

浙江工业大学管理学院

毕业设计(论文)外文资料翻译

题目： 基于 OBE 理念的教学管理系统设计

专 业： 信息管理与信息系统

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education: an exploration of its origins,
theoretical basis, and empirical evidence

附 件： 1. 外文资料译文; 2. 外文原文



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框架和理论综述

在追溯了现代 OBE 背后的历史里程碑之后，我们现在转向本综述的第二部分，并考虑一个潜在的概念框架或理论。但是，在这样做之前，必须解决术语问题。

术语审查

虽然基于结果和基于能力的教育共同关注的是课程的产品，而不是过程，但它们之间的任何差异都是微妙的。Shumway 和 Harden（2003）写道，由 MSOP，AAMC，ACGME，CanMEDS 和苏格兰医学院等机构指定的学习成果“具有相似之处，并包含一套类似的才干或能力”。根据 Albanese 等人的说法（2008），结果和能力之间的区别在于“想要”和“需要”这两个词。结果定义了我们希望学生具备哪些技能和素质，而能力则决定了医生在照顾患者时需要具备哪些技能和素质。

调整项目（Cumming 和 Ross 2007）以这种方式区分了成果、目标和能力：学习目标由教学人员设定和描述，并与特定组件相关。学习成果用层次结构来描述，顶层由大型域组成。在这些领域内，更详细的成果被描述到对制定评估方案蓝图有用的程度。最后，能力属于学生或毕业生，而不是教师。成功完成学位课程的人的能力应至少与规定的学习成果相当。这些术语在优化项目中或多或少可以互换使用。

Fernandez 等人最近的一篇评论（2012）得出结论，健康科学教育工作者认为能力由知识，技能和其他组成部分组成，尽管他们发现不同作者在如何使用该术语方面存在明显差异。在实践中发现基于结果和能力的教育之间没有本质区别；本文与 Hodges（2010）一致，使用术语 OBE 来指代两者。除了引用使用替代术语的作者，它还对“能力”（而不是才干）进行了标准化。

学习理论综述

从迄今为止的分析中可以得出结论，OBE 自然地与评估相关联，但与教学和学习活动的联系却不那么自然。OBE 在定义结果和支持医学课程的教学活动之间似乎存在差距。我们并不是唯一提出这一看法的人，我们也是这样做的国

家。在我们面前，Prideaux（2004）和 Norman（2006）质疑学习成果与教学/学习之间联系的性质。另一个差距是 OBE 在行为主义中的根源（这可以被认为是一种过时的理论取向）与现代学习理论之间的差距。

Biggs 和 Tang 的建设性对齐课程框架似乎能够帮助我们更广泛地思考 OBE 的可用性和局限性，该框架强调教学/学习过程以及评估，并将它们与学习成果保持一致（Biggs and Tang 2007）。与 OBE 一样，建设性的一致性要求明确无误地陈述预期的学习成果。与 OBE 一样，它也非常重视评估系统，这些系统要求学习者展示对预期学习成果的熟练程度。从建设性的一致性角度来看，教学活动应以增加学生在评估中精通学习成果的可能性的方式进行规划。据预测，这种方法将促进一种深入的学习方法，因为它鼓励学生参与适当的活动并达到理想的表现水平。因此，它拓宽了 OBE 的理论基础，包括学习；然而，可以说，比格斯和唐的理论也将学习范围缩小到可观察的行为，并省略了与情感和专业属性相关的学习元素。他们的框架可以被定性为建构主义的框架。然而，OBE 可以与建构主义理论相协调的事实并不能令人信服地证明 OBE 已经超越了其行为主义的起源。

寻找当代学习理论是徒劳的，该理论可以调和社会对医生的需求，以显示复杂而充满情感的个人和专业属性，而 OBE 的重点是评估能力的可证明方面，因此回过头来仔细研究 OBE 在最近的关键出版物中被如此强烈推荐的基础似乎是合乎逻辑的。Cooke 等人（2010）引用了 ACGME 等机构的权威声明，但没有引用理论或经验证据。Harden 等人（1999）通过引用 Spady（1988，1994）来支持他们的主张，应该记住，他说影响不可能是学习结果，因为这与他的行为主义立场相冲突。因此，在第二轮倡导的背后没有新的理论，OBE 并没有比 1970 年代更接近于为专业精神的情感和复杂元素提供课程框架。

