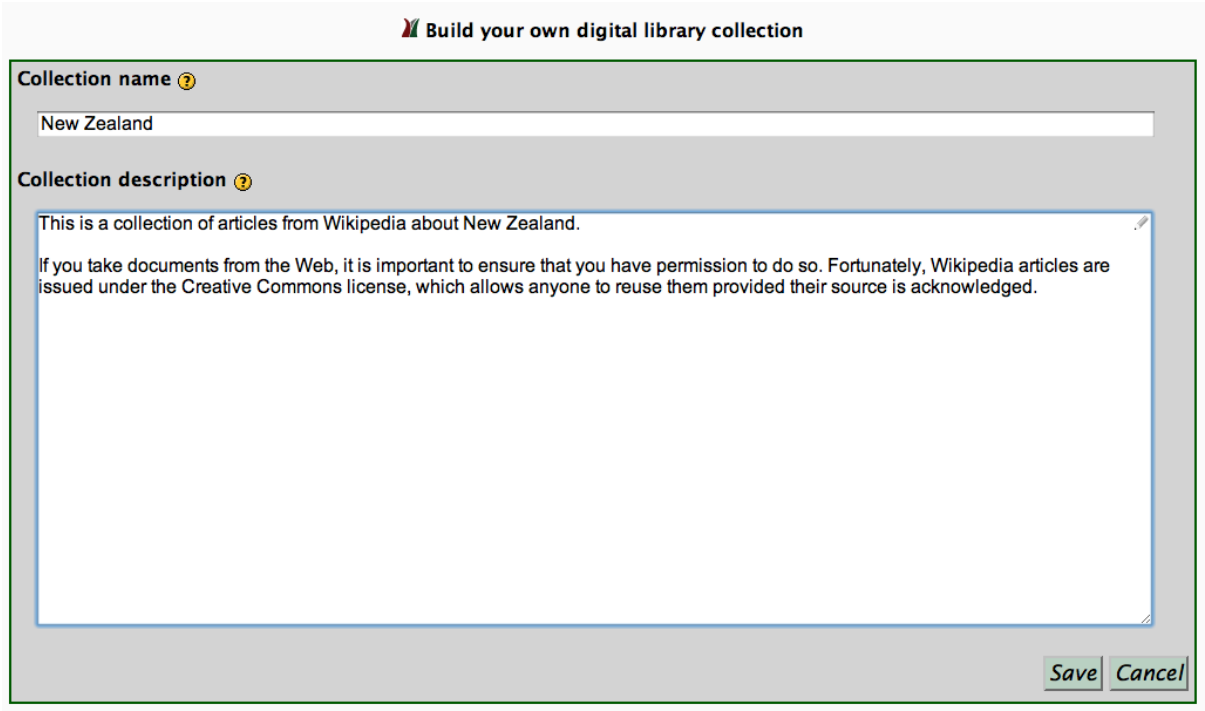
Teachers with classes of different abilities can build a single collection containing images of different kinds and assign them appropriate difficulty level metadata (*Advanced* and *Intermediate* in the illustration). This metadata can be used to determine which images are selected for a particular game. Alternatively, the teacher can click individual images to deselect or select them.

5. Creating your own collections

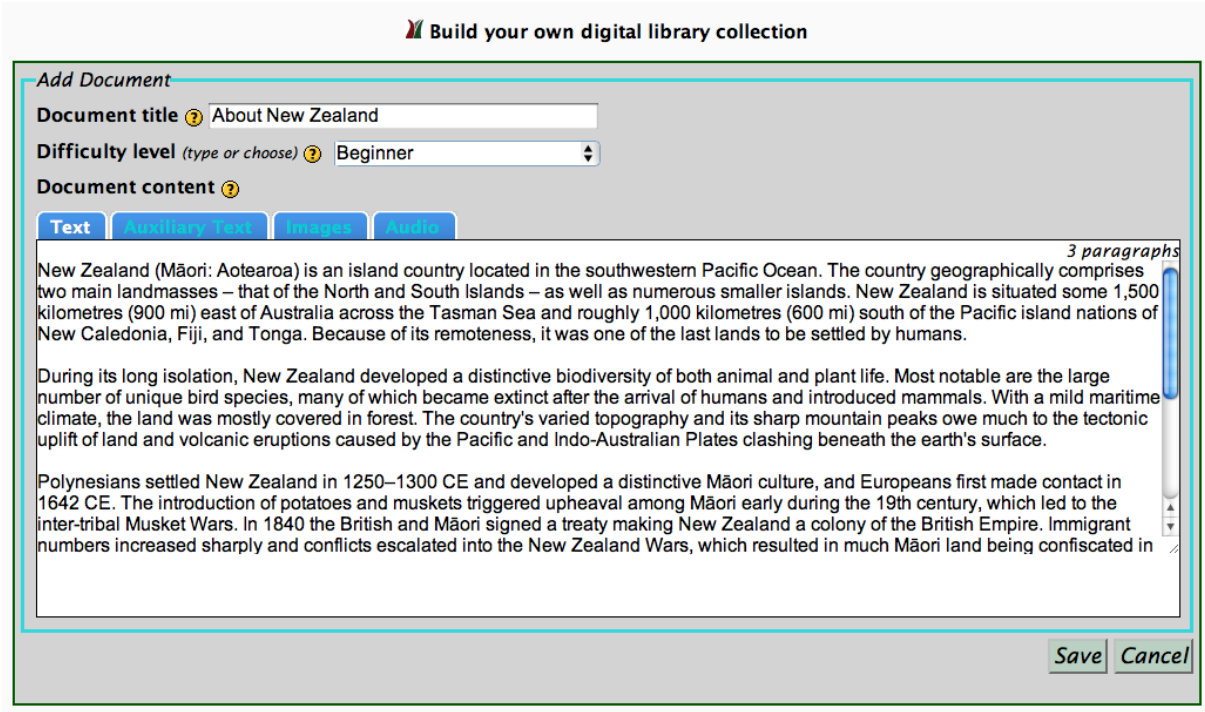
FLAX's primary purpose is to present language activities to students to enhance their language learning. It is not essential to create your own collections in order to do this: you can define a wide variety of games based on the standard collections that are supplied with FLAX. But it's generally preferable to use a collection based on your own material.

Teachers often want to use their own linguistic material in their courses. FLAX makes it easy to build small collections out of any documents – including images and audio – that you have available electronically. There are other ways of building large collections, but we won't describe those here. Greenstone, the digital library software that underpins FLAX, is capable of handling vast collections of all kinds of information.

Teachers may want to create their own collections of documents for reasons other than language learning. After all, libraries have always been central to education. It is surprising, and perhaps a little disappointing, that digital libraries do not usually seem to play a central role in computer systems for educational support. FLAX allows teachers to organize readings and provide students with integrated access to them. If appropriate, they can also serve as a source of material for language learning.



Starting a new collection



Adding a new document

5.1 Creating a collection

The process of creating a collection is exactly the same whether you are Moodling or not. First find the *Add a collection* button. In stand-alone FLAX you will have to log in; in Moodle-FLAX you turn editing on and select either a *FLAX digital library* activity or a *FLAX language exercise*. Click the *Add a collection* button to get a form, shown opposite, into which you enter a name for the collection, and a description to go on its home page. Then click *Save* to move to the next stage, which is to add documents.

Each document is added using the form shown in the second image. First choose a title. Then choose a difficulty level, either from the list provided (*Beginner*, *Intermediate* and *Advanced*), or by typing in your own level name. When browsing the digital library as described in Chapter 2, the documents will be classified by difficulty level.

Then paste the document text into the box. You can copy text from a Web page, from a Word document, from almost anywhere. (However, you cannot copy text from an image.) Of course, copyright is your own responsibility: before adding any document, please ensure that you have permission to do so. Paragraphs should be separated by blank lines. The form states (on the right) how many paragraphs there are.

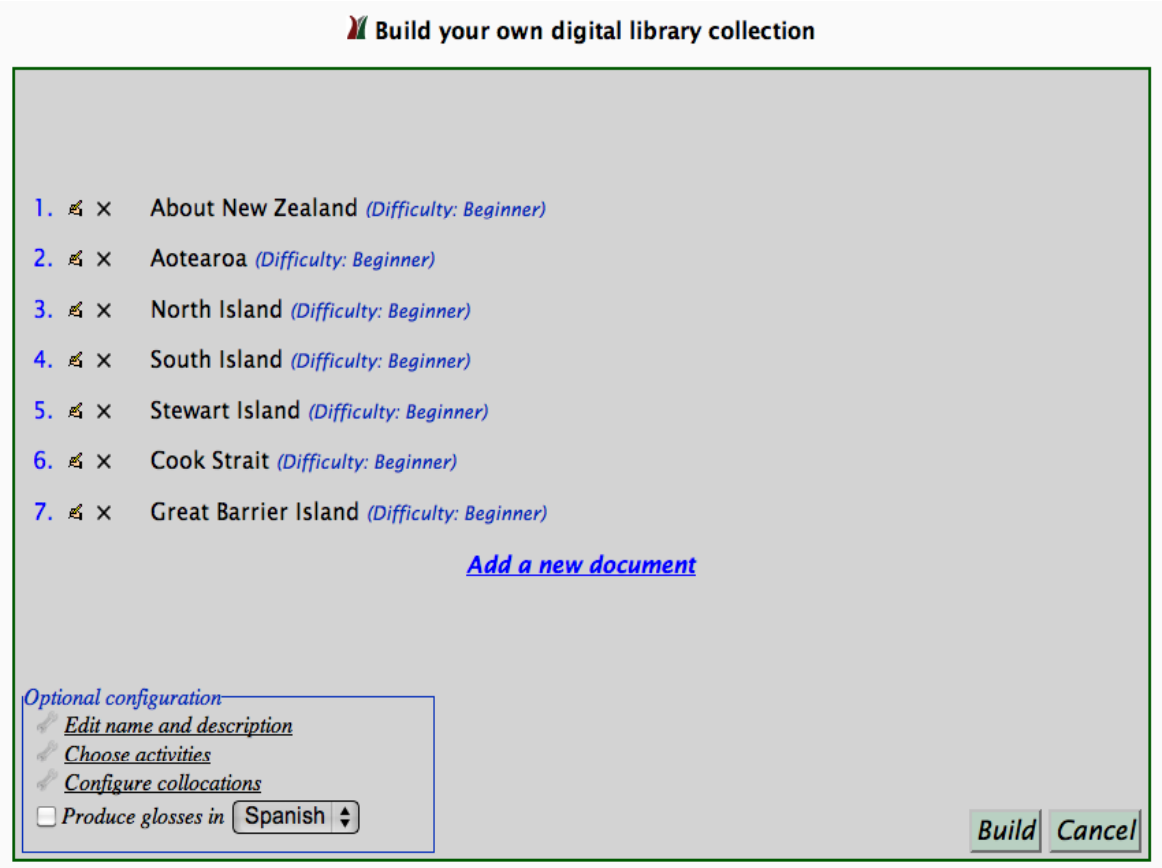
As well as entering text, you can also enter *Auxiliary Text*, *Images*, and *Audio* using the blue buttons shown (the button labels may be illegible in the printed image opposite).

