

Key Concepts

**Prioritising and ordering Informed
Health Choices (IHC) Key Concepts to be
included in a secondary school re-
sources: Protocol**

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Colophon

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Abstract

Background

The Informed Health Choices (IHC) Key Concepts are principles for thinking critically about healthcare claims and deciding what to do. The Key Concepts provide a framework for designing curricula, learning resources, and evaluation tools.

Objectives

To prioritise which of the 49 IHC Key Concepts to include in learning resources that we are developing for lower secondary schools in East Africa, and to determine the order in which the concepts should be learned, and the competences and dispositions needed to use those Key Concepts.

Methods

Eight judges will use an iterative process to reach a consensus: two with expertise regarding the Key Concepts and two who are familiar with the context in each of three countries: Kenya, Uganda, and Rwanda. After familiarising themselves with the concepts, they will pilot test draft criteria for selecting and ordering the concepts. They will also review drafts of the core ideas and tasks that the learning resources will address, and the competences and dispositions that are needed. After agreeing on any changes that are needed, each of the eight judges will independently assess all 49 concepts and reach an initial consensus. We will seek feedback on the draft consensus from teachers, students, and other stakeholders. After considering the feedback, the judges will independently assess the concepts again and reach a final consensus.

Discussion

The prioritised and ordered Key Concepts will be the starting point for the learning resources that we will develop. We will conduct a context analysis in each country at the same time. The context analyses will explore where use of the learning resources best fits in the curriculum. They also will explore conditions for introducing them into schools, such as the availability of time, who the decision-makers are, and what influences their decisions.

Background

As noted by Dewey: *“It would be impossible to over-estimate the educational importance of arriving at conceptions: that is, meanings that are general because applicable in a great variety of different instances in spite of their difference [...] They are known points of reference by which we get our bearings when we are plunged into the strange and unknown [...] Without this conceptualizing, nothing is gained that can be carried over to the better understanding of new experiences”* [1].

As part of the Informed Health Choices (IHC) project, we have identified concepts that people need to apply to critically assess claims about the effects of health interventions and make well-informed choices: the IHC Key Concepts [2]. The concepts provide a framework for curriculum planning and designing learning resources. The framework is reviewed and updated yearly. As a first step towards developing learning resources for students in the first two years of secondary school (lower secondary school) in Kenya, Rwanda and Uganda, we need to prioritise IHC Key Concepts, as well as determine the order in which included concepts should be taught and reinforced.

Teachers may be overwhelmed by the amount of content they are expected to cover, especially when standards are viewed as discrete and disconnected. Marzano and Kendall reviewed 160 national and state-level documents listing standards in various subject areas in the USA and synthesized the material to avoid duplication. They identified 255 content standards and 3968 discrete benchmarks that delineate what students should know and be able to do [3]. They estimated that if teachers devoted 30 minutes of instructional time to teach each benchmark, they would need an additional 15,465 hours (nine school years).

This is consistent with findings of a process evaluation we conducted to explore barriers to scaling up use of the IHC primary school intervention in Uganda [4]. The intervention consisted of providing the IHC primary school resources, as well as teacher training workshops. It was shown to have a large effect on primary school children’s ability to think critically about health claims [5], which was sustained after one year [6]. Teachers who used the primary school intervention in the trial said: the IHC Key Concepts were important; they were motivated to teach the concepts; and the children were enthusiastic about the lessons. The main barrier we identified to scaling up use of the intervention was

the need to incorporate the lessons in the national curriculum. The IHC lessons were viewed as an addition to what was already a packed primary school curriculum.

It is essential to prioritise what to include in school curricula. Wiggins and McTighe argue that prioritising should focus on “big ideas” and “core tasks”; “A big idea is a concept, theme, or issue that gives meaning and connection to discrete facts and skills,” while a core task is “the most important performance demands in any field” [7]. Priorities should be established by building upon the big ideas and by focusing schoolwork around core tasks or “transfer tasks” derived from authentic challenges. In the same vein, Bruner writes: *“For any subject taught in [...] school, we might ask [is it] worth an adult’s knowing, and whether having known it as a child makes a person a better adult. A negative or ambiguous answer means the material is cluttering up the curriculum”* [8].

