Distance Education, 2013
Vol. 34, No. 1, 119–128, http://dx.doi.org/10.1080/01587919.2013.770426

Routledge
Taylor & Francis Group

REFLECTION

When prophecy fails

Jon Baggaley*

Centre for Distance Education, Athabasca University, Alberta, Canada

(*Received 25 September 2012; final version received 16 November 2012*)

Inaccurate predictions about educational technology are discussed, and the tendency for them to go unchallenged. Their global generalizability is questionable when the expertise underlying them is restricted to local contexts or is unknown. The limitations of futuristic studies need to be stressed to prevent their conclusions from being applied out of context. Problems arise when studies inaccurately claiming to represent developing-world needs and conditions are used for educational planning in those nations. The article analyzes the predictions made by the annual Horizon Reports and the One Laptop Per Child project. It suggests that these projects are currently responding to criticism in a manner similar to that described in the classic study *When Prophecy Fails*.

Keywords: emerging media; New Media Consortium; Horizon Project; One Laptop Per Child; educational planning; futurology

Gazing at horizons

Predictions about emerging media are popular in distance education—as published, for example, by the New Media Consortium's (NMC) Horizon Project (NMC, 2012a). The NMC has produced nine Horizon reports (Johnson, Adams, & Cummins, 2012a; Johnson, Smith, Willis, Levine, & Haywood, 2011; NMC, 2004, 2005, 2006, 2007, 2008, 2009a, 2010a), each of them predicting how long it will take for specific new media to be adopted in a time frame of one to five years. Adoption of a technology is defined as its entry into the educational mainstream: that is, "about 20% of institutions adopting it within the period discussed" (Johnson, Adams, & Cummins, 2012a, p. 35). The trouble with horizons, though, is that they look great from a distance, but as you move towards them they change. The Methodology section of the 2012 Horizon Report (Johnson, Adams, & Cummins, 2012a, pp. 34–35) claims that its predictions are reliable and accurate, using "a carefully constructed process that is informed by both primary and secondary research" to review "dozens of technologies, meaningful trends, and critical challenges" (p. 34). The methodology involves the formulation of research questions and their ranking for importance by an international advisory board via "a unique consensus-building process based on an iterative Delphi-based methodology" (p. 35). The advisory board's "work begins with a systematic review of the literature—press clippings, reports, essays" (p. 34)—an approach that has led

*Email: jonbaggaley@gmail.com

Downes (2011) to describe the Horizon Project as "a publicity tracker, not a tech tracker" (para. 2). The 2012 Report says little about how the advisory board is selected, beyond the fact that it is by invitation, although the NMC website's Members section (NMC, 2012b) suggests that board membership is one of the benefits available on payment of the NMC membership fee. The current annual fees for individual members are $US99 (K–12) and $US2500 (higher education).

Yet the criteria for selecting the expert sample in a Delphi-type study are central to assessing its results, because the Delphi consensus-building approach tends to marginalize extreme views, and its conclusions may have no relevance beyond the contexts of the experts who generate them. The advisory board of the 2012 Horizon Report comprised 30 members working in the United States (US) (64%); 11 in Europe (23%); 2 in Australia; and the remaining 4 in Brazil, China, Japan, and Nigeria (Johnson, Adams, & Cummins, 2012a, p. 36). Thus, the Report was US-centric. Since 2008, as a step toward global inclusivity, the NMC has published several region-specific reports, focusing to date on Australia, New Zealand, and the United Kingdom (UK). "The NMC is … currently working on one for Latin America, with plans to do the same for Singapore, Africa, Central Europe, and India" (NMC, 2012c). Since 2009, the reports' scope has also been broadened to extend beyond higher education to a K–12 edition (Johnson, Adams, & Cummins, 2012b; Johnson, Adams, & Haywood, 2011; NMC, 2009b, 2010b). But the educational needs of the continent with the world's 10 largest mega-universities, Asia, are not explicitly served by the Horizon Project at all. Graduate students in research methods courses are taught to create their samples and to weigh their claims with more caution than that, to prevent being accused of methodological bias. Despite these problems, the 2012 Horizon Report (Johnson, Adams, & Cummins, 2012a) assures us that its relevance is worldwide, identifying and describing "emerging technologies likely to have a large impact over the coming five years in education around the globe" (cover page) and reflecting "the realities of the time, both in the sphere of higher education and in the world at large" (p. 3).