Auxiliary text might contain information about the document's source, or perhaps key vocabulary items that it introduces. This text is shown in a box at the bottom of the document, but is not included in any language games that are made from it. (Here is an example, the "Adventure sports" article. Scroll down to see the auxiliary text.)

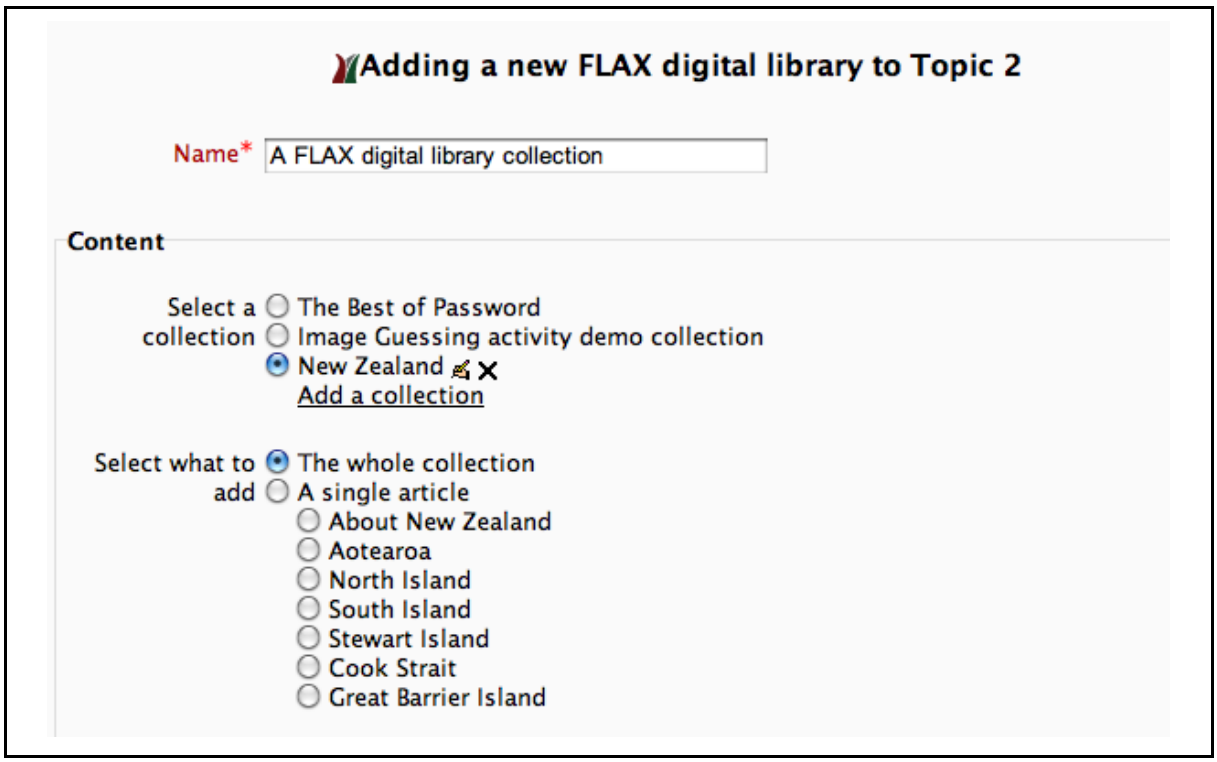
Images may be associated with the document. After clicking this button you can upload an image file, which will be displayed at the beginning whenever the document is shown. Several image files can be uploaded, in which case they will be equally spaced throughout the document. (The documents you include in FLAX collections are intended to be simple: controlled image placement is not possible.) You can also make collections where each "document" is an image accompanied by a caption or some explanatory text. This would be suitable for the Image Guessing activity in Section 4.8.

Audio files are specified in exactly the same way. This facility is intended to allow students to listen to documents as well as read them. In the document shown, which is about New Zealand, the national anthem could be given as an audio file. You can associate more than one audio file with a document; the user plays them by selecting from a menu.

When you have finished adding a document, click the *Save* button. You will get a form that lists the documents in the collection so far, with a button for adding the next one. Continue in the same manner until the collection is complete. At any time you can return to an earlier document and edit it (click the *edit* icon beside the document name) or delete it (the "x" symbol).



Summary of the documents added so far



A new collection called *New Zealand*, which I can now edit if I want

5.2 Building and installing the collection

The list of documents you add to the collection is shown in the top panel opposite (you can see the *edit* and *delete* icons beside the document names). When you have finished adding documents, click the *Build* button. After a short delay, which depends on the number and size of documents, the collection will finish building and be added to your FLAX system.

If you are working in Moodle, the new collection appears in your list of collections, along with the usual Moodle *edit* and *delete* icons (these only appear beside collections that you yourself have built). It will be visible to any other teachers who use the same Moodle installation. You can go back and add new documents to your collection, or alter its configuration as described in Section 5.2.

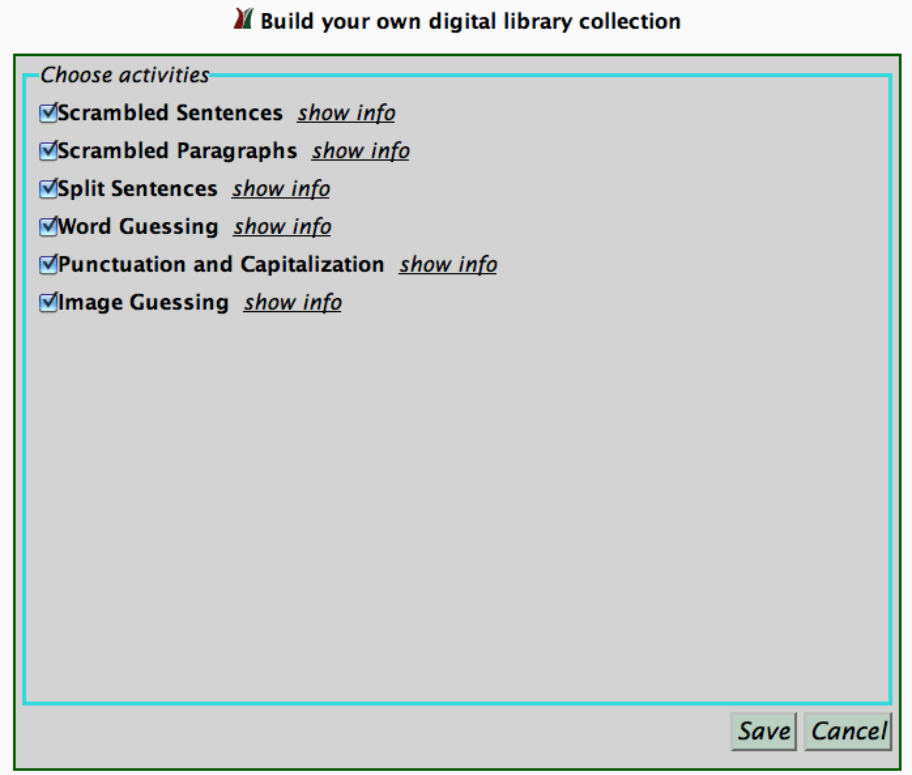
At this point it is possible to enable glosses in another language. As explained in Chapter 2, FLAX sends text to the University Research version of Google Translate and receives a list of translations corresponding to words and phrases in the text. This facility is enabled for English, French, German, Italian, Polish, Portuguese, Russian and Spanish, although it has only been optimized for Spanish.[9]

If you are using stand-alone FLAX, your collections are listed under two headings:

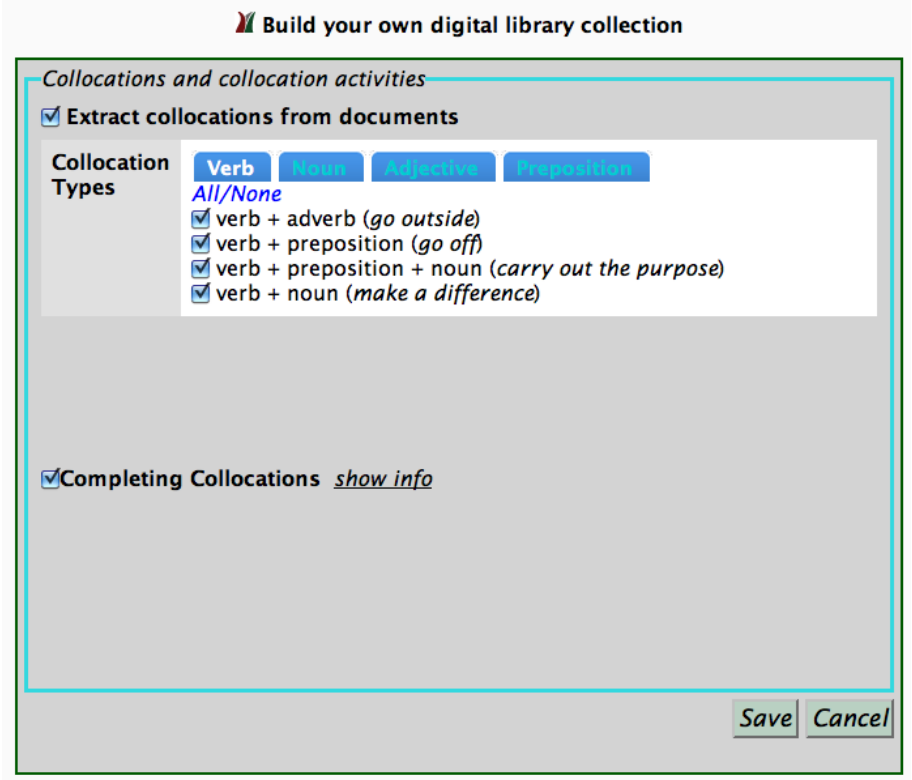
- My finished collections
- My collections under construction.

