Fostering reflective thinking with the Learning Achievement Self-Evaluation Record (LASER)

MARK COULSON, STEVE TORRANCE AND STEPHEN NUNN
Middlesex University, UK

We present the rationale, development, and evaluation of a simple tool designed to encourage reflective thinking in first year undergraduate students. We outline the role of reflection in undergraduate studies of psychology, and suggest how this may underpin the development of critical thinking. We then examine a ‘design brief’ which informed the development of the Learning Achievement Self-Evaluation Record (LASER). The LASER is then described, and an evaluation of its impact on students and the curriculum is presented.

Reflective thinking has received less attention in the literature on student learning and teaching than has critical thinking. Before addressing the relationship between the two, and examining how reflection may act as a prerequisite for critical thinking, a brief definition of reflective thinking (or reflection) is in order. One of the most influential writers on the topic, Schön (see, e.g., Schön, 1983), suggests that the reflective person is not afraid to experience surprise, doubt and confusion, but is able to use these to formulate new ways of tackling problems and testing old ideas and theories. We see reflective thinking as an independent process which is necessary but not sufficient for critical thinking. The reflective aspects of the learning experience can help release students from the assumption that everything they encounter in their learning is absolute and undoubted. Engaging in reflection has been shown to improve self-insight under certain conditions (Hixon and Swann, 1993), and reflective journals may help the development of critical thinking skills (Kessler and Lund, 2004).

While critical thinking has been described as the ‘icing on the cake’ of academic study (Barber, 2002, 2003) and something which should be covered towards the end of a programme of study, reflection is a relatively natural behaviour which can be introduced to students at a very early stage. Our aim was to provide first year students with a structured opportunity to reflect on the material they study. We argue that the act of reflecting on learning, and explicitly identifying what feels easy or difficult, interesting or boring, and important or trivial, is an essential first step in generating a critical approach. By addressing questions such as these, students learn to identify their own biases, and explicit reflective evaluations can be used to ask questions about why feelings arise, what their effects are on the learning process, both positive and negative, and how this may affect the way in which the student approaches the subject on subsequent encounters.

We sought to produce a course component to foster reflection in first year students, as a route to critical thinking, in a large psychology undergraduate programme in a post-1992 university. This tool, the Learning Achievement Self-Evaluation Record (LASER) was adapted from a more informal tool which had been used on an optional module (a 20-credit semester-long unit of study) in the first year of the academic programme. The tool design process took into account the aims and constraints that impacted on the process, and was shaped by our view that reflection was central to critical thinking.

A DESIGN BRIEF

In developing the LASER, we took account of the following aims and associated constraints:

- To encourage reflective evaluation against the backdrop of increased skills training, and an ever increasing body of knowledge within the subject;
- To introduce reflective thinking at the start of a student’s programme of study, and integrate it into their weekly activities;
- To provide a clear rationale of the importance of adopting a reflective and critical approach to learning;
- To provide a set of tools to engender a reflective approach, which is not too onerous to complete, with the intention that students may continue the process when it is no longer compulsory;
- To generate meaningful feedback to students, not only on their reflective and critical thinking, which to

1 Correspondence concerning this article should be addressed to the first author at: School of Health and Social Sciences, Middlesex University, Queensway, Enfield EN3 4SA, UK. Email: m.coulson@mdx.ac.uk.
many is a novel activity, but on more general aspects of their work; and

- To cover the range of experiences about which students need to reflect.

Reflection can be modelled as taking place along two dimensions, its Direction and its Scope. In terms of Direction, reflection can apply to Produced or Experienced events. Reflection on a Produced event involves thinking about one’s own actions, beliefs or behaviours. Examples include reflecting on how well a presentation went, weaknesses in a piece of coursework, and how to revise and prepare for an examination. An Experienced form of reflection, by contrast, might consider a lecture, a book chapter, an entire year of study, or any other unit which in some important sense is ‘out there’, and which, although the student inevitably plays some role, is principally generated by others.

The Scope of reflective activities spans many levels, from the single essay or lecture to an entire programme of study. For convenience, we discriminate between three levels of Scope (while accepting the boundaries will never be completely clear cut). These are the Particular (a single event), the Aggregate (a series of linked events) and the Synoptic (a high level overview, possibly incorporating many different events with only weak associations with one another).