Shifting horizons

The full range of emerging technologies and methods addressed by the nine Horizon reports (Johnson, Adams, & Cummins, 2012a; Johnson, Smith et al., 2011; NMC, 2004, 2005, 2006, 2007, 2008, 2009a, 2010a) is presented in Table 1. The rows list the 37 distinct topics featured in the nine main reports and the columns refer to the individual reports. Six adoption dates are predicted in all but one of the reports, one for each distinct technology or method. Exceptions were as follows:

- "Knowledge webs" were combined with "social networks" in the 2005 report (NMC, 2005), causing these topics to be combined under one heading in the current analysis.
- Similarly, "augmented reality" technology was combined with other topics in the 2005 and 2006 reports (NMC, 2005, 2006), causing these topics to be combined under one heading in the current analysis, and the number of predictions in the 2006 report (NMC, 2006) to be reduced from 6 to 5.

Table 1. The annual horizons of the Horizon Project's higher education reports (2004–2012).

	Adoption dates predicted by the nine main Horizon Reports								
Emerging media	R04	R05	R06	R07	R08	R09	R10	R11	R12
1. Augmented reality/ context-aware computing/ enhanced visualisation	2009	2010	2011					2014	
2. (Simple augmented reality)							2013		
3. Cloud computing						2010			
4. Collaboration webs					2009				
5. Collective intelligence					2013				
6. Data mashups					2011				
7. Electronic books							2013	2012	
8. Extended learning		2006							
9. Game-based learning		2008	2009					2014	2015
10. Game-based (massive multiplayer)				2012					
11. "Geo-everything" (location tracking)						2012			
12. Gesture-based computing							2015	2016	2017
13. Grassroots video					2009				
14. Intelligent searching		2008							
15. "Internet of things" (smart grids)									2017
16. Learning analytics								2016	2015
17. Learning objects	2005								
18. Mobile apps									2013
10. Mobile broadband					2011				
20. Mobile computing							2011		
21. Mobile (pocket) 'phones			2009	2010		2010		2012	
22. Multimodal interfaces	2007								
23. Open content							2011		
24. Personal broadcasting			2007						
25. Personal web						2012			
26. Rapid prototyping	2007								
27. Scalable vector graphics	2005								
28. Scholarship/publication innovations				2012					
29. Semantic-aware applications						2014			
30. Smart objects						2014			
31. Social computing/ networking/ knowledge webs	2009	2010	2007	2008					
32. Social operating systems					2013				
33. Tablet computing									2013
34. Ubiquitous wireless		2006							
35. User-created content				2008					
36. Virtual worlds				2010					
37. Visual data analysis							2015		

Key: The shaded cells indicate revised predictions about adoption dates of specific topics.

The cells in the table thus contain ((9 x 6) - 1 =) 53 predicted adoption dates.

The Horizon report predictions about the adoption dates are contentious. In relation to gesture-recognition software, for example, the 2012 Horizon Report (Johnson, Adams, & Cummins, 2012a) states: "Software that relies not on specific languages, but on natural human movements common to all cultures has a compelling utility in countries such as India" (p. 27). India is actually a good example of a nation with gestures that differ greatly between its many cultures—such as the subtly expressive side-to-side head nod with its varied meanings (acceptance, agreement, denial, doubt, resignation, optimism) depending on the verbal context, particularly in southern India (Nair, 2012). While the 2012 Horizon Report may eventually prove correct in this prediction, there is no way of being confident about that, based on the regional expertise of the 2012 Horizon Report advisory board (Johnson, Adams, & Cummins, 2012a, p. 36). If the board had included a member from India, any suggestion that gesture-recognition software will not be viable in India might have been marginalized by the 47 non-Indian board members.