Your new collection will appear as under construction. Select it with the mouse and drag it into *My finished collections* to make it available to all users of the FLAX server. If you want to change the collection, drag it back to the "under construction" area, where four buttons appear alongside it: *edit*, *delete*, *copy*, and *preview*. You can only do this for collections that you have created, not for ones belonging to other people – and, of course, you can't edit the standard collections. With these buttons you can *copy* any collection, which produces a copy under "My collections under construction," or *delete* and *edit* collections – typically by adding or deleting documents, or changing the collection's name. You can also *preview* collections to see what they look like.

[9] In order to enable glosses, FLAX must have access to the University Research version of Google Translate. You will need to make special arrangements for this if you install the FLAX system on your own server.



Selecting which activity types to include



Selecting which collocation types to include

5.3 Optional collection configuration

If you wish, you can perform some optional configuration for your collection:

- Edit name and description
- Choose activities
- Configure collocations

The first is straightforward. The second lets you specify which “activity types” your new collection will allow. Some activities don’t make sense for certain collections: for example, a collection of images supports the image guessing activity, but not activities that involve textual documents – and *vice versa*. The default is to include all that seem relevant to the collection, and it’s simplest to leave it and assume that people using the collection will not try to define inappropriate activities.

The third option shows a list of collocation types to include. FLAX analyzes each document and finds the collocations that appear in it. It parses each sentence to determine the syntactic part of speech of its words, groups collocations by type and first word, and associates them with the document. They can be highlighted when users read the document, and also form the basis of collocation games. Chapter 6 contains more information about collocations.

At this stage in collection-building you can determine what kind of collocations FLAX seeks. Select one of the parts of speech on the buttons in the second image opposite – noun, verb, adjective, adverb, preposition – to see the collocation patterns that are associated with it. You can select or deselect these individually. If you’re not interested in collocations at all, collection building will be faster if you deselect *Extract collocations from document* (at the top).

A collocation search for “identity” in the Best of Password collection

6. Collocations

FLAX contains special facilities for identifying and learning collocations. The term *collocation* has many definitions, but, roughly speaking, it is a sequence of words that come together frequently – more often than chance would suggest. Scholars sometimes add that collocations should have some degree of semantic unpredictability, or be fixed, identifiable, non-idiomatic phrases and constructions, or, from a language teacher's point of view, simply be "words that I think my students would not expect to find together." Some authors restrict collocations to word pairs; others allow longer sequences.

However defined, most language teachers agree that collocations are of the utmost importance in language learning. Collocation knowledge – or lack of it – explains why language learners find it hard to differentiate words like "look", "see" and "watch"; "injury" and "wound"; or "broad" and "wide". Complex ideas are hard to express unless one can use simple vocabulary in a range of collocations.

FLAX identifies collocations by syntactic pattern. During the building process each document is automatically parsed and its collocations identified. Note that automatic parsing is not infallible, and some syntactic patterns may be incorrectly identified – particularly in the case of ambiguous words like "the wind" (noun) and "to wind" (verb).

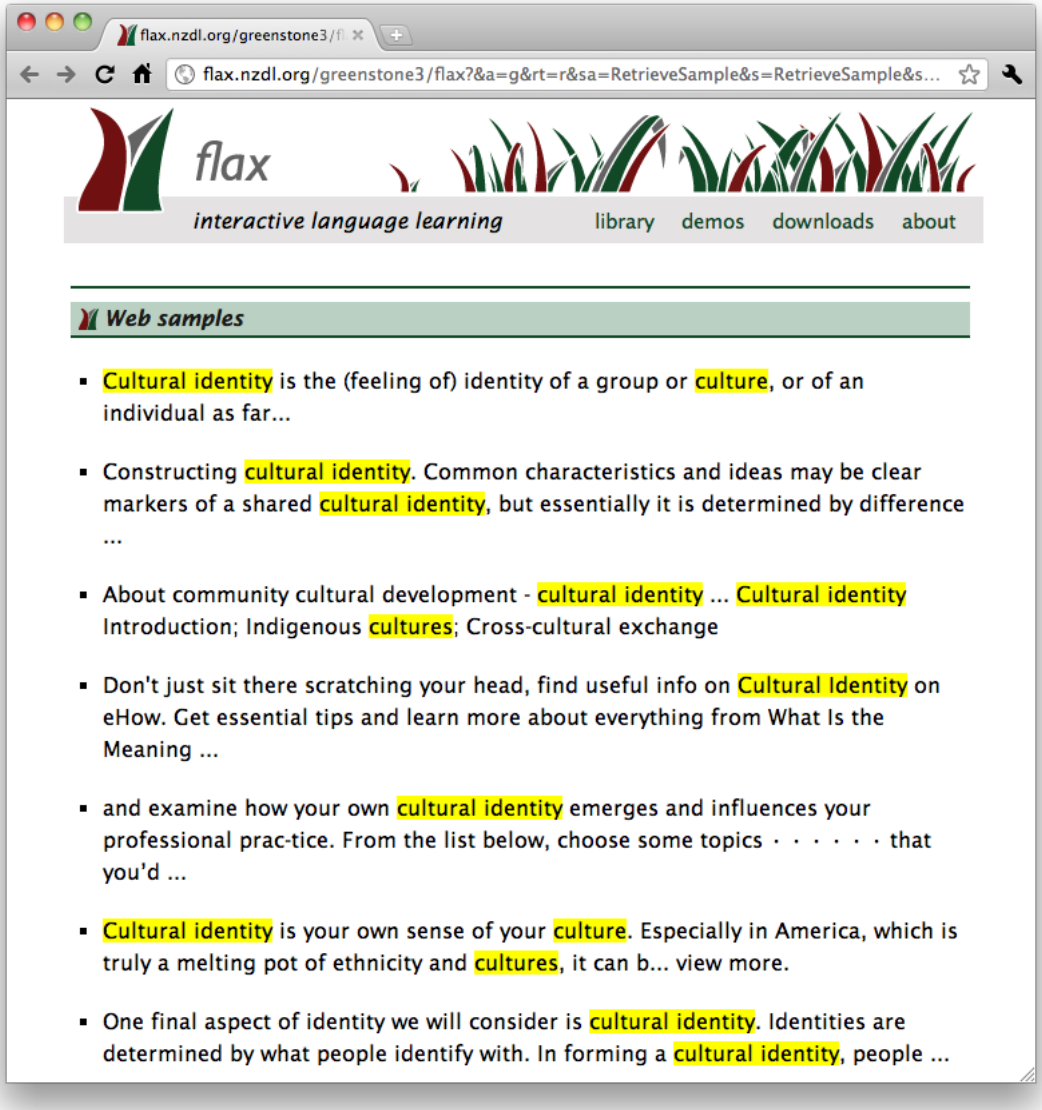
Here are the patterns that FLAX looks for, along with an example of each. Buried deep within FLAX is a file that defines these patterns; so you can change them if you like. Determiners (e.g. "the") and other common words ("some", "for" and "through") are ignored when identifying collocations, but are included as part of the phrase.

verb	verb + noun	*make a difference*
	verb + preposition + noun	*carry out the purpose*
	verb + adverb	*go outside*
	verb + preposition	*go off*
noun	noun + *of* + noun	*chance of rain*
	noun + noun	*rain forest*
adjective	adjective + noun	*heavy rain*
	adjective + *to* + verb	*necessary to control*
	adjective + preposition + noun	*good at sports*
preposition	preposition + noun	*at home*

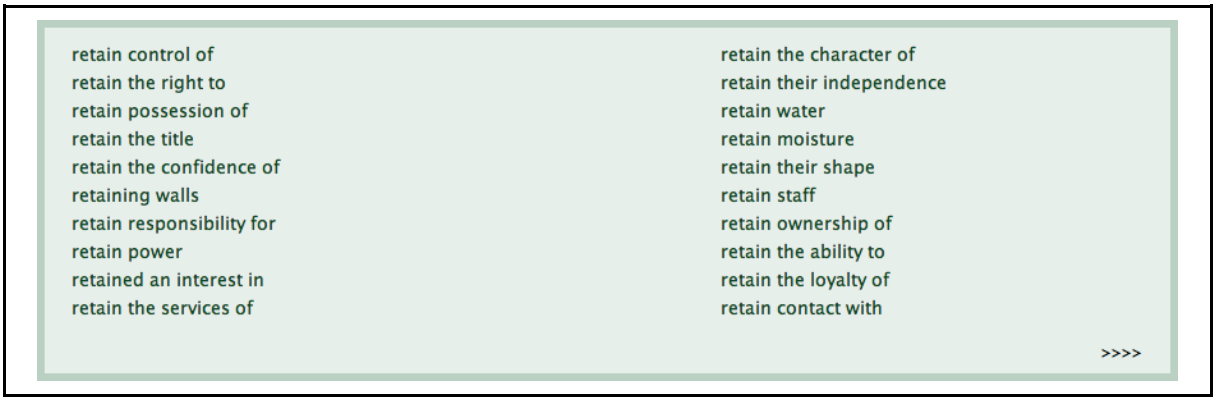
As mentioned in Section 2.2, you can search all collocations in a digital library collection. You do this by pulling down the menu labeled *Search for* and selecting *collocations* instead of *articles*. For example, a collocation search for the word "identity" returns the three collocations shown in the image opposite. Here the first two phrases match the *verb + noun* pattern and the third matches *adjective + noun*.