实证文献综述

复习问题和方法

上述结论是，OBE 之所以被提倡，主要是因为它能够支持技能和知识的评估，并且在理论上，它支持复杂个人和专业属性发展的能力尚不清楚，这促使我们转向实证文献，以构建探索性回顾问题：预定的学习成果如何影响本科医

学教育的学习和教学？我们的方法是搜索研究出版物。因为 Carraccio 等人（2002）的一篇综述总结了千禧年之前的证据，并得出结论，需要进一步的研究工作来发现 OBE 是否产生了更有能力的医生。

方法

之所以选择两个主要的搜索引擎——Scopus 和 Cambridge Scientific Abstracts (CSA) 的自然和社会科学——是因为它们包含了大多数大型的相关数据库，如 Medline、Embase、Web of Science、ERIC、PsychInfo。我们还搜索了这两个搜索引擎没有涵盖的 CINAHL。所有检索均涵盖 1999–2010 年期间。由于数据库对性能结果进行分类的方式不一致，我们在标题、摘要和描述符中进行了简单的关键字搜索。我们的战略是将背景和人口以及概念和影响变量结合起来。背景和人口被定义为本科医学教育，医学生或医学院；概念被定义为学习成果，基于结果的教育、能力、才干、基于能力的教育、学习目标、目标或清单；影响变量是教学或学习。最终的搜索语法太大且太复杂，无法在此处重现，但可根据要求提供。

“Hits”被导入到 Refworks 软件 (Proquest, Bethesda, USA) 中。Scopus 中的 4356 次点击按相关性排序，并包括最相关的 1000 次点击。来自自然科学的 1400 个 CSA 命中和来自社会科学的 469 个命中都包括在内，来自 CINAHL 的所有 161 个命中都包括在内。我们还手工检索了自己的参考数据库，以提高搜索的敏感性。总共有 2168 篇文章在手动删除重复和没有摘要的论文后仍然存在。纳入符合以下四项标准的研究：

1. 该论文涉及本科医学教育，医学生或医学院。
2. 调查了 OBE 中定义的学习成果。
3. 提供了一些可验证的，来自实验或观察的观察结果的观察数据。
4. 报告了学习成果对教学或学习的影响，效果或作用。

根据这四项标准，一位作者 (TD) 按标题和摘要排除了 2126 个明显不相关的点击。第二位研究人员没有参与这一阶段，因为我们发现，让一个人筛选出大量完全不相关的论文，这些论文必须在第一轮教育审查中被排除在外 (Dornan et al. 2007)。第一次迭代给我们留下了 42 篇论文，需要全文审

查。在随后的迭代中，所有论文均由两位作者进行审查，并通过共识决定纳入和排除。所有 42 个都符合标准 1;42 篇论文中有 30 篇被标准 3 排除在外，即 4 篇论文，剩下 12 篇论文。12 篇论文中有 4 篇在标准 2 的第三次迭代中被排除在外，因为它们基于构建教学活动的主题列表，但没有表明学生的水平或预期表现，因此不能归类为学习成果集。12 篇论文中有 8 篇纳入了具有清晰、明确、可观察的性能要素的结局，并被纳入本综述。

结果

表 1 列出了 8 篇纳入的论文。

发现

学习成果、教师和教学

很少有研究明确说明学习成果如何影响医学教师的教学。唯一的例外是一项定性访谈研究，该研究发现学校水平的学习成果影响了教师的课程规划，而课程水平的成果影响了他们的教学（Bolander 等人，2006 年）。从消极的一面来看，研究表明，对专业知识有更丰富看法的教师，他们鼓励通过参与来学习，可能会受到注重成果的限制。