Bruner’s idea of a “spiral curriculum” is based on recurring, deepening inquiries into big ideas and important tasks, helping students learn in a way that is developmentally sensible and effective; *“The basic ideas at the heart of all science and mathematics and the basic themes that give form to life and literature are as simple as they are powerful. To be in command of these basic ideas and use them effectively requires a continual deepening of one’s understanding of them that comes from learning to use them in progressively more complex forms.”*

The basic principle underlying Wiggins’ and McTighe’s approach to curriculum design - “backward design” - is to begin with the desired, final outcomes and to focus on the learner’s needs. Rather than building a curriculum around the logic of the content, it should be designed around the needs of learners trying to understand the big ideas and to perform the core tasks.

This protocol describes an eight-step process in line with the thinking of Wiggins and McTighe and of Bruner, in which we will prioritise and order IHC Key Concepts to be included in secondary school resources for students in Kenya, Rwanda, and Uganda. In other words, we will develop a spiral curriculum for those resources. We also will determine the general competences (required skills, knowledge, or capacity to do something) and dispositions (frequent and voluntary habits of thinking and doing) necessary to make use of those concepts, and the order in which they should be developed. As Murray notes, *“skills, no matter how highly developed, without the requisite habits of mind to make full use of those skills, are impotent”* [9].

The process described in this protocol is one of several initial steps in the development of the resources, which also include: establishing teacher and student networks in each of the three countries, as well as national advisory groups in each country and an international advisory group; and conducting context analyses. These other steps, as well as an overview of the development process, are described in separate protocols.

The national advisory groups will include important stakeholders, such as policymakers, education authorities, teacher trainers, educational researchers, and health professionals. The international advisory group will include members from low, middle and high-income countries with important expertise, such as educational researchers and professionals; health research methodologists and health education researchers; experts in design, information technology, and learning games; and people from relevant international funders and organisations. The international project team consists of researchers, designers, and information technologists, as well as a PhD candidate in each of the three East-African countries.

After prioritising and ordering the concepts, we will use an iterative, human-centred design process to develop the learning resources. We will interview students and teachers and observe them using prototype resources. Then we will use those findings to inform modifications. The final versions of the resources will be tested in randomised trials in all three countries. We will conduct process evaluations alongside the trials.

Objectives

- To prioritise and order IHC Key Concepts to be included in secondary school resources
- To determine the competences and dispositions needed to use the IHC Key Concepts included in the secondary school resources

Methods

We will use an iterative, structured consensus process that builds on Wiggins' and McTighe's "backward design" approach, the Nominal Group Technique consensus process [10], and Feinstein's criteria for sensibility [11]. The process will be coordinated by ADO and will include the following steps:

1. Selecting and training the judges
2. Establishing big ideas and the core tasks
3. Defining criteria and response options for judgements, competences and dispositions
4. Prioritising and ordering concepts
5. Reaching initial consensus
6. Collecting feedback
7. Prioritising and ordering concepts and reaching final consensus

Step 1. Selecting and training the judges

Eight judges will prioritise and order the IHC Key Concepts to be included in the IHC secondary school resources: two experts in the IHC Key Concepts (IC and DS); one PhD candidate from each country (FC, MM, and RS); an additional person from each country familiar with the local context and IHC Key Concepts (i.e. familiar with concepts, but not necessarily our specific framework). The additional judge from each country will be identified by each of the three PhD candidates. All eight judges will be asked to familiarise themselves with this protocol. The judges who have less experience with the IHC Key Concepts will familiarise themselves with the concepts and the framework. Anything they do not understand about the concepts or framework will be clarified by the expert judges in a first meeting. Meetings of all eight judges will be online, led by the coordinator.

