
REVIEW ARTICLE

Evaluation in health education. A review of progress, possibilities, and problems

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The quality of evaluation in health education has been an important obstacle to better interventions, and wider acknowledgement of the importance of health education in improving public health. In the past, the urgency of immediate health problems, the practical orientation of health educators, and the complex nature of evaluation in health education have usually meant that interventions were established on the basis of limited research, and with little or no consideration given to the need to evaluate. Progress in evaluation has been painfully slow.

In the past two decades greater attention has been given to the need to evaluate, particularly in the United States, and there has been a corresponding development in the quality and range of examples of well evaluated health education projects and programmes.

This paper has been developed on a review of the growing literature on the subject of evaluation in health education, and illustrates key issues with examples from a range of evaluated programmes. A framework for evaluating health education programmes is proposed and suggestions are made for improved health education research.

Health education and health promotion

As knowledge is gained about the relationships between personal behaviours and environmental conditions, and risks to health, so has there been a growth in the potential contribution of health education to the improvement of public health. The term "health education" can be limited to include only interventions based on the provision of learning opportunities directed towards achieving change in health risk behaviours, or the maintenance of health enhancing behaviours. This can include personal or mass media communication, and health education can be directed at individuals, or at groups of individuals.¹ Such a narrow definition would exclude other forms of intervention which are directed towards improving health status through, for example, the provision of screening or prophylactic services, environmental control, legislation, or policy development within organisations. This broader range of interventions is normally encompassed in the term "health promotion".

However, such distinctions have less meaning in practice, and the two approaches are widely regarded as interdependent. "Health promotion" requires the involvement of an informed public in

the process of achieving change in the conditions that determine health.² Health education is normally a central tool in this process. For these reasons this paper includes interventions which consist of more broadly based actions than those reflected in the narrower definition of health education above.

These problems of defining health education have an impact both on the anticipated outcomes of interventions (ie, what should be measured), and on the methodology which may be used (ie, how it should be done). The framework developed for this paper represents an attempt to encompass the broad range of legitimate evaluation methods and outcomes which may be used within the context described above.

Health education interventions—art or science?

Most of the current major threats to public health in the developed world are amenable to some form of prevention. For example, in the case of cardiovascular diseases and cancer, the major causes of premature death, there is substantial epidemiological evidence which indicates the relationships between individual behaviours such as smoking, diet and alcohol use, and increased risk. Thus epidemiology investigates the *need and causal basis* for intervention. Further research within the domain of the behavioural and social sciences has indicated the importance of a range of personal, social and environmental characteristics which, in turn, influence these behaviours. Such research studies investigate the *scope of content* for intervention.

Programmes to reduce risk depend on the quality of these basic research studies. In some cases the established links are strong—such as the evidence linking smoking and lung cancer. In other cases the evidence may be weaker, and the relationship more complex—such as that linking type A behaviour to coronary heart disease. In the former case, the need for action to reduce smoking is compelling. In the latter case, the nature and substance of any action will need to be tempered by the available evidence, and reflect the inherent ambiguities.

Once a causal relationship has been established between individual behaviour and an increased risk of disease, it also becomes viable to consider whether health education might be a feasible intervention strategy, drawing on the established theoretical base for achieving personal or social

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change. This might include, for example, social learning theory, diffusion of innovation theory, social marketing principles, community development and so on.³⁻⁶ Thus health education research investigates the *methodologies for change* for intervention.

These three basic inputs of *cause, content* and *method* represent the necessary components for assessing and understanding the success of a health education intervention. They demonstrate the need to draw upon a wide body of basic theory and research before undertaking an intervention. This base also highlights the vulnerability of health education interventions because they often have to rely heavily on an inexact scientific base concerning cause or content. Ultimately the scope for achieving change, and thus the scope for demonstrating a favourable outcome could be greatly reduced if this scientific base is weak.

