



CAMBRIDGE ASSESSMENT

Extending educational taxonomies from general to applied education: Can they be used to write and review assessment criteria?

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Abstract

Using theory-based taxonomies of educational objectives to review and shape curricula and associated assessments is good practice, as this can contribute to assessment authenticity. It is also important for students, university admissions tutors, and employers to recognise the domains of knowledge covered. Although many taxonomies have been developed in the context of general education, they frequently cover both cognitive and non-cognitive knowledge domains and their wider applicability is underexplored. Identifying shared domain coverage between academic and applied curricula (often described as vocationally-related curricula in England) could help to bridge the gap in esteem found between general and applied education routes in many countries.

The present aim was to test whether a general educational taxonomy could be utilised in applied educational contexts. The first stage of research entailed identifying published taxonomies with sufficient potential, and selecting the most appropriate. Ten taxonomies were reviewed against seven pre-determined inclusion criteria. Although no individual taxonomy met all seven criteria due to insufficient domain coverage, two taxonomies were selected for joint use. Secondly, the selected taxonomies were applied to existing curriculum materials in a range of applied subjects. That is, learning objectives and grading criteria were reviewed successfully for domain coverage, and additional grading criteria were also written in a single standard format. Thirdly, training materials for assessment developers were constructed and trialled, and feedback data was collected. Participants in this roundtable session will discuss the selected taxonomies and can explore their potential applicability in their own educational assessment contexts, both academic and applied.

Introduction

Since Bloom and his colleagues created their seminal taxonomy of educational objectives (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956; Krathwohl, Bloom, & Masia, 1964), it has widely been considered good practice to use taxonomies to formulate and review curricula, learning objectives, and associated assessments. Demonstrating sufficient coverage of each of an adequate range of knowledge domains and sub-domains, both cognitive and non-cognitive, is important both for authenticity and for transparency surrounding what students are learning. Since Bloom's original work, revisions have been published (Anderson et al., 2001; Krathwohl, 2002) and alternative taxonomies have been developed (Anderson et al., 2001; Biggs & Collis, 1982; Hauenstein, 1998; Krathwohl, 2002; Marzano & Kendall, 2007; Marzano & Kendall, 2008) to accommodate advancements in psychological understanding. Consequently, assessment developers in general education may choose from numerous taxonomies as the basis for their work.

We hypothesised that since many of the general educational taxonomies cover both cognitive and non-cognitive knowledge domains, they may also be applicable in applied educational contexts. Since the wider applicability of such taxonomies is relatively underexplored, testing their utility in applied contexts was the main aim of this study. In many countries, applied curricula and assessments (often described as vocationally-related curricula in England) are perceived as the 'poor relations' to their more academic equivalents (Gleeson & O'Flaherty, 2013; Kämäräinen & Fischer, 2008; McGrath et al., 2006). Clarifying the cognitive demands placed on applied students could facilitate their progression to higher education. Similarly, clarifying the non-cognitive demands could facilitate progression into employment and vocational training schemes.

Method

The study comprised three stages. The first entailed identifying published taxonomies with sufficient potential and selecting the most appropriate. In total, ten potential taxonomies were identified: Anderson et al. (2001); Atkinson (2013); Biggs and Collis (1982); Carpenter and Wisecarver (2004); Harrow (1972); Hauenstein (1998); Hutchins et al. (2013); Klein, DeRouin, and Salas (2006); Krathwohl (2002); and Marzano and Kendall (2007, 2008). Each taxonomy was reviewed using the following seven pre-determined inclusion criteria:

- Credible in terms of its underpinning theory and/or empirical basis
- Broad enough to incorporate five knowledge domains: affective, cognitive, interpersonal, metacognitive and psychomotor
- Hierarchical or cumulative, such that higher levels tend to relate to higher grades
- Written accessibly
- Straightforward enough to be used by assessment developers with little first-hand research experience
- Readily available
- Used successfully in a relevant context.

Secondly, the taxonomies that best met the criteria were applied experimentally to existing curricula in a range of applied subjects which are taught at secondary and tertiary level in England, such as business, performing arts, and health and social care. This entailed reviewing the domain coverage of learning objectives and grading criteria, and using a single standard format to write additional grading criteria.

Thirdly, training materials for developers working on applied curricula and assessments were constructed and trialled. A two-hour interactive training event was held with a team of eight experienced developers, each with a background in a different applied subject. The training included a theoretical background to the use of taxonomies, an explanation of how to apply the taxonomies, and structured opportunities for the developers to use the taxonomies to review and construct learning objectives and grading criteria. Afterwards, feedback data was collected from the participants via a written questionnaire covering: (i) the accessibility of the taxonomies; (ii) the appropriateness of using the taxonomies in day-to-day development activities; and (iii) any suggested refinements.

Results

None of the ten reviewed taxonomies met all of the selection criteria, primarily because no individual taxonomy incorporated all five knowledge domains. A taxonomy by Marzano and Kendall (2007) came closest, covering the affective, cognitive, metacognitive and psychomotor domains. It was selected for use in conjunction with a taxonomy by Hutchins et al. (2013) which provided the most comprehensive articulation of the interpersonal domain. The standard application format of Marzano and Kendall (2007) was found to be readily extendable to Hutchins et al. (2013).

The experimental application of the two selected taxonomies to applied curricula was judged by the research team to be successful. The assessment developers' feedback on the training session was used to further refine the training materials, and provided ideas for further research in this area.

Discussion

The discussion in this interactive session will focus on the two selected taxonomies. The practicalities of using them to review domain coverage in existing curricula and assessments, and to construct new assessment criteria, will be considered in depth, along with the advantages and disadvantages conferred. Roundtable participants will have opportunities to consider whether they could apply the taxonomies themselves in their own educational assessment contexts, both academic and applied. Additionally, the analysis of the questionnaire data will be used to inform discussion of whether the selected taxonomies are suitable for routine use by non-researchers, including teachers and other assessment developers, in other countries, and to identify any necessary modifications.

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