By crossing the two levels of Direction with three of Scope, a matrix with six cells can be envisaged, each cell containing a conceptually distinct form of reflective activity. The matrix, along with examples of the types of reflection described by each, and the form of LASER associated with each activity, can be seen in Table 1.

### Table 1

A reflective matrix indicating examples of reflective activity

<table>
<thead>
<tr>
<th>Direction</th>
<th>Scope</th>
<th>Produced</th>
<th>Experienced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Particular</td>
<td>Self-assessment of essay grade&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Evaluation of a lecture&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Aggregate</td>
<td>Reflection on strategies, time management, and outcome of work on a given topic&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Critical summary of lectures, seminars and readings on a given topic&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Synoptic</td>
<td>Identification of own learning style following work on a module; outlining own training/development needs and setting goals&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Personal evaluation of a module and how this relates to programme of study and learning goals&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
</tbody>
</table>

<sup>Note</sup>. <sup>1</sup>Summarise and Reflect LASER; <sup>2</sup>Integrate and Interpret LASER, <sup>3</sup>Self-Assessment LASER

The above considerations led to the construction of three different forms of the LASER, designed to capture the range of experiences, in terms of Direction and Scope, on which students would be required to reflect on. Rather than reproduce the six cells from Table 1 and create six separate types of activity, we collapsed across some of the cells to retain a conceptual simplicity which would permit students to distinguish between the different LASERs. As simplicity was an important aim, each form of LASER was limited to a single side of A4 paper, and consisted of three sections which differed according to the specific type of LASER:

- **Summarise and Reflect LASERs** focus on experienced reflection across Single or Aggregate experiences (for instance a single lecture, or a series of related seminars);
- **Integrate and Interpret LASERs** are synoptic, examining reflection across a wide range of Experienced events (such as an entire module); and
- **Self-Assessment LASERs** focus on Produced events (performance on a single piece of work, or across a whole body of work, which might include any learning activity, whether assessed or not).

In each LASER the student is asked to outline the topic, evaluate it and reflect on the evaluative judgments. In general, around 40% of the content of each LASER is descriptive, 20% is evaluative and the remaining 40% reflective, although this differs slightly across the three forms. Copies of all three forms are provided in an Appendix.
EVALUATION OF THE LASER

In evaluating the LASER we wished to address a series of questions. First and foremost, if reflective thinking leads to more effective learning, we would expect some manifest effect of the LASER on student performance. While this may be difficult to measure in anything but a crude way (e.g., end of semester grades), it is nonetheless important to investigate whether there are any tangible returns to students. As the modules into which the LASER was introduced did not change either their syllabus or assessment format, we were able to compare performance across two cohorts, one who had no experience of the LASER, and a second which completed LASERs weekly. The two cohorts consisted of 152 students (121 women) who started their studies in September 2000, and 183 (154 women) who started in September 2001. All students were registered on single or joint honours programmes in psychology.

A second aim of the evaluation was to map student attitudes towards the LASER. As this was a novel tool, we wanted to see how students responded to it. To this end a questionnaire was developed and validated.

Finally, we wanted to ask whether student attitudes towards the LASER predicted academic performance. To the extent that individuals differ in the degree to which they reflect on their own learning, and these differences are reflected in their responses to questionnaire items, we might expect to see variations in subsequent academic performance, especially where such performance might depend on some degree of reflection.

RESULTS

Academic performance by cohorts with and without the LASER

The 2001 academic year represented the first year in which all first year students had been required to complete LASERs. It was also the first year in which it was possible to evaluate its success systematically. As the first year modules for which this became a required component remained unchanged from the previous academic year (save for the introduction of LASERs as a required component which did not affect the grade), it offered the opportunity to compare the performance of two similar cohorts across two modules differing in their assessment profile. In the first, the final grade was determined by performance on a 100 question multiple choice examination. For this, the 2001 cohort (those who had been required to complete LASERs) performed better than did their predecessors (t (333) = 4.02, p < .001, d = .39). The second module was assessed by a critical essay, and again the 2001 cohort performed better (t (288) = 2.52, p < .05, d = .30).