Step 2. Establishing big ideas and the core tasks

The big ideas and core tasks will inform the prioritisation of IHC Key Concepts to be included in the secondary school resources. The initial set of big ideas and

core tasks shown in Box 1 will be a starting point for the judges to discuss and refine in their second meeting. Note that our secondary school resources will focus on health, but the scope of the overarching aim for this project and others goes beyond health: to help people think critically about what to believe about the effects of interventions for their health, the health of others, and other reasons (e.g. the environment), and about what they should do to achieve their goals. This interdisciplinary aim is supported by the creation of a generic framework of Key Concepts for Informed Choices, which is based on the IHC Key Concepts [12].

The PhD candidates will collect individual written or oral feedback on the refined list of big ideas and core tasks from members of the teacher and student networks and advisory groups in each country, asking the respondents to: read the refined list of big ideas and core tasks; flag anything that they do not understand; flag anything they think is not important enough to be included in the secondary school resources; and suggest any other improvements. Before collecting feedback, the PhD candidates will provide members of the national networks and advisory groups a basic explanation of what is meant by “big idea” and “core task”, as well as the meaning of the specific ideas and tasks. They will provide the explanations and collect feedback individually, in groups, or both, via face-to-face meetings, online or phone calls, or in writing, depending on what is most practical. The coordinator will collect written feedback from the international advisory group. Feedback from members of all networks and advisory groups will be summarised by the coordinator and reviewed by all judges prior to the judges’ next meeting. In that meeting, the judges will discuss the summary and agree on appropriate changes.

Box 1. *Big ideas and core tasks for IHC secondary school resources*

Big idea 1: Claims about effects should be supported by evidence from fair comparisons, when possible and ethical.

Other claims are not necessarily wrong, but there is an insufficient basis for believing them.

- **Core task 1:** Recognise when a claim has an untrustworthy basis;
i.e. recognise claims about effects; that claims should be questioned; when a claim has an untrustworthy basis; and when to think more carefully about claims

Big idea 2: Evidence of effects should come from fair comparisons, designed to minimize the risk of systematic errors (biases) and random errors (the play of chance).

- **Core task 2:** When there is evidence used to support a claim about effects, recognise whether it is trustworthy or untrustworthy;
i.e. whether comparisons are fair or unfair, whether summaries of comparisons (reviews) are reliable or unreliable, and when presentations of effects are helpful or misleading

Big idea 3: Good choices depend on using the best available information.

- **Core task 3:** Make informed choices to achieve health outcomes and other goals
i.e. clarifying and understanding the problem and options when making decisions about what to do; judging the relevance of evidence used to inform those decisions; weighing the ad-

vantages and disadvantages of the options, taking into account how important the benefits and harms are, the costs, and the certainty of the evidence; and communicating with others about the advantages and disadvantages of the options

Step 3. Defining criteria and response options for judgements, competences and dispositions

The judges will use the criteria, response options and probes for judgements in Box 2 as a starting point, piloting them by making judgements about a small sample of IHC Key Concepts. The judges will discuss and, if necessary, revise the criteria, response options and probes, and add guidance. They will also discuss and, if necessary, make modifications or add guidance to the spreadsheet. Finally, the judges will also consider, discuss and, if necessary, revise initial sets of general competences and dispositions, taken from the 2019 version of the IHC Key Concepts list (Box 3) [13]. These were informed in part by research on epistemological development [14].

Box 2. Criteria, probes and response options for judgements

Criterion 1: Are the learners likely to be able to understand and use the concept?

Response options: Probably; Uncertain; Probably not

Probes:

- What do they need to learn before they can understand and apply the concept?
- Is what they need to learn in the curriculum and, if so, when?
- Will understanding other IHC Key Concepts help them to understand the concept?

Criterion 1: How important is the concept to the learners?

Response options: Important; Somewhat Important; Uncertain; Unimportant

Probes:

- Is the concept necessary for answering understanding the big ideas, and performing the core tasks?
- Is the concept commonly misunderstood or overlooked by the learners?
- Is the concept relevant to many health claims or choices that are of interest to the learners?
- Is the concept relevant to many non-health claims or choices that are of interest to the learners?
- Is the concept included in other frameworks for critical thinking, or relevant to those other frameworks?

