Guidelines for *Bilko Authors*

Introduction

Welcome to the *Bilko* writing team. These notes are intended as a guide to the preparation of lessons for the *Bilko* series. They do not constitute a book of rules for lesson writing: rather, they define a framework within it is possible to create lessons which are compatible with others of the series, but leave you free to develop your own ideas in your own way. The notes are in two parts: one, these *Guidelines for Bilko Authors,* which deal with purpose, style and the needs of those who will use the lessons; the other, *Technical Notes for Bilko Authors,* which deal with the handling of files and the range of tools offered in the *Bilko* software.

The first *Bilko* distance-learning module was published by UNESCO in 1989 and the seventh in 1999. *Bilko* has more than 7500 registered users in over 170 countries[1] worldwide and each year around 1600[2] copies of different lessons are downloaded from the Bilko web site for use in courses and workshops, or as self-teaching material. Writing for *Bilko* can thus bring your remote sensing research interests to a worldwide audience ranging from schoolchildren in secondary education to university teachers and researchers, and increasingly to professionals outside the university system, who wish to use remote sensing in their chosen field.

What is *Bilko*: a brief history

Bilko emerged from a series of informal discussions in UNESCO in the mid-1980s. Running through these discussions were three themes:

- that the interpretation of satellite images is a skill of great international, strategic and economic importance which should be developed widely and distributed globally,
- that UNESCO should take a role in the development of new media of instruction, specifically the use of small computers to teach topics normally denied to those having no access to large computers,

[1] Figures at 31 October, 2011.

[2] Annual average based on downloaded lessons from October 2004 to October 2011.

- that UNESCO should seek to improve the quality of teaching in selected fields by demonstrating what can be done by distance-learning methods.

At that time, the interpretation of satellite images could be undertaken only on large computers, and images were often seen as having military importance, so access to the equipment and technologies for image interpretation was privileged and even restricted.

At the same time the techniques of distance education were being developed by two separate groups. On the one hand were open-learning institutions which tended to use text, television and radio as their principal media with a certain amount of face-to-face instruction as backup, and on the other were industrial and commercial groups which developed training modules, leaning heavily on video-tapes and ports to large computers. In both cases, lessons were written by closely managed teams which had a strong house style and institutionally maintained discipline.

Rather than follow the conventions of the day, UNESCO chose to back a project based on personal computers (PCs) and floppy disks as the medium of transfer. A first version of the image-interpretation software now known as *Bilko* was written as part of the project and individual teachers known to be interested in the project were asked to write demonstration lessons based on that software. Few rules were set for the lessons, but they were edited to a common standard and put into a common format. It was also agreed that lessons should be designed for use by students and teachers working on their own with limited technical backup.

From the start it was agreed that all lessons should be written as models of good practice. All were to promote good teaching by exemplifying good teaching in action.

Today Bilko modules and lessons use techniques that were not available at the start of the project and reflect the interests of new authors drawn to the project.

Priorities have also changed: the need to sensitise the world to the importance of image analysis has long since passed and the *Bilko* team can reasonably claim to have made a useful contribution to the democratization of information through its work in this particular field. Certain aspects of the project have, however, never wavered: lessons have always been written for students and teachers who have modest resources or work in some degree of isolation from others in the field; the production group responsible for each module has been made up of volunteers who have chosen to submit to a common discipline in the writing of their material; and lessons have always been written with the intention that they represent models of teaching in their field, that can be used by others as the basis for lessons of their own.

Bilko today

Through IOC, UNESCO still provides support for the *Bilko* project, but the Project Secretariat for GOOS-AFRICA, European Space Agency and ENVISAT related coastal and oceanographic lessons is now based at UNESCO-Bilko, c/o V. Byfield, National Oceanography Centre, European Way, Southampton SO14 3ZH, United Kingdom. A small International Executive Steering Committee – mostly authors of

Bilko lessons – guides the project, sets the schedule of activities, edits submitted material and arranges for the production of teaching modules.

If you have a lesson you would like to submit either as single lessons, or for inclusion in a *Bilko* module, do not hesitate to contact the Secretariat (at bilko@noc.ac.uk or the address above). Better still, if you have an idea for a lesson but have not yet written it, take time to contact the Project Secretariat who will be able to direct you to appropriate members of the Steering Committee to discuss what you have in mind. The *Bilko* project is completely open, and will consider any lesson for inclusion in its modules so long as it is compatible with the general aims noted above and relates to a topic not too different to those already treated.

