

# Writing learning outcomes for the Core Curriculum

The first version of the Core Curriculum, and its successor, have been developed using what might be called a content driven approach. The objective was, and is, to create a set of resources into which GIS educators might 'pick and mix' elements according to their overall teaching strategy. Thus there are no overall educational aims or objectives, and there has been no attempt to specify objectives for the individual lecture authors to follow.

In designing the second version of the curriculum, we have decided to follow much the same strategy, but we have also been persuaded of the sense in asking each individual author to specify some clear LEARNING OUTCOMES that they think should results from following their materials through.

We ask that each lecture specify these intended outcomes in the simple format:

## Intended Learning Outcomes

After following this lecture, you will be able to:

1. list ...
2. evaluate ...
- .
- .
- .
- N. explain ...

Each lecture should specify between, say, 5 and 10 such outcomes.

For many authors this will be unfamiliar territory, so we have asked Alan Jenkins (Oxford Brookes University, England) and Dave Unwin (Birkbeck College, London, England) to pen some 'how to do it' guidelines. They have also agreed to edit your efforts before the Core Curriculum goes to press.

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## How to write learning outcomes

*by Alan Jenkins (Oxford Brookes University) &  
Dave Unwin (Birkbeck College London)*

As a result of reading this text and then applying it to the materials you write for the project you will be able to:

- state what is meant by a learning outcome
- give reasons why learning outcomes are valuable in designing a lecture
- use learning outcomes when planning and writing a lecture
- have a view as to whether you think they better enable you to describe to students what they are expected to learn from your material.

## **What are learning outcomes?**

Learning outcomes are statements of what is expected that a student will be able to DO as a result of a learning activity. For this new version of the Core Curriculum the activity will be following your materials on WWW or listening to a lecture based on them, but it could also be a laboratory class, even an entire study programme.

Note how we emphasise what students will be able to do. This distinguishes an approach based on learning outcomes from one which uses more intangible ideas related to educational aims and objectives. In the educational literature there are important debates about the differences between objectives /outcomes and competencies, but this introduction will not bother you with these niceties.

The key word is DO and the key need in drafting learning outcomes is to use active verbs. Note how in the introduction we used words such as give, use and have a view.

## **Why learning outcomes?**

Learning outcomes help instructors more precisely to tell students what is expected of them. By doing this, educationalists assert that they:

- help students learn more effectively. They know where they stand and the curriculum is made more open to them.
- make it clear what students can hope to gain from following a particular course or lecture.
- help instructors to design their materials more effectively by acting as a template for them.
- help instructors select the appropriate teaching strategy, for example lecture, seminar, student self-paced, or laboratory class. It obviously makes sense to match the intended outcome to the teaching strategy.
- help instructors more precisely to tell their colleagues what a particular activity is designed to achieve.
- assist in setting examinations based on the materials delivered.
- ensure that appropriate assessment strategies are employed.

Learning outcomes are particularly important in a project like this where materials and learning activities are produced by many people in order to be used by others. By stating what you expect

students to be able to do as a result of what you have written, you can help colleagues elsewhere better judge its appropriateness to their circumstances and consider how to change it to meet their own local needs. Given the practical emphasis of GIS, specification of learning outcomes seems particularly appropriate.

## Writing learning outcomes

We started this briefing with an example where we gave four possible outcomes for this exercise which you might like to revisit.

Here are some suggested ways in to the problem:

- think of what you expect students to be able to do / to know before reading your material

NOW

- think of them after they have read it. What should they now be able to do as a result of reading it?
- always try to use active words. Some suggestions, each keyed to a particular type of intended outcome, are given at the end of this document.
- try writing them!
- try writing them, and then ask a colleague who is not a GIS specialist / or students whether they know what is expected of them

## A GIS example

By way of example, a laboratory module in a spatial analysis course using Bailey and Gatrell's INFOMAP software on the analysis of point patterns might have any or all of the following as learning outcomes:

On completion of this exercise you will be able to:

1. Access INFOMAP on the PCs in the Computer Based Learning Laboratory and load data into it from a file.
2. Use the MAP routine to draw and print a dot map and give a verbal description of the pattern revealed.
3. Use the spreadsheet facilities within the DATA module to compute a simple nearest neighbour test of complete spatial randomness.
4. Use the ANALYSIS routine provided to estimate a K function of nearest neighbour distances.
5. Do a kernel density estimation transformation of the point data into a continuous surface of densities.

Reference to the lists of suggested words will show that, as befits a laboratory class, these outcomes almost all relate to the application of knowledge.

## What are the objections/problems?

- Some groups in the USA object to them as aiding education as social engineering.
- Some instructors say, with justification, that they can't predict what students will learn. Hence the use of the word 'intended'.

## What comes next?

Well, once you have written your learning outcomes, the next logical step is to design an assessment method to test whether students have achieved the outcomes. Only then can one really say what form of learning materials / activities are needed to assist students to pass the assessment. Clearly, your suggested examination questions should attempt to test whether or not the intended outcomes you specified have been achieved.

## Further reading

ALVERNO COLLEGE FACULTY (1994) *Student Assessment as Learning at Alverno College*, Alverno College Institute, Milwaukee.

Bloom B (1956 ) *Taxonomy of Educational Objectives, Book 1 Cognitive Domain*.

Bloom B (1964 ) *Taxonomy of Educational Objectives, Book 2 Affective Domain*.

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## Verbs that you might think of using to specify different sorts of outcome

For Knowledge				
arrange	order	define	recognise	duplicate
label	recall	list	repeat	memorise
name	state	relate	reproduce	**

  

For Comprehension				
classify	locate	describe	recognise	discuss
report	explain	restate	express	review
identify	select	indicate	translate	**

  

For Application				
apply	operate	choose	practice	demonstrate

schedule	dramatise	sketch	employ	solve
illustrate	use	interpret	write	**
<b>For Analysis</b>				
analyse	differentiate	appraise	discriminate	calculate
distinguish	categorise	examine	compare	experiment
contrast	question	criticise	test	**
<b>For Synthesis</b>				
arrange	formulate	assemble	manage	collect
organise	compose	plan	construct	prepare
create	propose	design	write	**
<b>For Evaluation</b>				
appraise	judge	argue	predict	assess
rate	attach	score	choose	select
compare	support	estimate	evaluate	**

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The NCGIA Core Curriculum in GIScience. Aug. 2000. NCGIA, University of California . 27 June 1996  
<http://www.ncgia.ucsb.edu/education/curricula/giscc/units/format/outcomes.html#top>