Criterion 3: Is there enough time and resources available to help them learn the concept?

Response options: Probably; Uncertain; Probably not

Probes:

- Is the concept already in the curriculum?
- Is the concept relevant to content in the curriculum?
- Are teachers likely to be able to teach the concept without a lot of additional training or preparation?
- Is the concept potentially confusing or difficult to teach?

Judgement 1: Should the concept be included?

Response options: Yes; Uncertain; No

Judgement 2: When should it be included?

Response options: Amongst the first concepts; Early on; Later; Amongst the last concepts

Probes:

- Do other concepts build on it?
- Does understanding it depend on understanding other concepts?
- Is it easy or difficult to understand?
- Is it important to revisit the concept?

Box 3. Initial sets of competences and dispositions

Goal

To enable people to make good decisions* about which claims to believe about the effects of things they can do for their health, the health of others or for other reasons, and about what to do to achieve their goals.

Competences

To achieve this goal, people should be able to:

- 1. Recognise when a claim has an untrustworthy basis by:**
 - a) recognising claims about the effects of treatments
 - b) questioning the basis for treatment claims
 - c) thinking carefully about treatment claims before believing them
 - d) recognising when a treatment claim is relevant and important, and warrants reflection
- 2. Recognise when evidence used to support a treatment claim is trustworthy or untrustworthy by:**
 - a) recognising the assumptions, evidence and reasoning behind treatment claims
 - b) recognising unfair treatment comparisons
 - c) recognising unreliable summaries of treatment comparisons
 - d) recognising when a statistical model and its assumptions are used to support a treatment claim
 - e) recognising misleading ways of presenting treatment effects
 - f) understanding how systematic errors (the risk of bias), random errors (the play of chance), and the relevance (applicability) of treatment comparisons can affect the degree of confidence in estimates of treatment effects
 - g) understanding the extent to which evidence does or does not support a treatment claim
- 3. Make well-informed decisions about treatments by:**
 - a) being aware of cognitive biases when making decisions
 - b) clarifying and understanding the problem, options, and goals when making a decision
 - c) recognising when decisions have irreversible consequences
 - d) judging the relevance of evidence used to inform decisions about treatments
 - e) weighing the advantages and disadvantages of treatments, taking into account the size of treatment effects, how important each outcome is, the costs, and the certainty of the evidence
 - f) communicating with others about the advantages and disadvantages of treatments
- 4. Reflect on people's competences and dispositions by:**
 - a) monitoring how they decide which treatment claims to believe and what to do
 - b) monitoring how people adjust the processes they use to decide what to believe and do to fit the relevance, importance, and nature of different types of treatment claims and choices
 - c) being aware of when people are making treatment claims themselves

* A good decision is one that makes effective use of the information available to the decision maker at the time the decision is made. A good outcome is one that the decision maker likes. The aim of thinking critically about treatments is to increase the probability of good outcomes (and true conclusions), but many other factors affect outcomes aside from critical thinking [15].

Dispositions

People should be in the habit of thinking critically about:

1. Claims by

- a) being aware of treatment claims (including those you make yourself) and choices
- b) questioning the basis for treatment claims
- c) being aware of cognitive biases and going from fast to slow thinking before forming an opinion about a treatment claim, making a claim, or taking a decision
- d) seeking evidence to reduce uncertainty when considering a relevant and important treatment claim or decision

2. Evidence used to support claims by:

- a) questioning the trustworthiness of evidence used to support treatment claims
- b) being alert to misleading presentations of treatment effects
- c) acknowledging and accepting uncertainty about the effects of treatments
- d) being willing to admit errors and modify their judgements when warranted by evidence or a lack of evidence

3. Choices by:

- a) clarifying and understanding the problem, options, and goals when making decisions about treatments
- b) preferring evidence-based sources of information about treatment effects
- c) considering the relevance of the evidence used to inform decisions about treatments
- d) considering effect estimates, baseline risk, the importance of each advantage and disadvantage, the costs, and the certainty of the evidence when making decisions about treatments
- e) making informed judgements about the certainty of estimates of treatment effects
- f) making well-informed decisions
- g) Being aware of how people decide which treatment claims to believe and what to do