Writing for *Bilko*

For an isolated student, perhaps the most difficult aspect of any lesson is to appreciate just how much has to be learned. S/he has to identify both the level of understanding required of the phenomena introduced and the tasks that may be set to verify that the required level of understanding has been reached.

A traditional university story is of the professor who notes that in his department they set the same questions to students in their first and final years of study, and then remarks "Of course, we change the answers." In the physics version of this tale the question set might be: Describe how to set up a standard of time. While the first-year student might reasonably answer in terms of the pendulum, quartz, caesium and astronomical time, the final-year student would be expected to show knowledge of the bandwidth of the appropriate caesium line, explain how satellites are used to transfer time signals from laboratory to laboratory around the world, and perhaps give some account of the relativistic corrections to be considered given the relative velocity of the clocks on the satellites and on the Earth. Lessons for distant students must specify the level of understanding required

For many of your students, language is another difficulty: think in terms of a lesson written in English by someone who is Japanese and studied by someone whose native language is French. Even if the text is error-free, cultural differences can produce text that is difficult to follow. For such students it is helpful to use sentences that are relatively simple in construction and to argue in a manner that is slightly repetitive. Vocabulary, of itself, is not a major problem since most students have technical dictionaries.

Most frustrating for students are lessons that are incomplete. A question for which no solution is given is useless for a student who has no local support, and even a bare answer, with no explanation, is not of great use to a student who has missed the essential point being made. A bare answer also puts the whole question at risk from a single misprint.

Perspective of the local teacher

While some students work independently, most are likely to work under the supervision of a local teacher. As a local teacher is almost certainly the person who will select the lessons to be used by a class or student, it is important to present the information that will aid that choice in the most convenient manner possible.

A lesson is not a course. It is likely therefore that a local teacher will see the *Bilko* modules as a source of illustrations for a course having a theme far different from those considered by the *Bilko* author. For such a teacher, *Bilko* may be seen as just one offering among others, which may include textbooks, reports, video, and other computer-based exercises. The lesson is likely to be the subject of two screening processes, one to check that the lesson offered is of appropriate general interest, the other to verify that it competes in detail with the other possibilities available.

To help teachers make their selection, one of the few inflexible rules of the *Bilko* system is that **every lesson must incorporate a brief summary of its content and a listing of the aims and objectives set for the lesson** (more on this later). This is an important point for the selection of lessons can be a frustrating exercise.

Consider the selection of video. This is essentially a linear medium, so viewing is slow. The effect is that the initial screening, presumably from a catalogue, assumes great importance. With *Bilko* it is possible to jump from lesson to lesson and module to module, but reading each lesson takes time, so it is still important to present key information in a way that can be assimilated quickly. This is why the initial sections describing the lesson – aims, objectives and summary – are more regulated than the rest of the text.

Local teachers weighing the use of *Bilko* in their courses may well have interests running across those of individual *Bilko* modules: their courses may relate to a particular geographical region, may focus on particular analytic skills in the social or physical sciences, or emphasise the detailed skills of image interpretation. If a teacher is expert in certain aspects of a lesson, but knows that s/he has shortcomings in others, it is important to be able to establish quickly whether the lesson covers any blank areas or requires an excess of time to establish skills which are of a nature peripheral to the underlying course.

While *Bilko* texts have always been written with the independent student in mind, the reality is that local teachers have a key role in the learning process that uses the *Bilko* lesson. The single text that comprises the lesson must take account both of the needs of the student and the local teacher. There can be no *Answer Book* or *Teacher's Notes* for lessons that are inherently open in character.

Backup

Even in the worst of circumstances you receive some feedback from your students when you teach them face-to-face. The thousand-strong first-year class, depending on the local culture will go silent or make a lot of noise, if there is an overt gap in the logic

of your presentation or you make a simple error. You can then resolve the problem in just a few words.

When you write a lesson for distant students you have no such feedback. You have to create feedback loops of your own to remove weaknesses of presentation, and to pick up slips and errors in your text. Feedback is an essential element of quality control.

If you have a face-to-class of your own, this is an obvious source of feedback: so also are colleagues and friends. Another source of feedback is the *Bilko* team: *Bilko*'s success is largely due to the willingness of *Bilko* authors to work as a team, to read through and comment on the work of fellow authors.

By writing a lesson for *Bilko*, you become a member of the *Bilko* team and as a member you are free to call on the services of that team. Ultimately, the team will edit all material before it is incorporated in a *Bilko* module, for UNESCO cannot be responsible for the distribution of material of less than professional standard, and UNESCO has handed responsibility for the quality of modules over to the *Bilko* team.