In the image opposite, the icons beside the collocations are clickable, as are the words in the collocations – "keeping", "identity", "retain", "cultural."[10]

[10] This involves a large database, and for it to work you must be using a "collocation-enabled" version of the FLAX server, as discussed in Section 7.2.



Samples from the Web of the collocation “cultural identity”



Collocations involving the verb “retain”

6.1 Exploring collocations

Here we explain the links in collocation search results shown in the image facing the *previous* page. Two icons accompany the collocations that are presented; these retrieve example sentences from different collections of English.

The UK flag icon retrieves examples from the British National Corpus (BNC). This contains 100 million words of written text from newspapers, specialist periodicals and journals, academic books and fiction, letters and memoranda, and so on.[11]

The "world" icon retrieves examples from the World-Wide Web. Clicking this performs a live Web search and retrieves sentences containing the collocation.

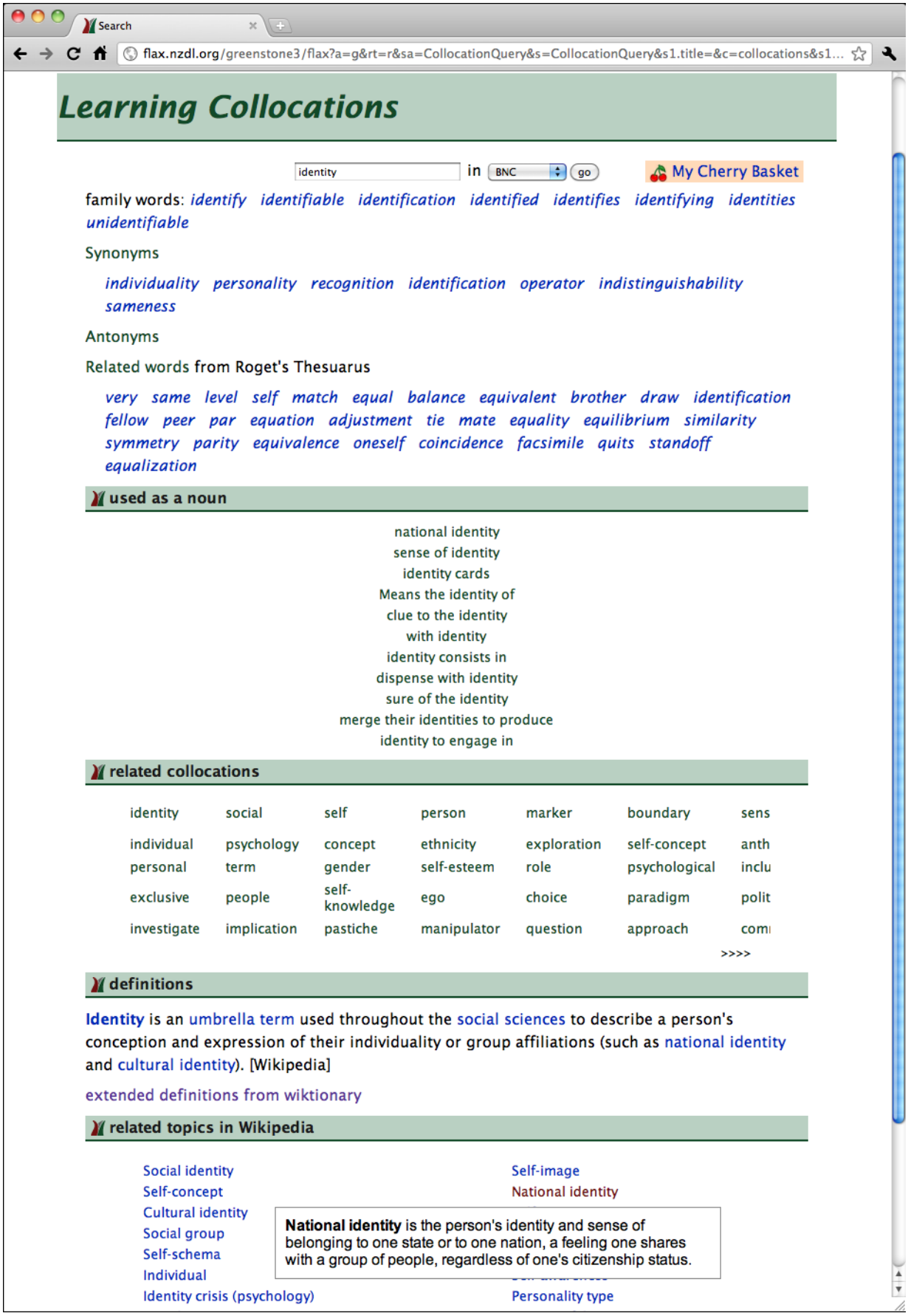
The illustration opposite is obtained by clicking the "world" icon beside *cultural identity* in the earlier illustration. FLAX retrieves the samples that are shown from the Web in real time. What is shown is raw, unadulterated Web text; some examples may be fragmentary, and others may not represent exemplary linguistic usage. Examples retrieved from the BNC are generally of much higher quality, and FLAX shows the entire paragraph that contains the phrase. However, many multi-word phrases simply do not occur in the BNC because, despite its impressive size, it is still ten thousand times smaller than the web.

Returning to the image facing the *previous* page, hyperlinks are shown on the words displayed in the collocations returned by a search – here "keeping", "identity", "retain", and "cultural". These bring up a list of other collocations of the same form that involve the same word. For example, if you click the word "retain" in the image facing the previous page, FLAX brings up the list shown opposite, at the bottom.[12] Here are the first twenty collocations. But there are many more! You can click the >>>> button (bottom right) dozens of times and still get new ones.

These collocations are derived from the British National Corpus. As well as finding collocations in the documents of a collection (described above), FLAX also identifies them in this massive corpus of natural language. This corresponds more closely with the above notion of a collocation being a sequence of words that come together frequently.

We refer to this vast dictionary of collocations as the *BNC collocations*. Here they are presented in decreasing order of frequency in the British National Corpus. Thus "retain control of" is the most frequent collocation of "retain", "retain their independence" the second, "retain the right to" the third, "retain the character of" the fourth, and so on.

[11] For this to work, the BNC must be installed as a collection on the FLAX server.
[12] See footnote on previous page.



Exploring the word “identity”

6.2 Exploring individual words

FLAX contains experimental facilities for exploring individual words and how they are used. The display of collocations of the word “retain” at the bottom of the previous page is a pop-up box that can be dismissed by clicking on any empty space within it. This reveals a larger page behind it, shown in the illustration opposite for the word “identity”. We use this word for illustration because, at present, fuller information is available for nouns than for verbs like “retain”.

This page contains a wealth of information. At the top are words belonging to the same family as “identity.” Below are synonyms and, where available, antonyms (to see these you need to click the words *Synonyms* and *Antonyms* respectively). Following these are related words from Roget’s thesaurus. All these words are clickable, causing FLAX to display information for that word instead of the current one (“identity”).

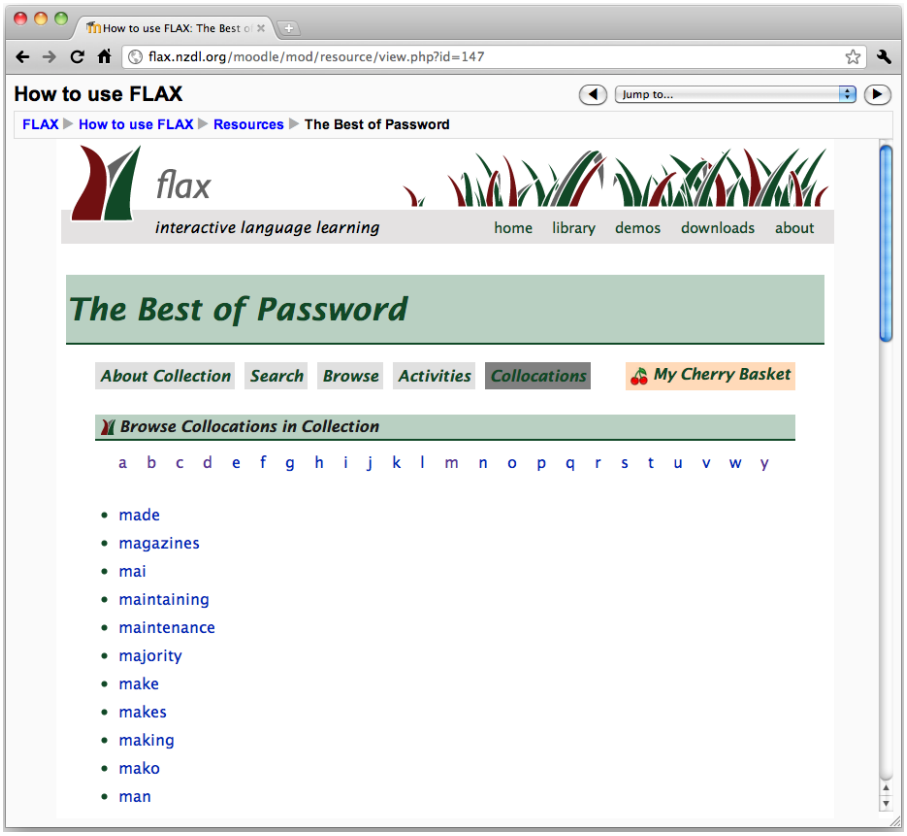
In the second section are collocations of the word “identity”. Each of these is clickable, yielding a box containing many other collocations of the same type. If you click any of these other collocations you can add them to your cherry basket or (by clicking again) see text samples from the British National Corpus.