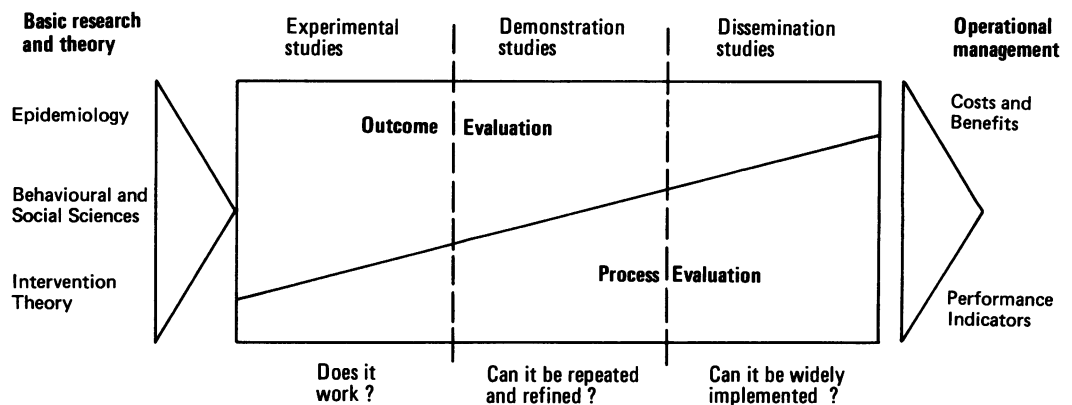
Evaluation in health education

The term "evaluation" has very different meanings for different individuals, and can be approached from various perspectives depending ultimately on the scale and objectives of an intervention programme. Health scientists, policy makers and practitioners will each pose different but equally valid evaluation questions, and each will have a different expectation of the evaluation process. This paper concentrates on the two fundamental tasks in evaluation—determining outcome and understanding the process of change.

largest number of examples from the scientific literature are of evaluations which aspire to demonstrate achieving an outcome. In general such tightly restricted studies are of limited relevance to practitioners and policy makers as the scope and limitations for widespread use are not usually demonstrable.

If a programme achieves the desired outcome under optimal circumstances, the second evaluation task is to identify whether or not it can be repeated. Given the highly focused and confined conditions demanded by experimental research design, there is no guarantee that an intervention programme will work again at a different time or place, or when managed by different people (often with less enthusiasm). At this stage, the evaluation task broadens. On the one hand, it is to continue to assess effectiveness in different settings, but on the other hand it is to use data gathered through this work to test the professional, organisational and population variables which affect the likelihood of success. The evaluation aim is not simply to assess if an intervention works, but to understand *why* it works so that it can be repeated and/or refined. Correspondingly, a wider range of evaluation methods need to be employed. Evaluation at this level appears to hold less interest among academic researchers, but may be of greater value to practitioners and policy makers.

If an intervention can be shown both to be effective under optimal conditions and to be capable of successful and safe replication in a variety of circumstances, its ultimate success will



Developmental model for the evaluation of health education programmes

The relative importance of these two dimensions will vary with a health education projects' stage of development and the target audience for the evaluation. The figure illustrates a hierarchical model to provide perspective to this problem. It sets out the principal evaluation question at three key stages of development, and illustrates how the balance of importance between outcome and process evaluation changes at each of these stages.

At the first stage, outcome evaluation is dominant, the evaluation question being simply to determine whether or not the desired end points are achieved. However, even here it is important to understand the variables which influence the change process—if only to control for them in constructing an experimental evaluation design. In general, it is this stage that is of greatest interest to academic researchers, and correspondingly the

depend upon achieving maximum uptake among potential beneficiaries. The key evaluation objectives at this third stage illustrated on the figure are less to do with assessing the effectiveness of the intervention in terms of behaviour change or risk reduction, but more to do with assessing the penetration of programmes within target populations, and testing the dissemination process of widescale implementation. In the latter case studies which test acceptability and use within professional networks, assess consumer acceptability of interventions, and identify structural constraints and opportunities presented by organisations (such as schools and health services), all contribute to understanding success or failure in the dissemination process. Evaluation research at this level has greatest meaning and relevance to practitioners and policy makers but, judging from

the paucity of published examples, is of least interest to academic researchers.