In fact, different Horizon reports have repeatedly revised the predicted adoption dates about seven new technologies: for example, augmented reality from 2009 to 2014, and game-based learning from 2008 to 2015. Table 1 indicates these *shifting horizons* in shaded cells, and the total number of predictions for which they account (22/53 or 42%). NMC analysts seem to have a particular problem in predicting the mainstream adoption of mobile learning methods. The 2006 Horizon Report (NMC, 2006) was the first to discuss this topic, predicting an adoption date of approximately 2009. M-learning has been featured three times in the reports since then, and in the process its adoption date has been deferred to sometime soon. Similarly, the adoption date for the gesture-based computing example discussed above has shifted from approximately 2015 to 2017 (Johnson, Adams, & Cummins, 2012a, p. 26). The remaining 31/37 topics (84%) were featured in one report only. Either they have all entered the mainstream now, or they are no longer considered fashionable for discussion, or both. The reports do not assess whether any of the technologies/methods ever actually arrived in the educational mainstream.

The reports' track record from 2004 to 2012 can be summarized as follows:

(a) topics featured more than once, with revised predictions about adoption dates: 7/37 (19%);
(b) number of revised adoption dates: 15/53 (28%);
(c) topics featured once, with (unverified) predictions of adoption by 2012: 21/37 (57%);
(d) topics featured once, with predictions of future adoption in 2013–2017: 9/37 (24%).

Thus, either the reports' original predictions have been revised (category a: 19%) or their accuracy is uncertain (mutually exclusive categories c and d: 81%).

When prophecy fails

The classic text by Festinger, Riecken, and Schachter (1956) describes what happens *When Prophecy Fails*. The prophets tend not to move on to new topics, but promote their prophecies more widely than ever, believing that if enough people accept them they will come to be regarded as accurate. Believers in the prophecies

plan their families' future around them, sacrificing their homes and jobs to prepare for the day when the predictions will come true. A Texas observer noted that such plans were made by people who thought the world would end on May 21, 2011 (Samuel, 2011). Even when it is impossible to deny that a prophecy has failed—for example, the day after the predicted end of the world—the prophets argue that they got the date wrong and revise it.

The Horizon Project, based in Austin, Texas, has recently been publicizing its predictions in China (China Education Association for International Exchange, 2012). At a conference organized in Beijing with the Horizon Project as a main agenda item, Baggaley (2012) raised the concerns expressed in the current article. The NMC's director, Larry Johnson, responded publicly to the observation that the Project has repeatedly revised its predictions with a single statement: "Our predictions have stood the test of time" (Johnson, personal communication, October 20, 2012), and he gave no response otherwise. In follow-up discussion at the same conference, Johnson received these questions from the writer and other participants:

> Q1) Your paper suggested that the Horizon Reports cover Asia, but so far they do not. When do you expect to publish an Asia-specific report?
>
> A1) In a year or so.
>
> Q2) Why does the Horizon Project not discuss when its predictions come true?
>
> A2) We don't talk about technologies when they arrive in the educational mainstream, because the target of the reports is the future, not the present or the past.[1]
>
> Q3) What is the Reports' methodology for identifying when a technology arrives in the mainstream?
>
> A3) The Reports' methodology section explains that the technologies are regarded as having arrived in the mainstream when 20% of educational institutions have adopted them.
>
> Q4) What is your methodology for knowing when the 20% adoption point has been reached?
>
> A4) (No answer.)

Johnson did mention, however, that the Horizon Project has a policy of a 30% annual change in the membership of its advisory boards. If a project is making accurate predictions, change is actually less desirable than continuity; but the 2012 Horizon Report (Johnson, Adams, & Cummins, 2012a) nonetheless states: "In any given year, a third of advisory board members are new, ensuring a flow of fresh perspectives each year" (p. 34).[2] So do the nine main reports show a 30% advisory turnaround rate overall? In fact, not. Their advisory board sections list a combined total of 129 members, including 64 individuals who have only served once; 54 who have served on two to five boards; and 11 who have served on six to nine boards. A hard core of the latter subgroup includes representatives of the NMC and the Horizon Project's co-publisher, EDUCAUSE. If these in-house views agree with one another, the project's Delphi-type method could conceivably cause them to dominate the board's conclusions. Given that the NMC's corporate members include Adobe, Apple, Hewlett-Packard, Enterprise Hive, Pearson eCollege, and

sundry other hardware and software producers (NMC, 2012d), such observations are central to the question of the Horizon Project's ability to generate objective predictions.

