

# Evidence-based education: development of an instrument to critically appraise reports of educational interventions

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**Objectives** Educational interventions may ultimately impact on patient care as well as affecting individuals' learning. Critical evaluation of educational literature by those involved in designing and developing educational interventions is therefore important. A checklist instrument for critically appraising reports of educational interventions is described.

**Design** The instrument was developed by an iterative process and piloted. The instrument consists of nine questions:

- 1 Is there a clear question which the study seeks to answer?
- 2 Is there a clear learning need which the intervention seeks to address?
- 3 Is there a clear description of the educational context for the intervention?
- 4 Is the precise nature of the intervention clear?
- 5 Is the study design able to answer the question posed by the study?
- 6 Are the methods within the design capable of appropriately measuring the phenomena which the intervention ought to produce?

- 7 Are the outcomes chosen to evaluate the intervention appropriate?
- 8 Are there any other explanations of the results explored in the study?
- 9 Are any unanticipated outcomes explained?

A worked example is given to illustrate how the instrument can be used in practice.

**Setting** The Department of General Practice in Glasgow.

**Subjects** Young general practitioners and the Educational Journal Club.

**Results** The instrument was feasible.

**Conclusions** The use of the checklist allows the reader to critically appraise reports of educational interventions and helps in the practice of evidence-based education.

**Keywords** \*Educational measurement, \*methods; evaluation studies; \*evidence-based medicine.

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## Introduction

There have been numerous papers recently in the medical literature reporting methods which can help clinicians develop the skills required to translate the results of medical research into clinical practice.<sup>1</sup> Series

in the *Journal of the American Medical Association*<sup>2</sup> and in the *British Medical Journal*<sup>3</sup> have shown their readers how to evaluate original research articles. Topics have included diagnosis, treatment, prognosis and economics as well as showing how to evaluate reviews, overviews and meta-analyses for their validity and applicability. The ultimate aim is to produce optimal patient care. One effective method employed by authors has been to start with a question which has arisen in real clinical practice.<sup>2</sup> They then describe the stages of finding and appraising the available evidence to enable the clinician to answer the original question.

If it is accepted that the educational method used can affect the development of clinical students at undergraduate and postgraduate level, then it is reasonable to suggest that it may also affect the clinical practice of these students. Thus educational interventions may

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ultimately impact on patient care as well as affecting a range of factors involved in individuals' learning processes. We would therefore suggest that critical evaluation of educational literature by those involved in designing and developing educational interventions is as important as similar exercises with clinical interventions.

We have produced a checklist instrument of the appropriate questions to ask when critically appraising reports of educational interventions.

## Development of the instrument

Each of the four authors of this paper has experience of refereeing papers reporting educational research and also of using the tools of evidence-based medicine. A draft outline of the instrument was produced by one of the authors (FS) based on the above experience. It was refined by all four authors using an iterative process. It was then piloted by a number of individuals and groups. For example, it was used by a group of young general practitioners during a period of higher professional training in general practice and by the Educational Journal Club in the Department of General Practice in Glasgow. The instrument was further refined after piloting.

## The instrument

Having identified a paper which seems to be appropriate, we suggest that there are a number of key questions to ask. The answers to these questions will allow you to judge if the results of the study are valid and if the intervention could be effectively applied, in your context, to address the educational needs of your learners. The questions are as follows:

### *1 Is there a clear question which the study seeks to address?*

Have the authors explained why a study was required, e.g. a new learning method is being evaluated or an established method has not been studied rigorously before to ensure that it addresses the purpose for which it was designed? This should be clear from the title or the abstract. This question should not be confused with the next one.

### *2 Is there a clear learning need which the intervention seeks to address?*

Are the aims of the intervention clear and explicit and are the objectives specific, observable and achievable with the domain (knowledge, skills or attitudes) identified? Does the learning experience address a need identified by the learners or teachers?

### *3 Is there a clear description of the educational context for the intervention?*

- Does it affect a curriculum, a course, a module or a session?
- Is its place in the overall course identified?
- Are the students described – number, age, stage, prior knowledge of the subject?
- Is the setting described – institution, physical environment?
- Is the setting sufficiently similar to your own and/or representative of real life?

### *4 Is the precise nature of the intervention clear?*

- Why was the intervention chosen?
- How was it organized, materials used (structure)?
- How did it run in practice (process)?
- What ground was covered (content)?
- Was the length and intensity sufficient to allow measurable change?

### *5 Is the study design able to answer the question posed by the study?*

It may not be possible to choose the ideal design for a study to test an educational method, e.g. randomized controlled trials are infrequently reported.<sup>4</sup> However, a randomized controlled trial or other robust form of evaluation should be considered whenever any major educational change is suggested.

### *6 Are the methods used within the design capable of appropriately measuring the phenomena which the intervention ought to produce?*

Is there an appropriate mix of qualitative and quantitative methods?