Beyond this stage, the basic evaluation tasks are directed towards supporting programme management. These tasks include monitoring the quality of programme delivery, and assessing value for money. More sophisticated "value for money" assessment can imply on the one hand controlled comparative studies between different types of health education, and on the other hand it may imply analysis of the costs and benefits of health education compared to other forms of intervention or action. Cost effectiveness and cost benefit studies have been undertaken in relation to health education⁷⁻⁹ but at present remain very much an underdeveloped science, and are not considered within the scope of this paper.

Evaluation of outcome

In assessing outcome to an intervention, two basic questions have to be addressed, namely can change be observed in the defined variable(s), and can this observed change be attributed to the intervention? In this paper it is not possible to discuss in detail the full range of problems and methodological issues that can arise in answering these questions. Some of these problems such as sample size and selection, data collection techniques, and response rates are common to all forms of evaluation research—particularly among the behavioural and social sciences. Such issues are addressed fully in many specialist publications.¹⁰⁻¹² However, two issues which cause particular problems for health education evaluation are examined in more detail below. These are study design, and the valid measurement of health outcomes.

STUDY DESIGN

Basic experimental design, and particularly a randomised control design, are well established as the ideal methods for evaluation.¹⁰ The key to success with such designs rests with maximising the internal validity of a study through a highly structured evaluation design, directed towards assessing the effects of an intervention under optimal circumstances. The basic elements of experimental design are pretest studies to establish baseline measurements; the use of a representative sample of the target population; random assignment of subjects to intervention and control groups; the use of a clearly defined intervention; and post-test studies to identify change from the baseline measurements.

In health education evaluation, meeting these basic criteria for experimental design has proved difficult. Although there are exceptions,¹³ it appears from published reports that experimental design has been restricted in the main to monofactorial interventions, particularly smoking cessation, and interventions undertaken in "closed" systems such as schools,¹⁴ health clinics,¹⁵⁻¹⁸ and workplaces.^{19 20}

Outside of such manageable systems or organisations, the most substantial problem encountered by researchers is in the use of a randomised control group. There are two dimensions to this problem. The first is practical and concerns the possibility of artificially

separating two groups within a defined community. The second is strategic and has to do with the use of communities as intervention points. The experience of the Multiple Risk Factor Intervention Trial (MRFIT) in the USA provides an example of the practical difficulties of random assignment within a community. Here, individuals assigned to the intervention and control groups, who were in any case volunteer high risk subjects, found themselves commonly as neighbours, social friends or work colleagues. Consequently, "contamination" of the control group was possible as one passed on to the other information and literature which was part of the intervention. In addition both groups experienced a social environment which was increasingly becoming more health promoting. As a result differences between the two groups in respect of serum cholesterol and diastolic blood pressure were less than those predicted in the original study design. This then compromised the statistical analysis and the conclusions that might be drawn.²¹

In interventions which are designed to influence human behaviour and social interactions, the artificial assignment of individuals in communities to intervention and control groups is not only often impractical but frequently impossible as it places quite unrealistic constraints on the intervention design. For example, it is virtually impossible to use the mass media in such a way that it only reaches a randomly selected population group (although this has been achieved in a community with two entirely separate cable television networks²²). Further, many health education initiatives actively draw upon community systems and networks such as local voluntary agencies and community groups as part of the intervention. Again, the randomised allocation of individuals places major constraints on the possibility of actively using community networks.

As well as these practical constraints, interventions have been strategically designed to influence populations rather than individuals. This has particularly been the case in cardiovascular disease prevention programmes such as those in North Karelia,²³ Stanford,²⁴ and Wales.²⁵ In these studies the strategy was designed to achieve mass shifts in risk factor prevalence and infrastructure change, rather than behaviour modification among defined individuals.