4. People's own thinking by:

- a) Being aware of how people decide which treatment claims to believe and what to do

Step 4. Prioritising and ordering concepts

Each judge will independently assess all IHC Key Concepts in the 2019 version of the list (Table 1) [13], using the updated spreadsheet. The independent judgements will be summarised by the coordinator, including each judgement made by each judge, and the mean and the median judgements. The judges will receive the summary and review it. The judges will then meet, discuss each concept and reach a consensus on whether each concept should be prioritised for inclusion in the secondary school resources and, if so, where in the order of included concepts it should be taught and reinforced. During the discussion, people from each end of the range of judgements for each concept will be invited to provide the reasons for their judgements, before others are invited to comment. The outcome of the meeting will be summarised and fed back to the judges.

Table 1. Overview of the IHC Key Concepts

<p>1. Claims <i>Claims about effects that are not supported by evidence from fair comparisons are not necessarily wrong, but there is an insufficient basis for believing them.</i></p>	<p>2. Comparisons <i>Studies should make fair comparisons, designed to minimize the risk of systematic errors (biases) and random errors (the play of chance).</i></p>	<p>3. Choices <i>What to do depends on judgements about a problem, the relevance of the evidence available, and the balance of expected benefits, harms, and costs.</i></p>
<p>1.1 It should not be assumed that treatments are safe or effective - or that they are not.</p> <ul style="list-style-type: none"> a) Treatments can cause harms as well as benefits. b) Large, dramatic effects are rare. c) It is rarely possible to be certain about the effects of treatments. <p>1.2 Seemingly logical assumptions are not a sufficient basis for claims.</p> <ul style="list-style-type: none"> a) Treatment may not be needed. b) Beliefs alone about how treatments work are not reliable predictors of the presence or size of effects. c) Assumptions that fair comparisons of treatments in research are not applicable in practice can be misleading. d) An outcome may be associated with a treatment but not caused by it. e) More data is not necessarily better data. f) Identifying effects of treatments depends on making comparisons. g) The results of one study considered in isolation can be misleading. h) Widely used treatments or those that have been used for decades are not necessarily beneficial or safe. i) Treatments that are new or technologically impressive may not be better than available alternatives. j) Increasing the amount of a treatment does not necessarily increase its benefits and may cause harm. k) Earlier detection of ‘disease’ is not necessarily better. l) It is rarely possible to know in advance who will benefit, who will not, and who will be harmed by using a treatment. <p>1.3 Trust in a source alone is not a sufficient basis for believing a claim.</p> <ul style="list-style-type: none"> a) Your existing beliefs may be wrong. b) Competing interests may result in misleading claims. c) Personal experiences or anecdotes alone are an unreliable basis for most claims. d) Opinions alone are not a reliable basis for claims. e) Peer review and publication by a journal do not guarantee that comparisons have been fair. 	<p>2.1 Comparisons of treatments should be fair.</p> <ul style="list-style-type: none"> a) Comparison groups should be as similar as possible. b) Indirect comparisons of treatments across different studies can be misleading. c) The people being compared should be cared for similarly apart from the treatments being studied. d) If possible, people should not know which of the treatments being compared they are receiving. e) Outcomes should be assessed in the same way in all the groups being compared. f) Outcomes should be assessed using methods that have been shown to be reliable. g) It is important to assess outcomes in all (or nearly all) the people in a study. h) People’s outcomes should be counted in the group to which they were allocated. <p>2.2 Syntheses of studies need to be reliable.</p> <ul style="list-style-type: none"> a) Reviews of studies comparing treatments should use systematic methods. b) Failure to consider unpublished results of fair comparisons may result in estimates of effects that are misleading. c) Treatment claims based on models may be sensitive to underlying assumptions. <p>2.3 Descriptions should clearly reflect the size of effects and the risk of being misled by the play of chance.</p> <ul style="list-style-type: none"> a) Verbal descriptions of the size of effects alone can be misleading. b) Relative effects of treatments alone can be misleading. c) Average differences between treatments can be misleading. d) Small studies may be misleading. e) Results for a selected group of people within a study can be misleading. f) The use of p-values may be misleading; confidence intervals are more informative. g) Deeming results to be “statistically significant” or “nonsignificant” can be misleading. h) Lack of evidence of a difference is not the same as evidence of “no difference”. 	<p>3.1 Problems and options should be clear.</p> <ul style="list-style-type: none"> a) Be clear about what the problem or goal is and what the options are. <p>3.2 Evidence should be relevant.</p> <ul style="list-style-type: none"> a) Attention should focus on all important effects of treatments, and not surrogate outcomes. b) Fair comparisons of treatments in animals or highly selected groups of people may not be relevant. c) The treatments compared should be similar to those of interest. d) There should not be important differences between the circumstances in which the treatments were compared and those of interest. <p>3.3 Expected advantages should outweigh expected disadvantages.</p> <ul style="list-style-type: none"> a) Weigh the benefits and savings against the harms and costs of acting or not. b) Consider the baseline risk or the severity of the symptoms when estimating the size of expected effects. c) Consider how important each advantage and disadvantage is when weighing the pros and cons. d) Consider how certain you can be about each advantage and disadvantage. e) Important uncertainties about the effects of treatments should be addressed in further fair comparisons.