### *7 Are the outcomes chosen to evaluate the intervention appropriate?*

Are they reliable, i.e. they consistently yield similar results? Are they valid, i.e. the measurements truly characterize the variables of interest?

### *8 Are there any other explanations of the results explored in the study?*

For example, maturation or selection bias in the student population.

### *9 Are any unanticipated outcomes explained?*

In order to illustrate how this instrument might be applied in practice, we have used the method of starting with a real educational problem in general practice.

### Educational scenario

You are a general practitioner involved in providing postgraduate education. During a session planning next year's educational topics you discuss, with your colleagues, difficulties in communicating about a range of issues with terminally ill patients. You agree to provide a course to help the group to develop skills in this area. You decide to try to identify an educational method,

which has been found to be effective in improving these skills, by reviewing the literature.<sup>5</sup>

### The search

You use a Medline search from 1966 to the present, searching on English language articles. The search terms used are: medical education, clinical competence, terminal care, palliative care, delivery of health

**Table 1** Appraisal of paper by Maguire *et al.*<sup>6</sup> using checklist

Is there a clear question which the study seeks to address?	Yes. What is 'the impact of workshops on key interviewing skills'?
Is there a clear learning need which the intervention seeks to address?	Yes. 'To help health professionals acquire the relevant interviewing skills' required in cancer care. The skills taught are those found in a previous study to increase the likelihood that patients will disclose major concerns
Are the aims of the intervention clear and are the objectives specific, observable and achievable with the domain (knowledge, skills or attitudes) identified?	Participants asked to identify own agenda Yes. Assessed with simulated patients Yes Skill
Is there a clear description of the educational context for the intervention?	
Does it affect a curriculum, a course, a module or a session?	Yes. Residential 3–5-day courses
Is its place in the overall course identified?	One-off course
Are the students described – number, age, stage, prior knowledge of the subject?	Yes mainly, 20 participants, age not given, assume all postgraduate and actively working in field, prior knowledge of the subject not given
Is the setting described – institution, physical environment?	No
Is the setting sufficiently similar to your own and/or representative of real life?	Yes. Relevant method for postgraduate education for general practitioners
Is the precise nature of the intervention clear?	Not precisely. Method described well but specific description of communication tasks, content of videotapes, content of simulated interviews would require further contact with original authors to replicate precisely. Reference given to a previous paper
Why was the intervention chosen?	Not clear
How was it organized, materials used (structure)?	Clear
How did it run in practice (process)?	Clear
What ground was covered (content)?	Agenda set by participants so varied according to their needs
Was the length and intensity sufficient to allow measurable change?	Yes. Assessment included 6-month follow-up
Was the study design able to answer the question posed by the study?	Yes. Training produced significant increase in use of open directive questions, questions with a psychological focus and clarification of psychological aspects
Are the methods used within the design capable of appropriately measuring the phenomena which the intervention ought to produce?	Yes. Cohort study. Assessed pre- and post-intervention and 6 months later Assessment method previously validated
Are the outcomes chosen to evaluate the intervention appropriate?	Yes
Reliable	Inter-rater reliability tested
Valid	Previously validated
Free from bias	Regular checks of reliability carried out but inherent possibility of bias present as not stated that tapes were assessed blind to whether recorded before, or after, intervention
Are there any other explanations of the results explored in the study?	Yes. Possibility of gains due to practice effect explored by quasi- experimental study. Possibility that workshops were attended by motivated professionals discussed
Are any unanticipated outcomes explained?	Yes. Reason for no increase in use of empathy and educated guesses explored in discussion

care, training. This strategy identifies eight articles, three of which appear to be relevant from the title and the abstract and you obtain copies of these. On further reading, one article appears to be particularly useful for improving communication with terminally ill patients.<sup>6</sup>

### Resolution of the scenario

The original paper which you identified as being most appropriate to your area of interest is appraised using the study instrument (Table 1).

### Comment

The paper scored very well using the instrument we have described. Most of the questions asked were answered positively. You are now able to return to the group and recommend that they adopt the method described by Maguire and colleagues.<sup>6</sup> You write asking the authors for further details on the teaching session and whether any of their material is available for use by your group (this was actually done in practice and was found to be very helpful). You prepare an evaluation sheet based on sound educational principles to determine whether the course meets the participants' objectives and to improve it in the future.

### Conclusion

We argue that medical education is a health technology which can impact on patient care. Other new health technologies are thoroughly evaluated under the Health Technology Assessment programme before they become widely adopted, yet medical education is undergoing widespread change encouraged by the

General Medical Council<sup>7</sup> although there is a limited evidence base for some of these changes. Therefore we should be prepared to practice evidence-based education. Instruments such as the checklist described here can help us to critically appraise educational interventions.

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