In institutions that specialise in distance education the use of teams is almost universal. Writing strategies inevitably vary from team to team and author to author, with some authors producing polished drafts after long intervals and some producing rougher drafts at shorter intervals.

Some of the most expert practitioners of distance education are very quick at producing rough drafts of their lessons and are adept at incorporating helpful suggestions for later drafts while rejecting those which take the lesson too far from its intended line. These writers use the team approach to best advantage.

Whatever your personal approach to writing, you are likely to need at least three drafts for your text, one to define the line of presentation and the limits of what is to be accomplished, one to pick up errors and omissions and to ensure that each part of the lesson has a suitable weight, and one to polish the presentation.

Writing style

If your purpose in writing is to demonstrate to colleagues that you are a master of your subject and a person of immense erudition, you should write a text book. If you want to write successful distance-education lessons your success must be judged by the number of students who learn by word of mouth that your lesson is worthy of study, by the number of students who look for more after working with the module in which your lesson appears, and by the occasional letter or e-mail from a student or local teacher commenting on what you have done. Your writing style to aim for is one which communicates your ideas not one which demonstrates your personal talents.

So if a distance-learning lesson is not to be like a text book, in what style should it be written? An aphorism sometimes used to describe the process is: "You should write for your student as if you were speaking to individual members of a small class." You can interpret this as meaning that you should address your student directly and use simpler sentence constructions than you might use in an academic paper. An alternative approach is to conjure up an image of a student who is competent, but not brilliant,

whose English is adequate, but not fluent, and whose backup takes the form of a computer, a dictionary and an atlas. Ask yourself how you can communicate with this student if the student can ask no questions.

There are no detailed and explicit rules associated with the writing of lessons for *Bilko* except that, following UNESCO, we use European English. We take the view that writing is a private, creative endeavour so you, as author, must be free to express as you think best. There are, however, a few points of style that are generally considered to be helpful for independent students, and your writing may be improved if you can incorporate them in your writing:

Address your students directly

Nineteenth-century authors could begin a text with "Dear Student". Today, such a construction is unthinkable, but the word "you" is acceptable.

Not all authors can bring themselves to adapt to a style in which they address their students directly, but it is considered to be a format well-suited to distance education. Try to use this style for your lessons, but if you find it excessively difficult, revert to your usual style. You must be comfortable with the style in which you write if you are to communicate effectively.

Use (relatively) simple sentence constructions

In research papers it is admissible to slip past the editor occasional sentences of some complexity: it can be amusing, in one package, to specify hypotheses, list reservations, trace a convoluted argument, and reach a worthy conclusion in one sharp final phrase. If others are to understand you, it is better to keep your sentences short.

Long sentences are not forbidden in distance education, but think of students with language difficulties and avoid complication where you can. Put important points in short sentences.

Learn to employ constructive redundancy

Sometimes a student will fail to understand your explanation of an event or phenomenon. For some reason s/he does not make the logical connection you have tried to establish. In face-to-face teaching the student will ask a question and you will reply using different words, a different order in the presentation of your argument, or a different emphasis. Just a few words may resolve a problem the student finds very puzzling.

With a distant student you cannot reply to questions, but you can guess where questions will be asked and add a few extra words of explanation. In that your reasoning is repeated it is redundant, but it helps understanding and is therefore constructive. Hence our term *constructive redundancy*.

This technique is also helpful when you want to use words that your student may not understand. You can use the construction "…, that is …" to slip an informal definition into your text.

Pedagogical points

Structure of the lessons

Asked how to present a lesson, an old teacher once replied: "First, I tell them what I'm going to tell them. Then I tell them. And then I tell them what I told them." In *Bilko* this traditional tale is turned into a lesson structure which begins with a statement of aims, objectives and a brief description of the lesson. This is followed by the lesson itself and then by a summary of the lesson.

The logic of this form of presentation is that a student who knows where a lesson is leading will more readily grasp points as they are made in the course of the lesson. From the summary that ends the text a student can infer the relative importance that you, the teacher, associate with the points made.

At a micro-level, this approach can be used effectively within each step of a lesson. Tell the student what the objective of the next step (*activity*) in the lesson is, tell the student how to carry out the activity, and finally review what s/he has accomplished in the process.

We are well aware that individual *Bilko* lessons do not always conform to this pattern, but they have always remained close to it – particularly in the setting of aims and objectives. Future modules are likely to have the same blocks at the beginning and the end, but the main lesson – as always – will be in the hands of individual authors.