At the next meeting the judges will review the consensus and discuss:

- What changes, if any, are necessary
- What readily available information, if any, we might want to use to inform our judgements, in addition to market and stakeholder analyses
- What feedback we might want to collect from teachers and students

The judgements will not be anonymous, since it will be necessary for each judge to explain their thinking. However, the initial judgements will be independent, and the coordinator will ensure the ensuing discussion is structured, with each judge getting an equal chance to contribute.

Step 5. Reaching initial consensus

The coordinator will map the initial prioritisation and ordering of concepts against the sets of competences and dispositions. All judges will then meet to discuss the results of the mapping exercise and make any necessary changes to the prioritisation and ordering of the concepts, or to the competences and dispositions. Changes to the competences and dispositions may include rewording, removing, combining or adding competences and dispositions, or changing their order. At this point, the judges will have reached an initial consensus on the prioritisation and ordering of concepts, as well as the sets of competences and dispositions and their order.

Step 6. Collecting feedback

The teacher and student networks and advisory groups in each country will discuss the judges' initial consensus at meetings in each country. The PhD candidates will take detailed meeting notes. The meetings will begin by the PhD candidate in that country presenting and explaining: the project; the IHC Key Concepts framework; the competences and dispositions; the draft consensus; and key findings from the context analysis in that country. They will then facilitate a structured discussion. First, they will discuss any disagreements with the findings of the context analysis. Second, they will discuss the draft consensus, focusing on questions that have been identified by the judges. These might include questions about:

- IHC Key Concepts where there was disagreement amongst judges or important uncertainty about whether or when to include them
- The amount of time that can potentially be used to teach the concepts and, given that amount of time, the number of concepts that it is feasible to include
- Whether specific concepts are already taught or are likely to be understood by the learners
- Whether specific concepts are commonly misunderstood

Where face-to-face meetings with members of the networks are not possible, the PhD candidates will collect feedback via online or phone call, or in writing. The judges will collect written feedback from the networks and advisory groups using the following questions, like questions previously used to evaluate whether the list makes sense [2]:

- Are there concepts that have been prioritised that should not be?
- Are there concepts that have not been prioritised that should be?
- Is the order in which we suggest the concepts should be taught and reinforced logical?

The coordinator will collect feedback from the international advisory group, using the same questions, and summarise all feedback from meetings and written feedback.

Step 7. Prioritising and ordering concepts and reaching final consensus

Step 7 will be a repetition of Steps 4 and 5. Step 7 will be informed by the summary of feedback collected in Step 6. A report of the results of the entire process will be submitted to a scientific journal, so it can be used to inform future, similar processes.