学习成果、学生和学习

一些学生喜欢获得学习成果，一项研究显示，在腹腔镜检查培训师中促进主动学习，尽管参与者人数很少，结果没有统计学意义（Gonzalez 等人，2004 年）。结果使学生为教学课程做好了更好的准备（Waydhas 等人，2004 年），并在实习后考试中获得了更高的分数（Kuo 和 Slavin 1999）。在其他研究中，学习成果是复杂课程干预的一部分，这使得很难确定它们的独立贡献。这些研究表明，学生的自我评估能力和信心有所提高（Brody 等人，2003;雅各布斯等人，2005;Lai 和 Ramesh 2006）。一项研究中有一个重要的负面发现，该研究询问学生如何使用课程目标、考试蓝图和教学课程的内容进行考试准备（McLaughlin 等人，2005）。只有 34%的学生使用课程目标，他们明显不太可能达到平均水平的考试成绩。

表 1 收录的 8 篇论文分析

论文	设计	相关结果
博兰德等人。	欧洲医学院关于在学校环境中定义的学习成果、目标和目标	教师们意识到了学习目标并受其影响。如果颁布参与式学习的隐喻,对专业知识有更丰富看法的教师可能会受其限制。
布罗迪等人。 (2003)	在一次实习中进行了非控制性的复杂干预,包括三种自我选择的能力,随后向120名美国医学生发放了自我评估问卷。360个评价中收到了330个(93%)。	在81.5%的评估中,学生报告说在选定的能力方面有所提高。85.3%的学生报告说他们对执行这些能力有很大信心。
冈萨雷斯等人。 (2004)	在腹腔镜培训师的环境下,对8名美国医科学生进行了学习目标和反馈的对照实验,随后进行了绩效评估。还有8名学生在对照组。	模拟器总分无差异或者评估动物腹腔镜胆囊切除术的表现。干预组有训练更多的趋势。
雅各布斯等人。 (2005)	在一次实习中进行了非控制性的复杂干预,包括学习目标、各种学习经历、访谈和指南,随后向54名学生和37名住院医师发放了自我评估问卷。	学生和居民对学习目标了如指掌,并对实习工作表示赞赏。
郭和赛尔温 (1999)	在临床实习中进行了一项前后对照的复杂干预,包括目标、重新设计的课题、教学策略、书籍、时间和考试。52名干预前学生的考试成绩与42名干预后学生的成绩进行了比较。	在实习期MCQ考试中,平均得分从53.7%显著提高到67.7%。NBME-儿科科目的分数没有发现差异。
赖和拉梅什 (2006)	一个非控制性的复杂干预措施,在全校范围内转向结果,随后对116名学生在最后几个月进行了自我评估问卷调查。92人(79%)作了回答。	学生们普遍对他们在共同实践技能和病房常规方面的能力充满信心。大多数学生对评估的通用任务感到满意。他们为实习做好了充分的准备。
麦克劳克林等人。 (2005)	在一门临床课程中进行了一次干预,只增加了学习目标,随后对81名加拿大医科学生进行了关于目标使用情况的问卷调查。然后将使用情况与学生的考试成绩联系起来。	很少有学生(34%)使用目标($p/0.001$)。使用目标与拥有高于平均水平的考试分数的几率降低有关。没有发现与其他变量的联系。
韦达斯等人。 (2004)	在一次实习中进行了控制性的复杂干预,包括目标,随后向干预组的100名学生和对照组的351名学生发放了自我评估问卷。719份问卷中收到了614份(85%)	干预组的学生报告说,与对照组相比,他们和他们的老师为上课做了更好的准备。

第一列是论文的第一作者和发表年份。第二列描述了研究设计。第三栏给出了论文的主要结果

讨论

主要发现和意义

我们已经表明，对 OBE 的广泛倡导可以追溯到人造卫星的发射。它的理论起源于泰勒及其直接继任者的行为主义心理学。到千禧年之际，对 OBE 的倡导已经从理论论证的支持转变为对常识的呼吁，并得到监管机构权威声明的支持。在过去的 50 年里，OBE 经历了两个明确的倡导周期，然后是批评。在过去的十年中，OBE 在本科医学教育中被倡导和实施，但随后并没有对学习成果对教学和学习医学的影响进行大量研究。