Aims

An aim is the statement of an aspiration that a teacher holds for her/his students. You, the teacher, hope that as a result of working with the lesson they will be able to understand some concept, appreciate a point of view, assess the relative merits of two kinds of evaluation …

Your description of the aims of your lesson sets out on global terms your hopes for the outcome of the lesson. They set out the area of study, but do so in broad terms. They put your students in touch with the words they will find in a curriculum, but do not specify actions. They do not list in detail what is meant by word*s* such as *understand, appreciate, assess.*

In terms of the time-scale example mentioned above, the aims for the first and final year students could differ very little: *understand* what is meant by a time scale; *assess* the relative merits of time scales based on sidereal and atomic time; *appreciate* the corrections which must be made when data are exchanged between widely-separated clocks.

For students, your aims place the lesson with respect to other lessons and courses. For this reason they are also important for local teachers. Well-stated aims help local teachers to carry out the preliminary screening of lessons under consideration for inclusion in their courses. They do not provide enough information for detailed screening: for that the appropriate source of information is the list of lesson objectives.

Objectives

Lesson objectives specify tasks that your students should be able to undertake as a result of studying the lesson. Where the verbs used to describe aims are cerebral and passive, those used to describe objectives are active. In the objectives you list for your lesson you ask your students to calculate, evaluate, identify, measure, undertake, describe, compare (but now probably in quantitative terms) or assess (again probably in quantitative ways). The learning objectives of a lesson may also be considered as a set of intermediate tasks or skills that the student needs to master to achieve the overall aims of the lesson.

You use your objectives to tell your students how you intend to find out if they have satisfied the requirements set out under the heading of aims. In effect, the objectives your students would be expected to achieve – in some unspecified combination – in answering an examination question based on the lesson. It is in the specification of objectives that the apparently identical examination questions on time scales suddenly diverge: the final-year student would be expected to demonstrate skills corresponding to far more sophisticated objectives than would be set for the first-year student

For local teachers, objective lists are key tools in the selection of lessons for study. Whereas traditional descriptions (first-year ocean sciences, final-year social science (town planning), S102, …) are country-specific, objective lists are indeed objective. For lessons offered in a cross-cultural environment they are almost indispensable.

Active learning

For all students, there is a danger that the idea of reading a text will be confused with that of studying a text. For distance-learning students, the danger is particularly acute, for there is no accompanying face-to-face instructor to question performance. The response is usually to write an active text.

QUESTION: Viewed as a Lesson for Lesson Creators (the title of an earlier version of this text) this text is abysmally weak. In specific terms, why?

ANSWER: You have been led to read the text *passively* but for a single interruption when you were asked one simple question.

An accepted way of persuading students to work actively with their learning text is to intersperse it with questions and other activities. One problem in writing such a text, however, is that it is easier to devise questions in the later part of the lesson. In part this is in the nature of the learning process, for the more skills a student has learned the more questions can be asked. In *Bilko* lessons, this problem is relatively simple to resolve for the activities can be brief, and a typical lesson offers opportunities in the setting up and preliminary examination of images. Merely by being aware of this problem as you write your lesson may help you to bring forward a sufficient number of activities to provide a balanced lesson.

A good working rule is to imagine your lesson in printed format and to arrange that at least one task is set on each double page. Clearly, this rule must be modified for

lessons which are heavily illustrated. *Bilko* Module 7[3] provides useful examples of active learning; often using the approach of a repeated cycle of *explanation, activity, question* to engage the student in a stepwise progression towards achieving the aims of each lesson.

Completeness

Distance-education students may have good support or may work in near-isolation. Lesson authors can only suppose that the support level is low. The consequence is that lessons must be complete in form.

Completeness is, of course, a relative term: you cannot revise all the material on which your lesson depends; you cannot even predict with identifiable accuracy all the questions students are likely to face in dealing with your lesson. You can, however, cover the obvious ground. Points to keep in mind are:

- Never set a question without supplying the answer you expect and indicating how you have obtained it. (Remember that students sometimes think a question is too easy and look for a complicated explanation for something you have provided as a simple example.)
- Make sure that references are real and complete. References to reports of restricted distribution or not listed on the Web are pointless. Remember that it may be difficult for a student to follow up your references, so make sure that the references are designed to help the student not to legitimise your argument.
- If you use illustrations or maps make sure that the structures you refer to in your text are clearly visible in the version that will be seen by your students.
- If you refer to some feature on a map or image do not regard it as self-evident. Take the time to describe the feature and indicate its location: what is obvious to you may not be evident to your students.

[3] Edwards, A.J. (Ed.) (1999). *Applications of Satellite and Airborne Image Data to Coastal Management.* Coastal region and small island papers 4, UNESCO, Paris. vi +185 pp.