Below that are words that often accompany “identity”: “social”, “self”, “person”, etc. Click the word to see the collocation – and, if you wish, to add it to your cherry basket.

Next comes the definition of the word “identity”, extracted from the first paragraph of its Wikipedia article. Click the word itself, or any of the other blue words in this definition, to read the corresponding Wikipedia article. The link that appears below, *extended definitions from wiktionary*, takes you to the Wiktionary entry for the word “identity”, which includes its etymology, pronunciation, several definitions, translations into other languages, and so on.

The final section of the page gives related topics in Wikipedia. Mousing over any of these – such as “National identity” in the illustration – gives a pop-up containing a definition; clicking on it refocuses FLAX to display information for that word or phrase.

At the very top of the page is a selector box, currently showing “BNC” for British National Corpus, which allows you to search for collocations in other databases such as Wikipedia and the British Academic Written English (BAWE) corpus.



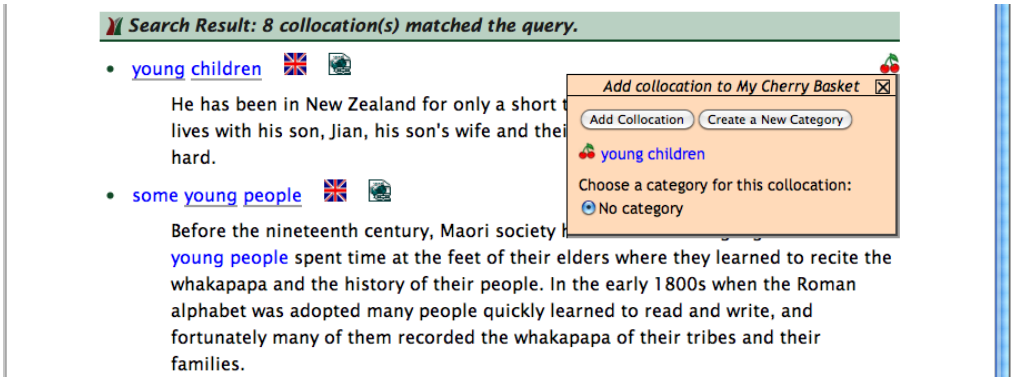
Browsing collocations in the *Best of Password* collection

Collocations associated with the word “made”

6.3 Browsing collocations in a digital library collection

The *Collocations* button in the control bar at the top of the *Best of Password* page (or any other collection's page) takes you to a list of the words that appear in the collection's collocations, ordered by first word. The image shows this browsing page in which the letter "m" has been chosen in the alphabetic selector at the top. The list of words is long; you must scroll down to see all the entries.

Clicking a word in this list takes you to a page that shows all its collocations in the *Best of Password* collection. This is just like the page described at the beginning of this Chapter that you get when searching the collocations for that word (recall the "identity" example), with buttons beside each collocation that look it up in the British National Corpus and on the Web, and put it in the cherry basket.



Adding a collocation to the cherry basket

Inside the cherry basket

6.4 Collecting collocations: the cherry basket

Collocation knowledge is difficult to acquire simply because there is so much of it. Native speakers carry hundreds of thousands of lexical chunks in their heads, ready to draw upon in order to produce fluent, accurate and meaningful language. This presents language learners with a daunting challenge.

In order to help them, FLAX provides a facility for “picking” favorite collocations and saving them in a kind of notebook. We call it a “cherry basket” because, like the words that form collocations, cherries tend to occur in twos and threes.

 The cherry icon beside a collocation adds it to the user’s cherry basket.

Collocations in the basket can be organized into categories, and new categories can be defined when picking a collocation. Or, if the user prefers, the basket can be left unorganized.

The basket’s contents are shown when the user clicks *My Cherry Basket,* on the right of the control bar near the top of the screen. Here, six collocations have been picked and organized into two categories, *people* and *youth*. The labels for the categories are chosen by the user.

The basket can be reorganized by dragging a cherry into the “folder” icon beside another category; collocations can be deleted (with the “x” symbol); and category names can be altered (with the edit icon). A “print friendly” version of the basket can be generated, which is also suitable for sharing by email.

The cherry basket, and indeed FLAX’s entire collocation facility, is particularly useful when learning English in a certain domain, like geography, management or academic writing. The teacher creates a collection of documents in the domain, perhaps from Wikipedia or some other public source. Students study them, investigate the collocations they contain, and choose ones they like for use in future writing exercises. Instead of simply mastering words – pronunciation, forms, and meanings – students learn the contexts in which they are used, which helps them combine words into apt phrases, sentences and texts.

Even for general writing, collocations help students express themselves more aptly and precisely. For example, learners, especially lower level ones, tend to overuse common words like “very” because of their limited stock of adverb modifiers. FLAX enables them to find modifiers that are more suitable for use with particular adjectives or verbs, such as “completely”, “physically”, “mentally”, “emotionally” with the word “exhausted”; and “heavily”, “strongly”, “deeply”, “easily”, “unduly” with the phrase “influenced by”.

6.5 Upcoming new collocation activities

We are in the process of adding new collocation activities to FLAX. While everything else described in this book exists within the FLAX system that we distribute, this section shows activities that we are working on, so that you can see what's coming up. All illustrations in this section are from prototype implementations, and do not form part of the current FLAX software.

Two activities described below utilize collocations in the context of a particular collection (as does the Completing Collocations activity described in Section 4.7):

- Correcting Errors
- Multiple Choice

As well as these, we are working on several collocation-based activities that are not associated with any particular collection:

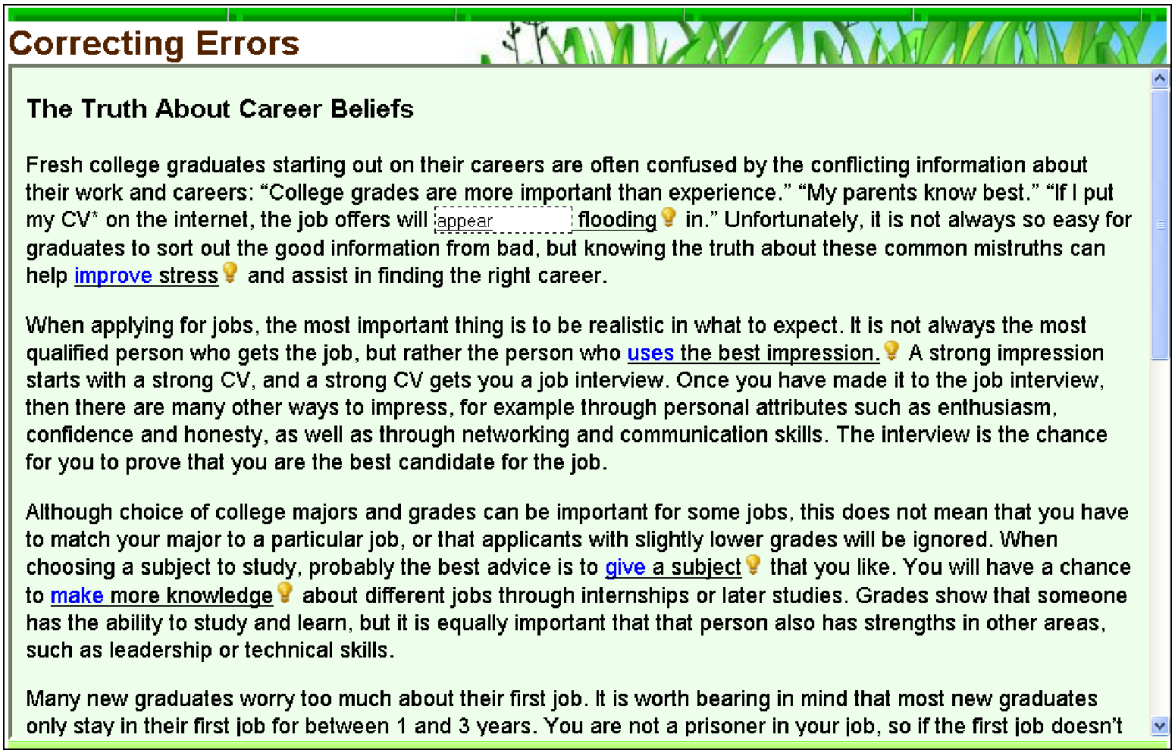
- Collocation Guessing
- Collocation Dominoes
- Collocation Matching
- Related Words

In these activities, teachers provide the words they want their students to focus on and FLAX creates games using collocations derived from various corpora. They involve selecting a group of collocations, and several of the activities are designed to help learners practice collocations associated with particular words. FLAX uses the following frequency-based selection principle.

Common words such as "take", "make", and "cause" have many collocations that can be grouped by frequency range. Empirically, the top group of one or two collocations is often at least twice as frequent as the others. Below that, other groups can be distinguished, with decreasing numbers of collocations. The highest priority for learners is to study collocations in the first group, but to expand their collocation knowledge they need to study ones in the second and third groups as well.

We select a fixed number of most frequent collocations for a given word, and randomly pick from this set for each game. Learners can practice different groups of collocations by clicking a *New Exercise* button. For each game the designer chooses a small number of collocations (typically five to ten). The number should be adjusted according to the word's usage frequency and the language ability of students, more collocations being used for common words and advanced students.

In the Collocation Matching and Related Words games, learners match or differentiate collocations involving two or more words. Of course, different words may share the same collocates, e.g. "speak the truth" and "tell the truth". In this situation we use the strongest collocation – in this case "tell the truth", because it is empirically more frequent than "speak the truth". Since collocations are picked randomly for each game, learners still have a chance to practice "speak the truth" when a collocation is chosen for "tell".