Knowing hyperbole

The One Laptop Per Child project (OLPC), based in Massachusetts and Florida, has been similarly criticized for not taking global conditions into account, and for making unfulfilled promises (Evans, 2009; Shaikh, 2009). When the project was launched in 2005, one suspected that its optimistic title should not be taken to imply that every child in the world would now get a laptop. But the project leader, former director of the MIT Media Lab, Nicholas Negroponte, made dramatic predictions nonetheless. In 2005, his goal was to produce and distribute tens of millions of laptops by 2007, costing approximately $US100 each: "We're not even going to promise they're $100," Negroponte told a United Nations Internet summit. "They may be $115. What we're promising is that the price will float down" (McCullagh, 2005, para. 6). To many who desperately wanted to believe that an educational solution for their impoverished regions was now at hand, these promises raised hopes. In 2009, however, the OLPC project reduced its staffing by 50% to 32 members (Dawson, 2009), suggesting that its efforts were not sustainable; and seven years since his prediction about tens of millions of laptops, Negroponte (2012) estimates that the project has so far put laptops in the hands of 2.5 million children. In the same statement, he has commented on the project's costs: "OLPC represents about $1 billion in sales and deployment worldwide since 2005—it's bigger than most people think." A simple division of $1 billion by 2.5 million children suggests that in real terms each laptop per child has involved four times more expenditure than the $100 predicted, give or take a hundred.

A project with similar intentions but more realistic goals is the Hole in the Wall project (Mitra et al., 2005). By making computers available to children in the streets of developing nations, this project has indicated that inexpensive computer training can be provided without raising false expectations. The project has encountered the common problems of technological innovation—for example, inadequate technical support and vandalized computers (Arora, 2010)—but at least it didn't suggest that one laptop would be available per child. Regarding the OLPC project, Negroponte has now admitted that his initial promises were "knowingly hyperbolic" (*The Chronicle of Philanthropy*, 2009, para. 3), owing to his need to use colorful terms in order to convince corporate backers and governments of the project's potential. But if he thought that corporate executives and politicians would believe his rhetoric, did he not think it possible that teachers and educational administrators in developing nations would also believe it, and might abandon efficient technologies because laptops were now on their way? And that if the OLPC project failed to deliver on its rhetoric these expectations would be dashed? An early evaluation of the OLPC project by Näslund-Hadley, Kipp, Kruz, Ibarraran, and Steiner-Khamsi (2009) yielded results including limited educational impact and students' lack of ability to focus on educational uses without teacher supervision. The OLPC (2009) criticized this study for being inconclusive and premature. A recent study by Cristia, Ibarran, Cueto, Santiago, and Severin (2012) has reported similar results. So the criticism seems premature no longer. Undaunted, Negroponte (2012) has continued

to insist that "[t]he votes are still out" (para. 13). He appears to be exhibiting the same type of denial as that described by Festinger, Riecken, and Schachter, (1956) in *When Prophecy Fails*.

Negroponte has now moved on from laptops to tablet computers, using helicopters to drop tablets into Ethiopian villages, to find out if local children can learn to read from them without help (OLPC, 2012). "When I say I drop out of the helicopters, I mean it," he told the 2011 Open Mobile Summit, "It's like a Coke bottle falling out of the sky" (Hachman, 2011, para. 4). This appears to refer to the 1980 movie *The Gods Must Be Crazy* (Trosky & Uys, 1980), in which an African bushman's life is changed forever when he finds a Coke bottle in the desert. As Hachman has pointed out, the bushman regards the bottle as an evil intrusion into his culture and goes to great lengths to get rid of it. He believes that the gods who dropped the bottle from a plane must be crazy. Negroponte (2012), however, believes that his helicopter project will clarify how to reach the other "100 million kids worldwide who do not go to first grade" (para. 10). In this statement we are presumably seeing a revised-down estimate of the number of children predicted to receive one computer each. So: 2.5 million down, 98 million to go.