The very nature of community based interventions denies the experimental control of many variables. Communities are complex and changing systems. For example, they are subject to variable levels of migration, thus diluting the potential impact of interventions. Unpredictable events (such as unemployment related to a decline in one particular industry) may affect one community in ways not shared by another in the study. The freedom to select areas randomly for intervention is also limited; the media, for example, frequently transcend community boundaries. But, perhaps most important of all, the casual chain in a community system is longer and harder to trace than in a clinical research study on volunteers—the classic application of a randomised control study design.²⁶

The most widely adopted solution to this problem has been in the development of the quasi-experimental study design. This has been the preferred option in American and European community based heart disease prevention programmes where the intervention population has been matched in terms of key health and demographic variables with a geographically separate reference population.²⁵⁻²⁸ In these examples, the separation at least minimises contamination resulting from the use of the mass media. However, the non-random allocation of intervention and control areas reduces the ability of these programmes to attribute change to the intervention. Additional strategies to strengthen inference about programme effects have therefore been adopted. These have included phasing the introduction of interventions into communities,^{20 29} differing intervention intensity in different populations,^{21 30} and adjusting for baseline differences by covariance analysis.²⁴

Other possibilities for evaluation where true experimental design is unachievable have included those based on using a convenience (ie, non-representative) sample,³¹ those using post-tests only,³² or combinations of these together with quasi-experimental design.³³ Each modification represents a weakening of the strength of the evaluation methodology, but will not necessarily invalidate the findings. Green and Lewis have usefully suggested a hierarchy within the experimental design criteria listed above which provides guidance on the best combinations of elements for varying circumstances.¹⁰

MEASUREMENTS OF OUTCOME

In clinical trials outcome is traditionally measured in terms of morbidity and mortality. Some health education evaluations have also attempted to measure outcome on this basis.^{eg, 13 25 27 28} However, biological measures (eg, blood pressure, serum cholesterol and weight), and health behaviour measures (eg, smoking, diet and exercise) are more commonly used for determining outcome in health education interventions. The measurement of change in the personal, social and environmental characteristics which influence behaviour is also legitimate and relevant to assessing outcome, particularly as the modification of these factors is the basis for most health education. Indeed, the more remote from this starting point, the more difficult is the task of causal inference. Studies suggesting direct links between community based health education and subsequent changes in morbidity and mortality have been both fragile and controversial.^{34 35}

In terms of measuring change in physiological risk the Multinational Monitoring of Trends and Determinants in Cardiovascular Disease (MONICA) protocol³⁶ provides standards for assessing reliability and validity which are widely used in epidemiological and health education evaluation studies. The procedures used in the WHO Countrywide Integrated Program for the Prevention of Non-communicable Diseases (CINDI) and the Heartbeat Wales/Welsh Heart Programme, for example, conform to these standards.^{37 38} However, no comparable yardstick exists for measures of health behaviour. Indeed,

the definition and measurement of health behaviour, and the variables which may influence it, has taxed the skills of researchers for decades. The task may be relatively straightforward in the case of defining and measuring smoking behaviour, but more complex in other areas such as assessing dietary behaviour or patterns of physical activity (the measurement of smoking behaviour among young people still challenges researchers today³⁹⁻⁴¹). Measuring attitudes or values, and personal and social skills, and environmental change are potentially even more problematical.⁴²

The solution to these problems has rested in the construction of reliable questionnaires, tests and scales—a science (and art) which has developed considerably in the past two decades. Again, it is not possible to consider in detail the process of constructing a valid questionnaire, and readers are referred to more substantial publications for this purpose.^{eg 43} However, two essential dimensions are that questionnaires used to measure behaviours should be objectively validated as far as is practical and used consistently over time. Evaluations which have undertaken biochemical validation of smoking status include those of smoking cessation programmes in schools,⁴⁴⁻⁴⁶ health clinics,^{47 48} and the workplace.⁴⁹ But common problems have been that deception rates are based on very small subject numbers⁵⁰ and that the number of cigarettes smoked remains unvalidated, since existing biochemical tests are not sufficiently sensitive for such validation. Biochemical tests have also been used to validate self reported alcohol consumption, and accurate height and weight measurements taken to validate self reports.^{38 51}