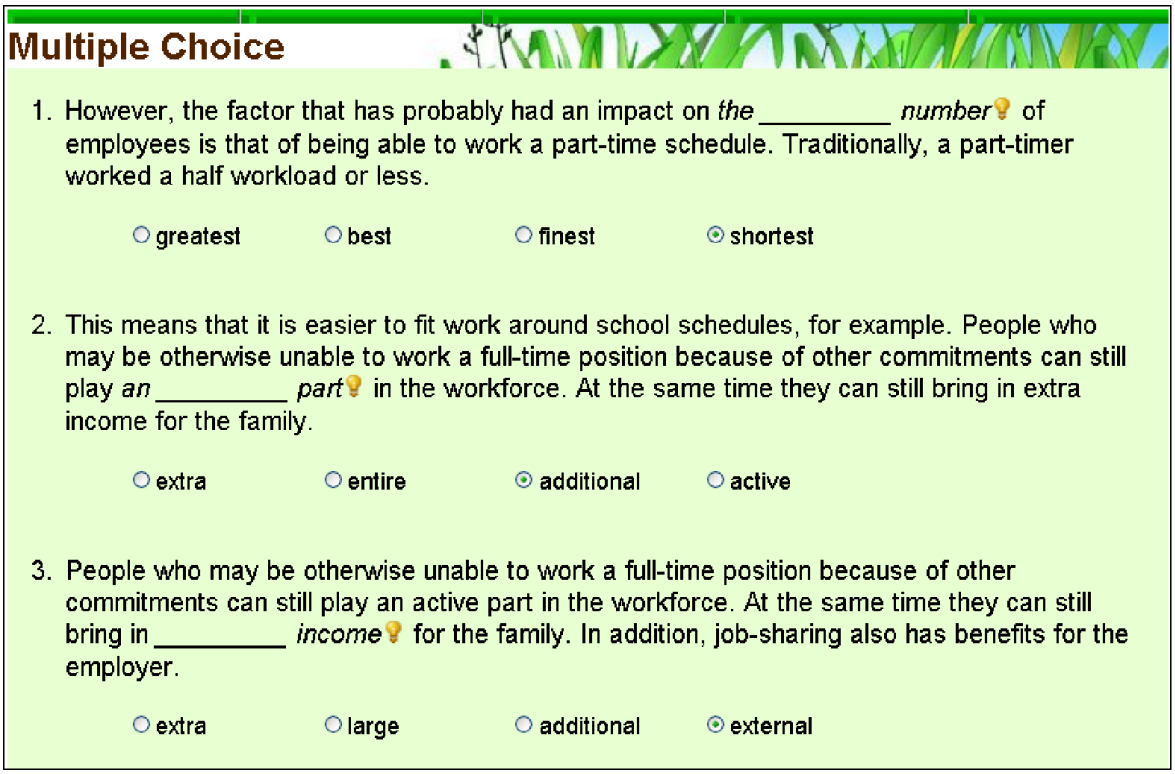


Correcting Errors (prototype version)

Correcting Errors

Correcting language errors is a challenging task because of the ambiguity of language, and to provide as much context as possible the entire document is given. The teacher first chooses a document and several target collocation types, and then decides whether learners will work on the first or last constituent word. The system replaces these words with infelicitous choices that learners must correct.

The illustration is based on an article entitled “The Truth About Career Beliefs.” It focuses on collocations of the *verb + noun* type and asks learners to find the right verb for the noun. Target collocations are underlined, and incorrect words colored in blue. Clicking a blue word brings up a box in which the student types in a new word. The answer is checked when the learner presses the *Enter* key or moves to another word. Correct entries are changed to black, while incorrect ones remain blue. The hint icon (light bulb) shows more collocations, retrieved using the target collocation’s first and last words respectively. For example, the first set of hints for “improve stress” include “improve the accuracy of”, “improve performance”, and “improve the lives of”; while the second set includes “reduce stress”, “cope with stress”, and “handle stress”. To make them more relevant, the collocations adapt to what the learner has entered – if the learner changes “improve stress” to “decrease stress”, the collocations of “improve” are replaced by those of “decrease”.



Multiple Choice (prototype version)

Multiple Choice

Multiple choice exercises, comprising a question and a set of alternatives from which the correct answer must be selected, are widely used language drills for learning vocabulary. We have tailored this to collocation learning by using sentences containing particular collocations as questions, with one collocation part missing. Four choices, including the correct one, are shown to students, who must select one that forms a valid collocation.

The illustration shows a game in which students complete *adjective + noun* collocations. The collocation is rendered in italics, and one part is missing: learners must select the correct choice. When a *Check answer* button at the bottom of the screen (not shown) is clicked, the blanks are replaced by the learner's correct choices, while incorrect ones are left so that they can continue working on them. As with other activities, clicking the light bulb brings up further related collocations.

Providing answer candidates

In Correcting Errors the original words are replaced with incorrect ones, and Multiple Choice gives three incorrect choices for each question. It's not easy to find words that are incorrect yet plausible! However, FLAX reduces the teacher's burden by providing a list of candidates. When creating a game, teachers can determine which of these to use, or provide their own.

For each collocation, twenty candidates are generated. They are not randomly chosen. Rather, they are selected to (1) somehow fit the context, (2) be of the correct form, and (3) not form a valid collocation. As an example of the second criterion, if a past tense verb or plural noun is used in the original text, the same is true of each candidate. For the third, if the target collocation is "make a complaint", candidates such as "file", "lodge", "resolve", "investigate" are not selected because they collocate strongly with "complaint".

The process involves three steps, corresponding to the three criteria described above. We explain it using the example sentence

Some of these communities have made a great effort to improve this situation by …

where "improve this situation" is the target collocation and "improve" the target word. First the preceding text, "effort to", is used to locate verbs that somehow fit the context. The system consults a dictionary of collocations and retrieves verbs that follow "effort to". Next the candidates are tagged and discarded if their tag does not match that of the target word – in this case, "improve" is a verb in base form. Finally, to remove candidates that form good collocations with "this situation", the five-word phrase that encloses "improve this situation" is extracted from the original text, yielding "to improve this situation by". Then verbs extracted in the second step are used to replace "improve", and discarded if the resulting phrase does in fact occur in the collocation dictionary.

Collocation Guessing (prototype version)

Collocation Guessing

In Collocation Guessing, a target word and a few associated collocations are chosen. The target word is removed from the collocations, and they are shown one by one to the learner, who must guess it. For example, given

plain, dark, white, bitter, milk, bar of,

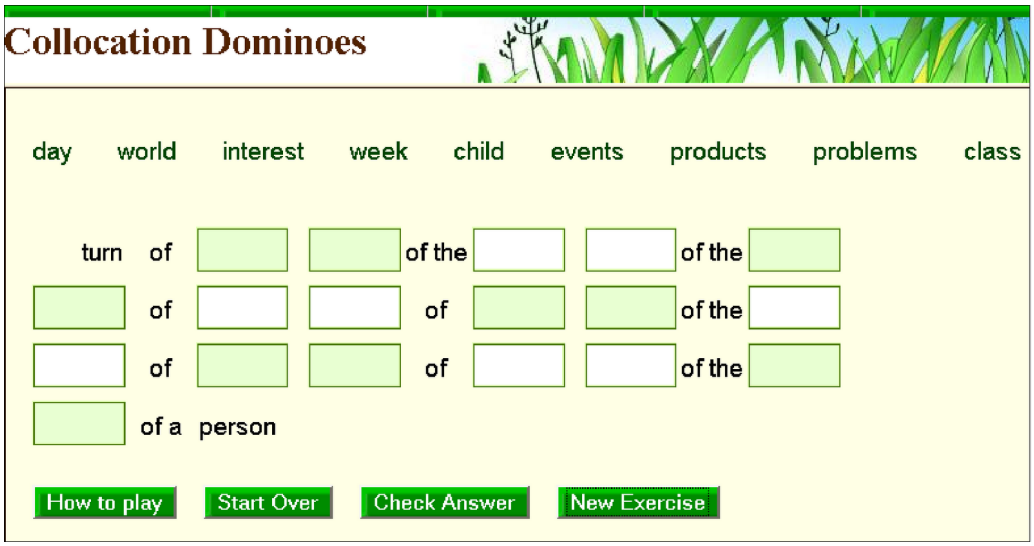
learners must guess which word collocates with all of them. The answer is obvious to chocolate lovers!

A single game comprises a word and a set of collocations. The interface is inspired by the classic computer game Tetris. Collocation "bricks" with the target word omitted drop down from the top of the game panel, one by one, hard on each other's heels. The learner continually enters guesses, and the game ends when the correct word is given – or the collocations run out. Bonus points are awarded depending on how few collocations have been seen before the correct word is entered.

The widgets on the right control the game's progress. At any time the learner can restart the game, move on to the next one, or restart the whole exercise (which typically consists of several games). The slider bar adjusts the speed at which the bricks drop.

To create a game, the designer supplies one or more target words. Using more than one allows for subject or topic related games. Games can also focus on a particular collocation type, or a range of types.

Take the word "make". If the *verb* + *noun* type was specified, collocations such as "make money", "make use of", "make every effort" would be used. However, if all collocation types were allowed, "make sure", "make up", "actually make", "make money" are legitimate examples too. Both options are good ways to enrich a learner's repertoire of collocations.



Collocation Dominoes (prototype version)

Collocation Dominoes

In this activity, the last word of one collocation becomes the first word of the next, like this:

> *bank check – check book – book club – club sandwich – sandwich board – board room …*

The illustration shows a game comprising *noun + of noun* collocations with the starting word “turn”. Adjacent pairs of boxes should contain the same word – and when the user places a word in one, the system automatically fills in the other. The words are chosen from the list at the top by dragging them and dropping them into boxes. Moves can be undone by clicking the collocation text. When *Check Answer* is clicked, any incorrectly formed collocations revert to empty boxes.

English word classes are flexible – many verbs can be used as nouns, or nouns used as adjectives – and even advanced learners often feel uncomfortable using *noun + noun* combinations. This activity helps them understand that these are standard English.