Conclusions

Predictions about emerging technologies play a useful role in alerting educators to new possibilities. But the history of the field is littered with uncritical stargazing, and well-designed media are left to rot like dinosaurs on the landscape owing to baseless promises that new media will improve on them. Abandoning technologies that do the job well in favor of unproven ones can set the field and the students back by years. Using *knowing hyperbole* for political purposes is a form of *jingoism*—exaggerated claims about access to technology and funding. The term derives from the music-hall chorus: "We don't want to fight but by Jingo if we do | We've got the ships, we've got the men, we've got the money too" (Meaney, 2002). President Roosevelt (1895, as cited in Wikipedia, 2012) explicitly acknowledged the role of jingoism in American foreign policy: "If by jingoism they mean a policy in pursuance of which Americans will with resolution and common sense insist upon our rights being respected by foreign powers, then we are 'jingoes'" (p. 1). At Reference.com (2012), jingoism is less kindly described as "the favorite ideology for people too dim-witted to think beyond self-satisfied pride in their own skin" (p. 1).

It is not always the projects' fault when their recommendations are misapplied. In educational research and evaluation, the reliability of conclusions is restricted by the situations on which they are based. But conclusions can be applied even when their lack of reliability is obvious, owing to political pressures to innovate (Postman, 1996). So the horizon gazing continues, with little or no regard for objective needs assessment and evaluative safeguards. The rhetoric of futuristic claims, and the inadequate methods used to support them, are like pond scum that needs to be scraped away in order to clarify what lies beneath. Notable exceptions are the Hype Cycle predictions about "the common pattern of overenthusiasm, disillusionment and eventual realism that accompanies each new technology and innovation" (Gartner.com, 2012, para. 4). Even one expert, widely travelled, discussing the pros and cons of likely adoption, can generate subtler predictions than those arising from the consensus views of a large panel of assessors. The Online Learning Outlook reports

published by Bates, most recently in 2012, use a more realistic approach of this kind, allowing readers to make their own assessments about technology adoption based on their expert understanding of local educational conditions (Bates, 2012).

The Horizon Project should consider reviewing and clarifying its methodology, based on the cumulative evidence of its first 10 years; for the inconsistencies in its reports do not suggest a primary concern for objectivity. International educators currently considering the Horizon Reports as a planning tool (e.g., in China) may wish to add some methodological recommendations of their own before investing time and money on implementing the reports' predictions. Similarly, the OLPC leadership should open its mind to the suggestions offered by critics who would clearly like the project to be more successful than it is currently. In developing futuristic research generally, those who use Delphi-type methods might heed the experience of Croesus, King of Lydia. In 547 BC, the Delphic Oracle told Croesus that he would destroy a mighty empire in battle against the Persians. Based on this prediction, Croesus went to war with Persia and destroyed an empire—his own (Fontenrose, 1978, p. 111). Meanwhile, those who indulge in *knowing hyperbole* can defend themselves with the lyrics from the musical, *Man of La Mancha*. How much better it is, they can argue, to look ahead rather than to look back:

> …and the world will be better for this, That one man, scorned and covered with scars, Still strove, with his last ounce of courage, To reach the unreachable stars. (Darian, 1965, p. 1)

But futurists should remember that the man depicted in that song was the windmill tilter, Don Quixote.

Acknowledgements

The author thanks Bernhard Blacher and Wolfram Laaser for their valuable insights.

Notes

1. Nor do the Horizon Reports discuss the failure of technologies to arrive in the mainstream by the dates predicted.
2. The membership lists in the nine main reports (Johnson, Adams, & Cummins, 2012a; Johnson, Smith et al., 2011; NMC, 2004, 2005, 2006, 2007, 2008, 2009a, 2010a) show a turnaround ranging from 28% to 47%.

Notes on contributor

Dr. Jon Baggaley is Professor Emeritus at Athabasca University, Canada, and Visiting Research Professor at World Wide Education (WWEDU), Austria. His book *Harmonizing Global Education* (2011) is published in Routledge's Open and Flexible Learning series. Baggaley's 20 TV productions *Beyond Communication* (2012) and *Inside Research* (2013) are produced and distributed by WWEDU. Segments are featured at http://www.youtube.com/jonbaggaley

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