Questionnaire assessing attitudes towards the LASER

The development of a questionnaire indexing attitudes towards the LASER served two purposes. First, it allowed us to gain an indication of the degree to which students accepted the introduction of the LASER and how they felt about it, in the context of the other assessments they were required to submit. As outlined above, a key design feature of the LASER was to provide a tool whose usefulness to students was apparent and whose completion was not perceived as either overly time consuming or irrelevant. Second, the questionnaire was not completed anonymously (although students were at liberty not to include any identifying information if they so wished; in the event only a very small number did) in order that attitudes could be used as predictor variables for academic performance.

Development of the questionnaire

A series of questions was produced whose face validity related to various aspects of the LASER and associated learning. These included items addressing the extent of reflection in which the student habitually engaged; planning; feelings about the usefulness and importance of the LASER; and whether they enjoyed the experience and would use it in future courses. At the time of development, LASERs were completed on downloadable forms and submitted as paper copies. As the intention was to move towards a system of electronic submission, questions which addressed students’ feelings about using the internet and submitting work via email or some other electronic means were included alongside more general questions about study patterns and attitudes towards the content and timing of the LASER.

An initial set of 80 questions was produced and administered to first year students across two entry cohorts (2001 and 2002). All responses were made on a 5-point Likert-type scale, with 1 representing strong disagreement with each statement. A total of 144 completed questionnaires were received. The scale showed good test-retest reliability over a 2-week period (r = .85 using 20 randomly selected participants from the 1st cohort). Collapsing the data across cohort, a principal components analysis revealed a four factor solution which accounted for 41% of the variance. Factors 3 and 4 proved to have unsatisfactory reliability coefficients, and are not discussed further. The first two factors were labelled Appreciation of the LASER (17% of the variance, \( \alpha = .90 \)), and Attitudes towards the internet (9% of the variance, \( \alpha = .81 \)), and items loading highly on these factors are presented in Table 2.
Table 2
Factor loadings for items loading highly (≥ .55) on each factor

<table>
<thead>
<tr>
<th>Item</th>
<th>Appreciation of the LASER</th>
<th>Attitudes towards the internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would encourage other people to complete LASERs to help their learning</td>
<td>-.68</td>
<td></td>
</tr>
<tr>
<td>I have not used the notes that I made to help me, since completing the LASER</td>
<td>.55</td>
<td></td>
</tr>
<tr>
<td>The LASER will help me to achieve higher grades than I otherwise would have</td>
<td>-.62</td>
<td></td>
</tr>
<tr>
<td>Completing LASERs has not changed the way I study</td>
<td>.62</td>
<td></td>
</tr>
<tr>
<td>I would not consider using a LASER to assist me in other modules</td>
<td>.63</td>
<td></td>
</tr>
<tr>
<td>I never make specific action plans</td>
<td>.55</td>
<td></td>
</tr>
<tr>
<td>I enjoyed completing the LASER</td>
<td>-.65</td>
<td></td>
</tr>
<tr>
<td>I have not used a LASER to study</td>
<td>.60</td>
<td></td>
</tr>
<tr>
<td>The LASER helps me to plan my learning more efficiently</td>
<td>-.69</td>
<td></td>
</tr>
<tr>
<td>The LASER is just more coursework to worry about</td>
<td>.69</td>
<td></td>
</tr>
<tr>
<td>I would feel uneasy if asked to use the internet to complete a piece of work</td>
<td>.57</td>
<td></td>
</tr>
<tr>
<td>I would prefer to complete an online LASER, rather than a word processed one</td>
<td>-.58</td>
<td></td>
</tr>
<tr>
<td>I would feel uneasy submitting my LASER online</td>
<td>.69</td>
<td></td>
</tr>
<tr>
<td>I wouldn’t feel confident emailing work</td>
<td>.56</td>
<td></td>
</tr>
<tr>
<td>I would not complete my LASER as well if it had to be done online</td>
<td>.60</td>
<td></td>
</tr>
<tr>
<td>An online LASER interests me more than filling out sheets</td>
<td>-.60</td>
<td></td>
</tr>
</tbody>
</table>

The two cohorts’ attitudes were non-significantly different (for Appreciation of the LASER, t (136) = 1.45; for Attitudes towards the internet, t (136) = 1.03). The overall means for responses to both factors (2.66 and 2.50 respectively) suggest an average attitude slightly towards the negative end of the scale.