对有效性的威胁

我们的结论的有效性主要取决于我们采取的三管齐下的方法。历史回顾必须是有选择性的，因为对 OBE 历史的全面审查将是一项艰巨的任务。同样，我们对理论的回顾也必然是有限的。这意味着重要的事实和论点将不可避免地分析中缺失。即使是第三个组成部分——系统文献综述——也可能不完整。我们发现的证据匮乏可能被视为其不完整的证据。然而，医学教育领域的证据审查一致发现，实际上，被认为是“正常”的东西几乎没有经验证据。虽然承认可能遗漏了信息性证据，但我们似乎不太可能错过足够有力的证据来使我们的发现无效。然而，我们发现的所有内容都围绕着上一节中提出的解释进行了三角剖分。它不打算成为关于该主题的最后几句话，甚至不是对证据的唯一可能的解释；远非如此，“影响”部分根据我们的调查结果提出了可以合理采取的下一步措施。

与其他出版物的关系

我们的分析仅限于英文出版物。斯堪的纳维亚语和德语关于教育的出版物（Gundem and Hopmann 1998）呈现出一种截然不同的教育话语，以“Bildung”一词为缩影。从这个角度来看，教育远远超出了获得技能和知识的范围。像 Klafki（1995）这样的德语作家，以人文学科为起点，显然专注于理想的目标，如发展批评和自我批评的能力和意愿、争论、同理心，以及根据上下文和

连贯思考。在这个框架内，教育和课程主要涉及 Bildung（努力实现这些理想目标的过程）；获取知识和技能是该过程的工具，而不是终点学习成果本身。

这篇综述是对 Prideaux（2004），Rees（2004），Talbot（2004）和 Takoke（2008）的批评的补充，这些批评讨论了 OBE 的潜力，以剥夺学习者的权力，并将充分性而不是卓越性作为医学课程的目标。虽然我们的历史回顾和理论批判借鉴了整个教育学术，但我们的证据审查仅限于医学教育连续体的一部分 - 本科医学教育。然而，Harden 等人（1999）的建议和 Flexner 百年纪念建议（Cooke 等人，2010）适用于整个医学教育，后者得到了详尽的文献综述的支持。我们没有选择性地参考研究生医学教育的出版物来扩展我们的论点，而是将 OBE 在研究生医学教育中的有效性留给未来的研究人员来研究，如下所述。

影响

用于练习

该评论没有导致 OBE 适合或不适合本科医学教育的立场，而是表明它可能比其他方面更适合某些方面。根据我们的分析，OBE 为能力评估的蓝图提供了逻辑基础，特别是那些评估可观察行为的能力。另一方面，即使是哈登等人（1999）的建议所依据的理论家也说，影响不能简化为可观察的行为。因此，将通过教育发展的个人和专业特质与通过培训发展的能力纳入同一过程似乎是不合逻辑的。这样做可能会否认人际关系在医疗实践中的重要性。Schön（1984）将实践称为“混乱”。OBE 有助于整理那些可以整理的实践部分，但其危险在于，不适当的应用可能会贬低实践本质中那些本质混乱的部分；特别是，支撑有效治疗关系的复杂人类。

奖学金

我们的综述确定的最紧迫的学术任务是从行为主义以外的理论角度研究 OBE；例如，认知和社会理论。我们认为，回答“OBE 是否有效？”这个问题的研究设计将没有什么用处，因为这个领域太复杂了。相反，“澄清”（Cook et al. 2008）研究回答了“OBE 如何工作，为谁工作，在什么情况下工作？”这个

问题是非常需要的，并且有助于在课程实施中进行基于行动或设计的研究。我们对 OBE 的好处知之甚少；学习成果与教学之间的联系是什么；当结果对教师有帮助时，当没有帮助时；它们何时以及如何对自主学习有用。

结论

我们的评论显示，Harden 等人（1999）说得对：“尽管 OBE 具有明显的吸引力，但记录其效果的研究相当罕见。正如 Harden（2007）所说，许多“孔雀”已经指定了一组结果，但很少有“海狸”使用学习结果作为课程相关决策的基础（Harden 2007）。在同意的同时，我们建议那些利用理论和权威声明来制定和仔细评估课程修订的海狸，将是推动该领域以及他们自己的课程向前发展的人。



Review of frameworks and theories

Having traced the historical landmarks underlying modern OBE, we now turn to the second part of this review and consider a potential conceptual framework or theory. However, before doing so, problem with terminology have to be reconciled.