To design a Collocation Dominoes game you choose the collocation type, a starting word, and the number of dominoes. You can also determine whether the activity is open, in which case users choose the missing words freely and type them in, or closed, in which case the words are given and the learner drags them into the correct position.

Collocation Matching (prototype version)

Collocation Matching

In Collocation Matching a set of collocations is selected, usually of the same collocation type. Each is split into left-hand and right-hand components, and they are shuffled. For example, “the secretary of state”, “course of action”, “hundreds of dollars” might be presented as:

the secretary	*of action*
hundreds	*of state*
course	*of dollars*

The learner must rematch them.

The illustration was created from six quantification words: “grain”, “drop”, “sheet”, “chunk”, “slice” and “bar”. The system automatically retrieved the collocations “grain of truth, “drop of water”, “a sheet of glass”, “a chunk of time”, “another slice of bread”, and “bar of chocolate”. Words were split from their associated nouns and shuffled, and the learner’s task is to match quantification words with nouns by dragging and dropping them in a way that creates the strongest partnerships.

At any time learners can check the answer, restart the current game, or move on to the next one – which will use the same set of quantification words but with different associated nouns.

Picking words thematically, as in this example, can help learners practice particular groups of collocations, which adds extra value to this kind of activity. Another example is a game based on certainty adverbials such as “certainly”, “definitely”, “surely” and “undoubtedly”.

Related Words (prototype version)

Related Words

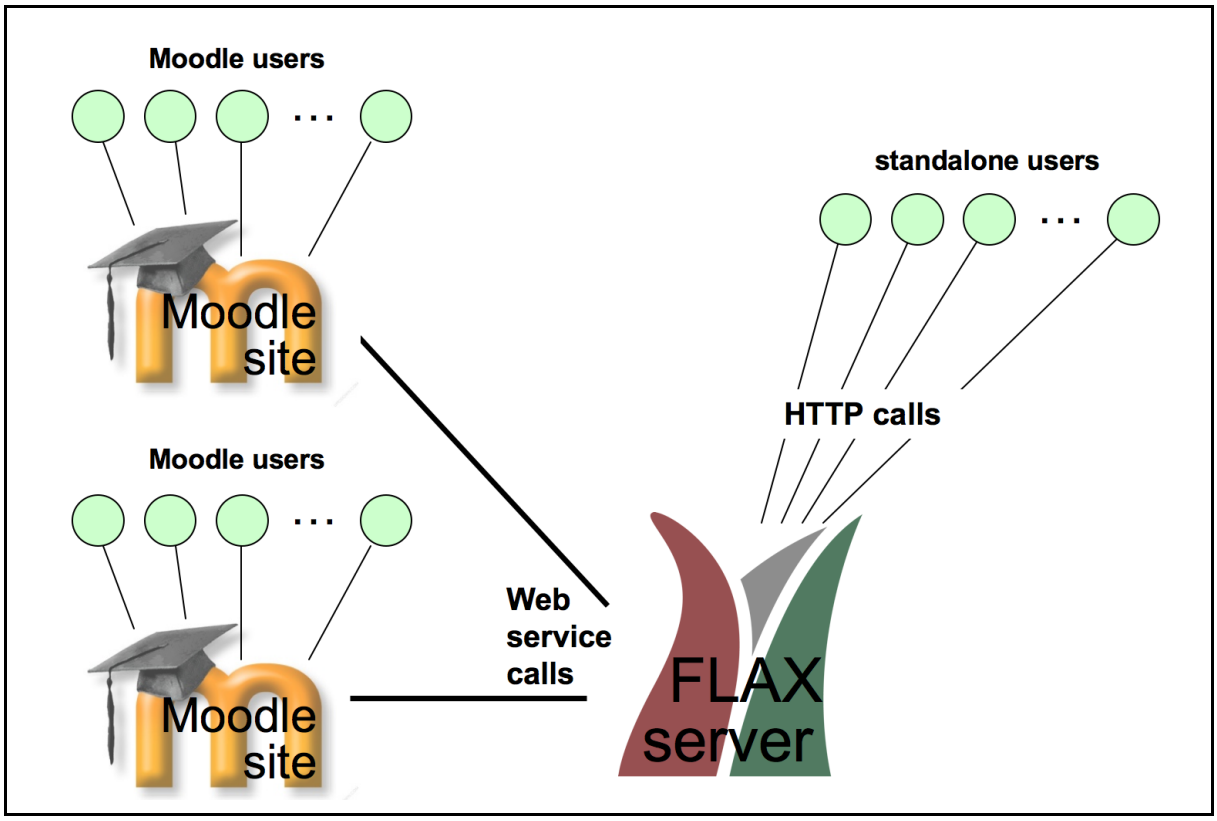
In the Related Words activity, a few words and several associated collocations are chosen. The words are removed from the collocations and shuffled. For example, if the words were “pay” and “make”, the collocations might be “pay the bill”, “make efforts”, “pay the debt” and “make a difference”, in which case the learner would be shown

_____*the bill,* _____ *efforts,* _____*the debt,* ____*a difference*

along with the words "pay” and “make”.

The accompanying illustration is for the words “speak” and “tell”. The number of occurrences of each is shown at the top of the panel, and decrements every time the word is used. The learner drags a word and drops it into a space to complete a collocation. Actions can be undone by clicking the collocation text. When the *Check Answer* button is clicked, incorrect collocations revert to their original state.

This activity works well with sets of words that share similar meanings but have different usage. Learners are often confused by groups of common words – “make” and “do”, “speak” and “tell”, “see” and “look” – and find it hard to understand their differences by consulting dictionaries. Studying collocations is an effective way to help learners distinguish between them.



Structure of the FLAX system

7. Under the hood

If FLAX is all set up for you, or if you use the demonstration version, you don't need to know anything more about how it works. This section is for people who have to set up the system, or for those who are just curious.

7.1 FLAX architecture

In the center of the diagram opposite is the FLAX server. Here it is servicing three groups of users: one group of stand-alone FLAX users (on the right) and Moodle users on two separate sites (on the left). Note that the FLAX server is a completely separate entity from the Moodle server; and several (in this case two) Moodle sites can use the same FLAX server. All the users in this illustration are on Web browsers, and there is no distinction between students and teachers.

Stand-alone FLAX users communicate with FLAX in the ordinary way: they use it as a Web server over the standard hypertext transfer protocol (HTTP). To do this, all they need is the URL of a FLAX site (http://flax.nzdl.org for the demonstration site). Teachers must register (Chapter 3) to save the exercises they create or to build collections; any collections they build are visible to everyone. We hope that serious users will download the FLAX server and run it on their own computer. The system is available at no cost from the FLAX website.

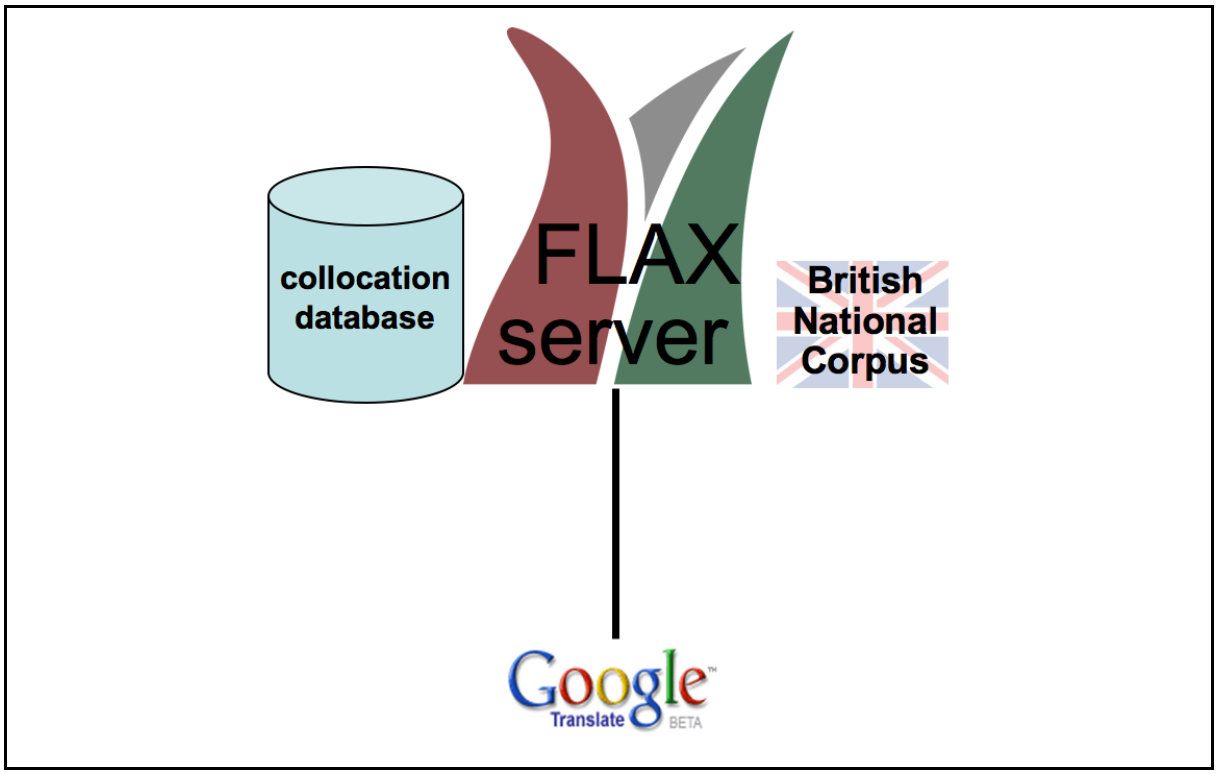
Moodle users communicate with their normal Moodle service, which must have a module called MoodleFLAX installed. MoodleFLAX sits inside Moodle and communicates with a FLAX server using Web service calls. Communication is fine grained: when students undertake FLAX activities their Moodle server is continually making Web service calls to the FLAX server behind the scenes. Cut this connection and the activities will stall. All the exercises you make and the collections you build are stored on the FLAX server: only the class grades are stored on Moodle.