**Predictive effects of questionnaire**

The relationship between attitudes and academic performance was investigated by comparing scores on the questionnaire factors with academic grades across the 1st year of study. The grades considered were the same as those used in the analysis of performance across cohort – a 100-question multiple choice examination on all areas of psychology, and a 2500 word essay on a chosen controversy within the subject.

There were non significant correlations between the Attitudes towards the internet factor and both grades, and a non significant correlation between Attitudes towards the LASER and performance on the examination. However, scores on the Attitudes towards the LASER factor were associated with grades on the essay (r = -.23, p < .05), with higher performance on the essay being associated with more positive attitudes towards the LASER.

**DISCUSSION**

We have argued that encouraging and developing the act of reflection represents a worthy goal of the initial stages of a degree programme. While critical thinking may be one of the ultimate and more sophisticated aims of HE programmes which is best covered towards the end of a course, reflection is something in which, to a greater or lesser extent, all people engage. It is therefore an activity which, although perhaps not always easy to engage in, is not as unnatural to many students as the questioning, doubting approach of the critical thinker. Reflection on the cognitive and affective aspects of the learning experience can ‘pave the way’ for an increasingly critical approach to study.

By introducing the LASER at the start of a student’s programme and encouraging reflection throughout the first year of study, students become used to thinking about what they are studying. There is some evidence that this may have an effect on the grades they achieve on

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2 The marking system uses a 20-point scale, where 1 is a top first, 16 a minimal pass, and anything below this a fail, hence the negative correlation. Only students who were awarded a 16 or better were included in the analysis. As the scale is technically ordinal, but is frequently the result of a standard percentage grade which is later converted, a parametric correlation was selected as the appropriate test. A non parametric correlation revealed an almost identical result (r_s = -.24, p < .05).
certain forms of assessment, although we acknowledge the inherent difficulties of isolating the cause of any cohort difference. We would all like our students to think and reflect as second nature, and achieving this demands that we repeatedly assert the importance of reflection in addition to providing exercises which require it.

While attempting to minimise workload on both staff and students, the LASER can be easily integrated into existing modules. It is relatively easy to assess, and we have used it as the basis for an early assessment of students’ English language skills. The LASER continues to be used throughout the first year of study, and is extending into the 2nd year of the degree programme as it becomes integrated into students’ personal development plans. As this process develops, we intend designing and evaluating new forms of the tools which acknowledge students’ development as reflective learners and aid their critical thinking skills.

ACKNOWLEDGMENTS

This research was supported by a grant from the Learning and Teaching Support Network in Psychology (now the Higher Education Academy Psychology Network), whose support is gratefully acknowledged.

REFERENCES


Revision accepted for publication on 16 April 2006.
Appendix

Summarise and Reflect LASER

Student Number: 
Module Code: PSY

Title of Topic: 
(may be lecture, book chapter, journal article, website etc.)

i) Rate your feelings about this topic by marking a point on each of the three scales:

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interesting</td>
<td>+-----------</td>
<td>+---------</td>
</tr>
<tr>
<td>Important</td>
<td>+-----------</td>
<td>+---------</td>
</tr>
<tr>
<td>Difficult</td>
<td>+-----------</td>
<td>+---------</td>
</tr>
</tbody>
</table>

ii) Outline the key concepts and the ‘message’ of this topic

iii) Reflect on your judgments in part i). What made you respond this way?
Integrate and Interpret LASER

Student Number:  
Module Code: PSY  
Topic:  
(may be entire module, series of lectures or seminars, collection of articles or book chapters etc.)

i) What elements made up this topic?


ii) What is the common message or theme? How coherently is this represented in the separate elements?


iii) Reflect on the importance of this theme for your understanding of psychology as a whole


Self-Assessment LASER

Student Number:
Module Code: PSY

Activity:
(may be essay grade, presentation, contribution to seminar, etc.)

i) Provide a brief outline of the activity, outlining its aims and objectives and your role in it

ii) Discuss the strengths of your contribution. If appropriate, indicate the grade you feel you deserve

iii) Identify areas for improvement, and outline how you will address these in future