Review of terminology

Whilst outcome based and competency based education have in common a main focus on the product, as opposed to the process, of curricula, any differences between them are subtle. Shumway and Harden (2003) wrote that the learning outcomes specified by bodies like MSOP, AAMC, ACGME, CanMEDS, and the Scottish medical schools “have similarities and embrace a similar set of competencies or abilities.” According to Albanese et al. (2008), the difference between outcomes and competencies is in the words “want” and “need”. An outcome defines what skills and qualities we want students to have, whereas a competency is a determination of what skills and qualities doctors need to have to care for patients.

The Tuning Project (Cumming and Ross 2007) distinguished between outcomes, objectives, and competencies in this way: Learning objectives are set and described by teaching staff and relate to a particular component. Learning outcomes are described with a hierarchy of levels, with the top level consisting of large domains. Within those domains, more detailed outcomes are described to a level that is useful for blueprinting assessment programmes. Finally, competencies belong to students or graduates rather than teachers. The competencies of someone who has successfully completed a degree programme should be at least equivalent to the prescribed learning outcomes. The terms are used more or less interchangeably in the Tuning Project.

A recent review by Fernandez et al. (2012) concluded that health science educators agree that competence is composed of knowledge, skills and other components, though they found clear differences between different authors in how they used the term. Having found no essential difference between outcome and competency based education in practice; this article has aligned itself with Hodges (2010) in using the term OBE to refer to both. It has also standardised on ‘competency’ (rather than competence) except when quoting an author who uses the alternative term.

Review of learning theory

OBE, it may be concluded from the analysis thus far, links naturally with assessment but not so naturally with teaching and learning activities. It seems there is a gap in OBE between defining outcomes and supporting the teaching and learning activities of medical curricula. We are not alone in making that observation; Prideaux (2004) and Norman (2006), before us, questioned the nature of the link between learning outcomes and teaching/learning. Another gap is between the roots of OBE in behaviourism, which could be considered an outdated theoretical orientation, and modern learning theory.

An approach that seemed able to help us think more widely about affordances and limitations of OBE was Biggs and Tang’s constructive alignment curriculum framework, which emphasises teaching/learning processes as well as assessment and aligns them both with learning outcomes (Biggs and Tang 2007). Like OBE, constructive alignment calls for intended learning outcomes to be stated clearly and unambiguously. Like OBE, also, it puts a strong emphasis on assessment systems that call for learners to demonstrate proficiency

in the intended learning outcomes. Teaching–learning activities, from a constructive alignment perspective, should be planned in such a way as to increase the likelihood of students being assessably proficient in the learning outcomes. The approach has been predicted to foster a deep approach to learning, since it encourages students to engage with appropriate activities and reach desired levels of performance. Thus, it broadens the theoretical foundation of OBE to include learning; it can be argued, however, that Biggs and Tang's theory also narrows learning to observable behaviours and leaves out elements of learning related to affects and professional attributes. Their framework may be characterised as a constructivist one. The fact that OBE could be reconciled with a constructivist theory is not, however, convincing evidence that OBE has moved beyond its behaviourist origins.

Having looked in vain for a contemporary learning theory, which could reconcile society's demand for doctors to show complex and affectively-laden personal and professional attributes with OBE, whose focus is on assessing demonstrable aspects of competence, it seemed logical to go back and scrutinise the basis on which OBE has been so strongly recommended in recent pivotal publications. Cooke et al. (2010) quoted authority statements of bodies like ACGME, but did not cite theory or empirical evidence. Harden et al. (1999) supported their advocacy by reference to Spady (1988, 1994) who, it should be remembered, said affects could not be learning outcomes because that conflicted with his behaviourist stance. So, no new theory lay behind the second cycle of advocacy and OBE is no closer to providing a curriculum framework for the affective and complex elements of professionalism than it was in the 1970s.