In the case of health behaviours that are difficult to define and validate, behavioural “markers” are commonly used for evaluation studies designed to detect change over time. For example in the case of nutrition, 24 hour dietary recalls have been used.^{26 52} However such methodology is thought generally too complex and costly for large scale surveys which require sizable numbers (often in excess of 1000) to show statistically valid changes over time. A more practical approach has been to identify key foods which represent important sources of, for example, dietary fat or sugar, and to focus the assessment of changes in consumption on these foods.⁵³ In general this simpler and more acceptable process is sufficiently sensitive to assess dietary change within a community. Corresponding methods have been used to assess patterns in physical activity in communities.^{54 55}

Similar attention to detail has been applied to the development of instruments which measure changes in the determinants of health behaviour, and in environmental factors. For example, in the past two decades considerable effort has been placed on developing tests and scales to measure reliably personal and social dimensions to behaviour such as self esteem, locus of control, and type A behaviour.⁵⁶⁻⁵⁸ Other studies have sought to evaluate environmental change such as the introduction of restrictions on smoking in public places.⁵⁹

Clearly, comprehensive tool kits for the

complex area of outcome measurement are not yet available "off the shelf". Much has been learned through careful experimentation in the past decades, and there is a growing range of standard methods for measuring health behaviours and determinants of health behaviours. For example common definitions and survey instruments for measuring children's health behaviour have been established through a WHO supported European cross-national research group.⁶⁰ The more consistent use of measurement techniques in health education research would not only do much to improve confidence in standards, but have the additional benefit of increasing comparability between studies.

Evaluation of process

Understanding process will always follow outcome evaluation as it can only have true relevance if an intervention can be shown to achieve its intended goals. Process evaluation can provide an assessment of how a programme is implemented, what intervention activities are provided under what conditions, by whom, to what audience, and with what level of effort.⁶¹ It can also assist in attributing causality to the programme intervention.^{24 25} Yet several reviewers have lamented over the poor status, and frequently poor quality, of process evaluation in health education.^{62 63} One suggested explanation for this concerns the value system which has evolved among researchers which gives empirical experimentation research high status, and tends to devalue the importance of process related research—frequently referred to as "soft" research. This may be because the methods involved in process research are both less well defined and in many cases simply unfamiliar to researchers used to experimental designs. As a consequence such methods may either be inappropriately applied or when properly applied, inappropriately assessed through academic peer review.

Although programmes with well developed process evaluation strategies are comparatively rare, a number of basic, and often interrelated, evaluation methods can be identified in published work. Examples of three basic approaches are examined here. These are network analysis, studies of programme exposure, and assessments of programme acceptability.

NETWORK ANALYSIS

Network analysis is, in essence, the process of tracing the progress of communications within a discreet community, determining such issues as dilution or distortion of programme inputs, as well as their relative efficacy in achieving change.⁶⁴ It has been used in community based programmes to understand the dynamics of change within defined social or professional networks in communities, and to provide supportive evidence for causal inference in quasi-experimental studies.^{24 25 65} In the Heartbeat Wales/Welsh Heart Programme, for example, surveys of key health education practitioners such as general practitioners and health visitors have been used to build an understanding of the potential opportunities and obstacles for

implementing previously evaluated intervention programmes. These surveys have also been used to monitor changes in attitude and health education practice within these groups in support of the outcome evaluation.^{66 67} Similarly, studies examining current organisational practice and policies have been used to help determine the scope for implementation, and to monitor the use of health education interventions in schools, health services and work sites.^{59 68-70}

PROGRAMME EXPOSURE

In any health education programme, a key element to the intervention has to be in maximising the contact with the defined target population. To evaluate the effects of an intervention, it is essential to be able to determine the extent and level of exposure to the intervention. Just as in a drugs trial one might measure the effect of differential dose response, a similar dimension to the evaluation of health education has to be considered. This is relatively simple where the intervention can be clearly defined (for example attending a smoking cessation group¹⁸), but far more complicated in community based programmes where the intervention is less easy to define, and determining exposure a far more complex task. Methods which have been used to measure programme exposure in health education range from simple audit and record keeping, to sophisticated monitoring among defined groups. The Pawtucket Heart Health Program (PHHP) provides an example of a comprehensive exposure measurement strategy. In this programme, exposure is monitored through the use of specially designed contact cards that are completed by everyone who participates in the intervention. Each contact card is specifically coded for the type of activity being conducted, where it is held, and the date of the event. The data have been used to determine the demographic profile of participants, document each participant's total number of exposures to the PHHP, refine and target intervention programmes, assess the immediate and long term impact of the PHHP through follow up telephone surveys, and provide a historical record of the entire intervention effort.⁷¹ Other less substantial studies of programme reach have explored community awareness of interventions^{25 65 72} and teachers' awareness and use of school based health education projects.^{68 73 74}