At the time that MoodleFLAX module is installed, you give it the Web address of a FLAX server. The FLAX demonstration site can be used temporarily, but again for serious use please download and install the FLAX server.

When several Moodle sites communicate with the same FLAX server, the collections built on each site are kept separate. Recall from Chapter 3 that collections are shared within your institution – i.e., on a single Moodle site. However, they are not shared *between* different sites.

The FLAX server runs on Linux, Windows, and Mac. It is easy to install. Download the server from http://flax.nzdl.org: full installation instructions are given. Moodle users need to download the MoodleFLAX module from the Moodle website and make the connection with their FLAX server.

However, some of the more advanced FLAX facilities require further work to set up.



More details of the FLAX server

7.2 More on FLAX servers

When installed as described above the FLAX server lacks three optional components:

- the British National Corpus (BNC)
- collocation databases for the BNC, the British Academic Written English (BAWE) corpus, and Wikipedia
- a link to the University Research version of Google Translate.

The British National Corpus (BNC) is a 100 million word collection of language from a wide range of sources, designed to represent a wide cross-section of current British English. It contains much copyright material, which has been generously made available on the understanding that the rights of the copyright holders will not be abused, and to acquire it you must sign a licensing agreement.[13] Having obtained the BNC, you need to build it into a digital library collection for use by FLAX. We can supply all the necessary code.

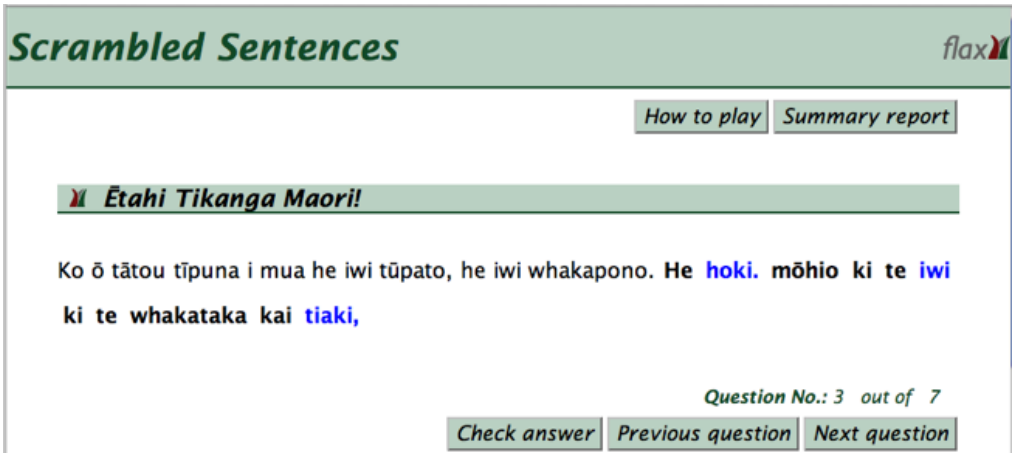
The full FLAX server at http://flax.nzdl.org contains three large databases of collocations. One (~2 Gb) is derived from the British National Corpus; another (~0.5 Gb) from a corpus of British Academic Written English (BAWE) which was developed at the Universities of Warwick, Reading and Oxford Brookes; and the third (~20 Gb) from the English version of Wikipedia. These are too large for us to distribute. In order to build them, we used an automatic algorithm that identifies the part of speech of every word, and then matches all word sequences against the set of collocation patterns listed in Chapter 6. Our software also analyzes the text of Wikipedia articles to find the definitions of concepts, and to determine related concepts.

Google Translate is used to produce glosses in other languages. FLAX calls the API to the University Research version of this system, which disambiguates words in their original context and allows the translated versions to be identified. To enable glosses you need Google's permission to access this API. Note that FLAX obtains glosses and builds them into a collection at the time the collection is created, so continued access to Google Translate is not required.

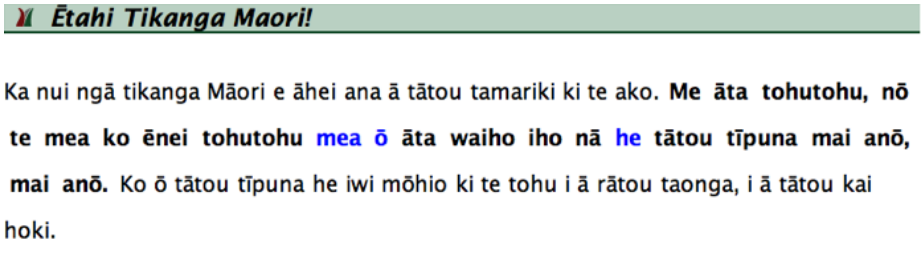
All these facilities are optional. All other activities – including the identification of collocations in documents, which does not use the collocation database – need only the basic server.

- The BNC is needed whenever examples are sought via the British flag icon
- The BNC collocation database is needed before the individual words of collocations become clickable
- The other collocation databases are required to enable further experimentation with collocations and words, as described in Sections 6.1 and 6.2
- Google Translate is required (at the time a collection is built) to provide glosses in other languages.

[13] The BNC is available on two DVDs from http://www.natcorp.ox.ac.uk.



Scrambled sentences in Māori: easy? …



… or not so easy!

Word guessing, in German

7.3 FLAX in other languages

The ideas underlying FLAX are language independent, and it can be used without any modification for teaching other languages – European ones, anyway.[14] Of course, syntactic structures such as active *vs.* passive sentence, or parts of speech, will not work properly for other languages. Such information is utilized as an optional feature in most exercises. Also, collocation-based activities will not work, because our collocation dictionaries are in English.

Nevertheless, FLAX can be used just as it stands for different languages. The illustration shows a Scrambled Sentence exercise in the Māori language of indigenous New Zealanders.

Fixing it up for other languages to provide all the features that are available for English is not, in principle, difficult. Here is what is needed:

- a syntactic module that can identify syntactic structure and parts of speech in that language
- a corpus of standard usage, to replace the British National Corpus
- a frequency-ordered list of word n-grams from some large corpus.

These components exist in one form or another for most commonly-spoken languages. Note that Google has made a Web n-gram collection available in ten European languages (Czech, Dutch, French, German, Italian, Polish, Portuguese, Romanian, Spanish and Swedish).

The FLAX project at the University of Waikato is keen to cooperate with people who wish to make it fully available in other languages.

[14] In its present form it will not work with languages such as Chinese that do not put spaces between words, and we are unsure about right-to-left languages such as Arabic.

Contact details

FLAX project website:

http://flax.nzdl.org

Email:

flax@cs.waikato.ac.nz

MoodleFLAX module:

http://docs.moodle.org/20/en/Flax_module

Host organization:

University of Waikato, New Zealand

Project team:

Ian H. Witten, Professor of Computer Science
Margaret Franken, Chairperson, Language Education
Shaoqun Wu, PostDoctoral Fellow
Xiaofeng Yu, Research Programmer
Michael Walmsley, Researcher
Liang Li, Researcher

8. Over to you!

As we explained at the outset, FLAX is both a vision and a language learning system that you can use. And we invite you to participate in both!

If you're a teacher, please use the FLAX language learning system. There are no charges: it's completely free. Moodle users can download the MoodleFLAX module; others can access FLAX from our website. You're welcome to try it out with your classes. For sustained use, we urge you to download and install the FLAX server, to avoid overloading our computers. It's easy to do, and runs on any computer. However, some advanced FLAX facilities require further work to set up (Section 7.2). If you need help, just ask us.

We like to hear from FLAX users. We're interested in your comments and suggestions, and also in more formal user studies and comparisons, to help us improve the software. If you build collections that you can share, we can put them on our website. We're particularly interested to hear about experiences with non-English language teaching.

We also invite you to help us develop the FLAX vision. As you have learned in Chapter 6, we are working on incorporating language activities that we've already prototyped into the "production" system. But we're also working on new ideas. Here are some.

Writing aids. We are seeking ways of detecting language errors in student writing, and suggesting alternative phrasing. Chapter 6 noted that lack of collocation knowledge explains why language learners find it hard to express their ideas simply, precisely, and persuasively. Yet FLAX has an enormous vocabulary of collocations – surely it can help critique, and offer constructive suggestions?

Extensive reading. FLAX supports intensive study of particular texts. A complementary approach is to encourage students to read large volumes of text. FLAX already incorporates contextual word glosses (Section 2.1 showed Spanish glosses). In an associated project, FERN, we are modeling users by recording their usage of glosses, and their reading speed. The system automatically selects reading material of appropriate difficulty – and on topics that interest the individual user.

Collocation learning. FLAX already includes many facilities to help students learn collocations. However, we are experimenting with further advanced facilities in connection with our three databases of collocations, and we are also using other resources, such as online lists of synonyms and antonyms, word families, Roget's thesaurus, and the Wiktionary.

Wikipedia mining. In a separate research project, we have discovered how to link topics in documents to Wikipedia articles, and to use this to quantify the semantic relatedness of arbitrary concepts. Both can be applied to language learning, for example by adding explanatory popups for named entities such as people and places, and by assessing the relevance of student guesses in certain exercises.

FLAX is open source software and you can work on it too. Please contact us if you would like to help develop the vision.

Acknowledgements

We gratefully acknowledge the help of all who have worked on the FLAX project, particularly John Brine and Katherine Brown.

We would like to acknowledge the stimulating environment provided by the digital library laboratory at the University of Waikato.

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Further reading

The definitive account of FLAX's support for collocation learning:

- Wu, S. (2010) *Supporting collocation learning*. PhD thesis, University of Waikato, New Zealand.

Published papers describing the FLAX system:

- Wu, S., Franken, M. and Witten, I.H. (2009) "Refining the use of the Web (and Web search) as a language teaching and learning resource." *Computer Assisted Language Learning*, 22(3), 249-268.
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- Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge University Press.
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