Review of empirical literature

Review question and approach

The foregoing conclusion that OBE was advocated primarily because of its ability to support assessment of skills and knowledge and that, on theoretical grounds, its ability to support the development of complex personal and professional attributes is unclear led us to turn to the empirical literature in order to frame the exploratory review question: How do predetermined learning outcomes affect learning and teaching in undergraduate medical education? Our approach was to search research publications since a review by Carraccio et al. (2002), which had summarised evidence up to the millennium and concluded that further research effort was needed to find if OBE produced more competent physicians.

Method

Two major search engines—Scopus and Cambridge Scientific Abstracts (CSA) natural and social sciences—were chosen because they include most large, relevant databases like Medline, Embase, Web of Science, ERIC, PsychInfo. We also searched CINAHL, which is not covered by those two search engines. All searches covered the period 1999–2010. Because of inconsistency in how databases classify performance outcomes, we conducted a simple keyword search in title, abstract, and descriptors. Our strategy was to combine context and population AND concept AND impact variables. Context and population were defined as undergraduate medical education, medical students, or medical faculty; concepts were defined as learning outcomes, outcome-based education, competence, competencies, competency based education, learning objectives, goals, or checklists; impact variables

were teaching or learning. The final search syntax was too large and complex to be reproduced here but is available on request.

'Hits' were imported into Refworks software (Proquest, Bethesda, USA). 4,356 hits in Scopus were sorted by relevance and the 1,000 most relevant included. 1,400 CSA hits from natural sciences and 469 hits from social sciences were all included, as were all 161 hits from CINAHL. We also hand-searched our own reference databases to increase the sensitivity of the search. In all, 2,168 articles remained after manually deleting duplicates and papers without abstracts. Studies that met all the following four criteria were included:

1. The paper concerned undergraduate medical education, medical students, or medical faculty
2. *And* investigated learning outcomes as defined in OBE
3. *And* provided some verifiable, observational data from an experiment or observation of the effects learning outcomes
4. *And* reported the influence, effects, or impacts of learning outcomes on teaching or learning.

Based on these four criteria, one author (TD) excluded 2,126 obviously irrelevant hits by title and abstract. A second researcher was not involved in this phase because we have found there is little to be gained by having more than one person screen out the large number of completely irrelevant papers that have to be excluded in the first round of an education review (Dornan et al. 2007). The first iteration left us with 42 papers to review in full text. In the following iterations, all papers were reviewed by two authors and inclusions and exclusions decided by consensus. All 42 of them fulfilled criterion 1; 30 of the 42 papers were excluded on criteria 3, or 4, leaving 12 papers. Four of the 12 papers were excluded in the third iteration on criterion 2, because they were based on lists of topics that structured teaching–learning activities, but did not indicate levels or the performance expected of students, and could not therefore be classified as sets of learning outcomes. Eight of the 12 papers included outcomes with clear, unambiguous, observable performance elements and were included in this review.

Results

The eight included papers are presented in Table 1.

Study designs

Seven of the papers concerned students and one concerned teachers. One study was conducted in a skills laboratory setting, five were conducted in the context of clinical courses, and two were conducted in school level settings. One study was qualitative; one study was a controlled experiment with 2 groups of 8 students followed by performance assessment; one study was a controlled complex intervention comparing questionnaire-based self-assessment of respectively, 100 and 351 students; one study was a pre-post controlled complex intervention comparing MCQ test-scores from 52 and 42 students, respectively; one study was an intervention involving 81 students followed by a comparison of test scores to questionnaire responses; finally three studies were uncontrolled complex interventions involving from 54 to 120 medical students followed by questionnaire-based self-assessment.