PROGRAMME ACCEPTABILITY

Although a programme may be evaluated and determined as effective by a group of highly motivated researchers working with equally motivated volunteers, it does not necessarily follow that the programme will be equally well received and executed when translated into "real life" settings. To facilitate the maximum dissemination of projects, studies which assess the acceptability of programmes form an essential part of process evaluation. These studies of acceptability include both the health educator and the client group/target population. Studies of health educators have looked at their experiences of implementing interventions, the acceptability of different programme activities, the perceived

effects of projects, and suggestions for modifications. Examples of such studies can be found with professional groups, particularly teachers^{68 73-75} and with peer facilitators.^{76 77}

Less common in published reports are evaluations which have taken the views and experiences of programme recipients into account. It has similarly been observed that surveys of patients views are not widely used in clinical trials.⁷⁸ One example in health education comes from the evaluation of general practitioners' use of a smoking intervention programme, in which recipients were asked about the acceptability of doctors helping people to quit smoking.⁷⁹ Other examples of programmes adopting structured techniques for assessing public reaction to interventions include those using postal surveys, community monitoring panels, and focus group work.^{25 32 62}

These three examples of the role and nature of process evaluation illustrate the importance of this complementary task in health education evaluation. At one level, process evaluation can support and enhance causal inference in quasi-experimental study designs. At another level, it opens the door through which basic experimental studies can be repeated, refined and widely disseminated. In this way, process evaluation has particular relevance to policy makers and practitioners.

Conclusions

There has been a substantial growth in health education research and evaluation in the past decade. This paper has discussed a range of published papers on the evaluation of health education programmes which illustrates both progress and problems. Progress can be seen in the increasing sophistication and effectiveness of methods employed in evaluation. Problems can be identified, in particular, in the appropriateness of the use of established study designs, and in the balance of research effort in relation to policy relevant information which emerges from it.

Many of the problems faced by researchers attempting to evaluate health education stem from unreasonable expectations of both the intervention, and the evaluation. As stressed earlier, health education research is a complex field which is heavily dependent on the quality of basic epidemiological and behavioural research. The weaker this basic research, the less scope there is both for achieving change, and for attributing observed change to an intervention. Tracing the causal path from a community intervention to subsequent long term changes in mortality is fraught with difficulty, and it is inappropriate and unrealistic in most cases for programmes to be expected to do this. Far more relevant is for health education interventions to be judged on their ability to modify risk factors and behaviours, and the personal, social and environmental factors which shape them. Achieving change at this level is the basic task of health education.

Equally there has also been an unrealistic expectation to adopt as the basis for outcome evaluation an experimental research design developed for other fields of medical research.

This is inappropriate at two levels. Firstly, the constraints on the intervention strategy imposed by such experimental designs make it virtually impossible to use the community based approaches which are considered to be the most valuable, since all factors affecting health behaviour can potentially be addressed. Secondly, because they are such a powerful and persuasive scientific tool, randomised controlled trials for outcome evaluation have tended to eclipse the value and relevance of other methods for outcome evaluation, and of evaluating the process of change.

For the future, the more feasible and appropriate outcome evaluation designs which have been tested in current and recent past programmes should be fostered and developed. It is equally crucial that more recognition is given to the importance of understanding the process of change within interventions, and including this dimension as a central component in the evaluation task. Relevant techniques do exist for process evaluation in health education, but are infrequently used or reported on. The paucity of published work on process evaluation in health education research is testimony to the fact that it is not yet taken seriously by researchers. The challenge is to develop scientifically sound and relevant evaluation designs for each stage in the development of an intervention programme. Achieving progress towards this goal is vital for the future role of health education in the improvement of public health.

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