Discussion

The prioritised and ordered Key Concepts will be the starting point for the IHC learning resources that we will develop for secondary schools in East Africa. In parallel, we will conduct a context analysis in each country. The context analyses will explore where teaching the Key Concepts best fits in the curriculum. They also will explore conditions for introducing the learning resources into schools, such as the availability of time, the availability and use of digital learning resources, who decides what learning resources are used and how, and what influences their decisions.

References

1. Dewey J. *How We Think: A Restatement of the Relation of Reflective Thinking to the Educative Process*. Lexington, MA: DC Heath, 1933.
2. Oxman AD, Chalmers I, Austvoll-Dahlgren A, Informed Health Choices Group. Key Concepts for assessing claims about treatment effects and making well-informed treatment choices. *F1000Research* 2019; 7:1784. <https://doi.org/10.12688/f1000research.16771.2>
3. Marzano R, Kendall J. *A Comprehensive Guide to Designing Standards-Based Districts, Schools, and Classrooms* (2nd ed). Alexandria, VA: Association for Supervision and Curriculum Development, 1996.
4. Nsangi A, Semakula D, Glenton C, Lewin S, Oxman AD, Oxman M., et al. Resources to teach primary school children in low-income countries to assess claims about treatment effects: process evaluation. *BMJ Open* 2019; 9:e030787. <https://doi.org/10.1136/bmjopen-2019-030787>
5. Nsangi A, Semakula D, Oxman AD, Austvoll-Dahlgren A, Oxman M, Rosenbaum S, et al. Effects of the Informed Health Choices primary school intervention on the ability of children in Uganda to assess the reliability of claims about treatment effects: a cluster-randomised controlled trial. *Lancet* 2017; 390:374–88. [https://doi.org/10.1016/S0140-6736\(17\)31226-6](https://doi.org/10.1016/S0140-6736(17)31226-6)
6. Nsangi A, Semakula D, Oxman AD, Oxman M, Rosenbaum S, Morelli A, et al. Effects of the Informed Health Choices primary school intervention on the ability of children in Uganda to assess the reliability of claims about treatment effects, one-year follow-up: a cluster-randomised trial. *Trials* 2019. <https://doi.org/doi.org/10.21203/rs.2.12516/v1>
7. Wiggins GP, McTighe J. *Understanding by Design* (2nd ed). Alexandria, VA: Association for Supervision and Curriculum Development, 2005.
8. Bruner J. *The Process of Education*. Cambridge, MA: Harvard University Press, 1960.
9. Murray JW. Skills development, habits of mind, and the spiral curriculum: a dialectical approach to undergraduate general education curriculum mapping. *Cogent Educ* 2016; 3:1–19. <https://doi.org/10.1080/2331186X.2016.1156807>
10. Campbell SM, Cantrill JA. Consensus methods in prescribing research. *J Clin Pharm Ther* 2001; 26:5–14. <https://doi.org/10.1046/j.1365-2710.2001.00331.x>

11. Feinstein A. Clinimetrics. New Haven: Yale University Press, 1987; 141-66.
12. Aronson JK, Barends E, Boruch R, Brennan M, Chalmers I, Chislett J, et al. Key concepts for making informed choices. *Nature* 2019; 572:303-6.
<https://doi.org/10.1038/d41586-019-02407-9>
13. Oxman AD, Chalmers I, Dahlgren A, and the Informed Health Choices Group. Key Concepts for assessing claims about treatment effects and making well-informed treatment choices. Version: 2019.
<https://www.informedhealthchoices.org/key-concepts-2-2/>
14. King PM, Kitchener KS. (2004). Evolution of a constructivist conceptualization of epistemological reflection evolution of a constructivist conceptualization of epistemological reflection. *Educ Psychol* 2004; 39:5-18.
https://doi.org/10.1207/s15326985ep3901_2
15. Baron J. *Thinking and Deciding* (4th ed). Cambridge, UK: Cambridge University Press, 2008.