Table 1 Analysis of the eight included papers

Paper	Design	Relevant results
Bolander et al. (2006)	Qualitative research interviews with 10 European medical faculty concerning defined learning outcomes, objectives, and goals in a school-setting	Teachers were aware of the learning goals and influenced by them. Teachers with a richer view of expertise might be limited by them if enacting a participation metaphor of learning
Brody et al. (2003)	A non-controlled complex intervention in a clerkship, including three self-selected competencies was followed by a self-assessment questionnaire to 120 US medical students. 330 of 360 (93 %) evaluations were received	In 81.5 % of evaluations, students reported improvement in selected competency. 85.3 % of students reported to be mostly confident performing these competencies
Gonzalez et al. (2004)	A controlled experiment in a laparoscopy trainer setting with learning goals and feedback to 8 US medical students was followed by a performance assessment. There were also eight students in the control group	No difference in simulator total scores or assessed performance during laparoscopic cholecystectomy on animal. There was a tendency to train more in the intervention group
Jacobs et al. (2005)	A non-controlled complex intervention in a clerkship, including learning goals, a variety of learning experiences, interviews, and guides was followed by a self-assessment questionnaire to 54 students and 37 residents	Students and residents were well-informed about learning goals and appreciated the clerkship
Kuo and Slavin (1999)	A pre-post controlled complex intervention in a clerkship, including objectives, redesigned topics, teaching strategies, books, timing, and exam. 52 pre-intervention students' test scores were compared to 42 post-intervention students' scores	Significant increase in mean score on clerkship MCQ exam from 53.7 to 67.7 %. No difference in NBME-Pediatric Subject scores was found
Lai and Ramesh (2006)	A non-controlled complex intervention with a school-wide shift to outcomes was followed by a self-assessment questionnaire to 116 students in their final months. 92 (79 %) responded	Students were generally confident of their ability on common practical skills and ward routines. Most students were comfortable with the generic tasks assessed. They felt well-prepared for internship
McLaughlin et al. (2005)	A single intervention in a clinical course, adding learning objectives only, was followed by a questionnaire to 81 Canadian medical students concerning use of the objectives. Use was then correlated to students' test scores	Significantly few students (34 %) used the objectives ($p < 0.001$). Use of objectives was associated with reduced odds of having an above average test score. No association to other variables was found
Waydhas et al. (2004)	A controlled complex intervention in a clerkship, including goals, was followed by a self-assessment questionnaire to 100 students in the intervention group and 351 in control group. 614 of 719 (85 %) questionnaires were received	Students in the intervention group reported that they and their teachers were better prepared for classes compared to the control group

The first column names the first author and publication year of the paper. The second column describes the study design. The third column gives the main results of the paper

Findings

Learning outcomes, teachers, and teaching

Very little research explicitly addressed how learning outcomes influenced medical teachers' teaching. The exception was a single qualitative interview study, which found that school level learning outcomes influenced teachers' course planning while lesson level outcomes influenced their teaching (Bolander et al. 2006). On the negative side, the study indicated that teachers with a richer view of expertise, who encouraged learning by participation, might be limited by a focus on outcomes.

Learning outcomes, students, and learning

Some students liked to be given learning outcomes, which were shown in one study to promote active learning in a laparoscopy trainer, although the number of participants was small and the result was not statistically significant (Gonzalez et al. 2004). Outcomes led students to be better prepared for teaching sessions (Waydhas et al. 2004) and resulted in higher scores on post-clerkship tests (Kuo and Slavin 1999). In other studies, learning outcomes were part of complex curriculum interventions, which made it hard to determine their independent contribution. These studies showed increases in students' self-evaluated competence and confidence (Brody et al. 2003; Jacobs et al. 2005; Lai and Ramesh 2006). There was one important, negative finding from a study, which asked students how they used course objectives, exam blueprints, and the content of teaching sessions for examination preparation (McLaughlin et al. 2005). Only 34 % of students used the course objectives and they were significantly less likely to have above-average test scores.

Discussion

Principal findings and meaning

Widespread advocacy of OBE, we have shown, can be traced back to the launch of Sputnik. Its theoretical origins were in the behaviourist psychology of Tyler and his immediate successors. By the turn of the millennium, advocacy for OBE had moved from being supported by theoretical argument to appeals to common sense, backed up by authority pronouncements from regulatory bodies. The last 50 years have seen two clear cycles of advocacy, then critique, of OBE. In the last decade OBE has been advocated and implemented in undergraduate medical education, but this has not been followed by substantial research on the impact of learning outcomes on teaching and learning medicine.

Threats to validity

The validity of our conclusions rests primarily on the three-pronged approach we adopted. The historical review had to be selective because a comprehensive review of the history of OBE would be a huge task. Likewise, our review of theory was necessarily limited. That means important facts and lines of argument will, inevitably, be missing from the analysis. Even the third component—a systematic literature review—may not have been complete. The paucity of evidence we found might be seen as evidence of its incompleteness. Evidence reviews in the domain of medical education, however, consistently find that what

is taken to be ‘normal’ rests, in reality, on little empirical evidence. Whilst acknowledging that informative evidence might have been missed, it seems unlikely we missed enough strong evidence to invalidate our findings. Everything we found, however, triangulates around the interpretation presented in the previous section. It is not intended to be the last word on the topic, or even the only possible interpretation of the evidence; far from it, the Implications section suggests next steps that might reasonably be taken in the light of our findings.

Relationship to other publications

Our analysis is confined to English language publications. Scandinavian and German language publications about education (Gundem and Hopmann 1998) present a rather different discourse of education, epitomised by the word ‘Bildung’. Education, from that point of view, extends far beyond acquiring skills and knowledge. German language authors such as Klafki (1995), with a starting point in the humanities, clearly focus on ideal goals like developing ability and willingness to critique and self-critique, to argue, to be empathic, and to think contextually and coherently. In this framework, education and curriculum mainly concerns Bildung (the process of striving towards such ideal goals); acquiring knowledge and skills are tools in that process, not the endpoint learning outcomes in themselves.

This review is complementary to the critiques of Prideaux (2004), Rees (2004), Talbot (2004), and Tooke (2008), which address the potential of OBE to disempower learners and set adequacy rather than excellence as the goal of medical curricula. Whilst our historical review and theoretical critique drew on education scholarship as a whole, our evidence review was confined to just one part of the medical education continuum—undergraduate medical education. The recommendations of Harden et al. (1999) and the Flexner centenary recommendations (Cooke et al. 2010), however, apply to medical education as a whole and the latter are supported by an exhaustive literature review. Rather than refer selectively to publications from graduate medical education to extend our argument to it, we leave the effectiveness of OBE in graduate medical education for future researchers to examine, as discussed below.

Implications

For practice

Rather than leading to a position that OBE is or is not appropriate for undergraduate medical education, this review indicates that it may be more appropriate to some than other aspects of it. It follows from our analysis that OBE provides a logical basis for blueprinting assessments of competence, particularly those that assess observable behaviours. On the other hand, even the theorist on whose writing the recommendations of Harden et al. (1999) rest said affects cannot be reduced to observable behaviours. It seems illogical, therefore, to subsume personal and professional attributes that develop through education into the same process as competences that are developed by training. To do so would, potentially, be to deny the importance of relationships in medical practice. Schön (1984) famously referred to practice as “messy”. OBE lends itself to tidying up those parts of practice that can be tidied up, but its danger is that inappropriate application could devalue those parts of the essence of practice that are inherently messy; particularly, complicated human ones that underpin effective therapeutic relationships.

For scholarship

The single most pressing scholarly task identified by our review is to examine OBE from theoretical perspectives other than behaviourism; cognitive and social theory, for example. Research designs answering the question “does OBE work?”, we suggest, will be of little use because the field is just too complicated for that. Rather, “clarification” (Cook et al. 2008) studies answering the question “how does OBE work, for whom, and in what circumstances?” are sorely needed and lend themselves to action or design based research conducted within curriculum implementations. We know little about what OBE is good for; what the connections are between learning outcomes and teaching; when outcomes are helpful for teachers and when not; when and how they are useful for self-directed learning.

Conclusion

Our review shows Harden et al. (1999) were right when they said: “Although OBE has obvious appeal, research documenting its effects is fairly rare.” As stated by Harden (2007), many “peacocks” have specified sets of outcomes but few “beavers” have used learning outcomes as a basis for curriculum related decisions (Harden 2007). Whilst agreeing, we suggest that beavers who draw on theory as well as authority statements to craft and carefully evaluate curriculum revisions will be the ones to move the field, as well as their own curricula, forward.

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