

Western Psychological and Educational Theory in Diverse Contexts

Edited by

Julian Elliott and Elena Grigorenko

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Education departments in universities throughout the Western world are increasingly recruiting international students who are subsequently exposed to educational and psychological theories and practices that, it is assumed, will inform best practice on their return home. Such ethnocentric (and sometimes ideological) understandings may also be reinforced by powerful international agencies which, by means of financial incentives and inducements, can exert a significant influence upon practice.

While academic proponents of such theories and practices are unlikely to deny the observation that these are culturally situated, and simplistic notions of 'transfer' to other cultures may be inappropriate and potentially undermining of existing practice, such caution may be less in evidence in professional contexts where there is a desire for change and new ideas, together with a desire for the status and influence that such knowledge may bring.

This book examines aspects of Western psychological and educational theory in relation to educational practice around the world, and considers the extent to which current understandings are truly applicable to a range of diverse settings. In so doing, it also seeks to question, where appropriate, existing orthodoxies within Western educational systems. This book was previously published as a special issue of *Comparative Education*.

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Are western educational theories and practices truly universal?

Education departments in universities throughout the western world are increasingly recruiting international students, who are subsequently exposed to educational and psychological theories and approaches to teaching and learning that, it is assumed, will inform educational policy and classroom practice on their return home.

Academic proponents of western theories and practices would most likely accept the observation that these are culturally situated, and argue forcefully that simplistic notions of 'transfer' to other contexts may be inappropriate and potentially undermine existing practice. However such cautions may be less evident in those professional contexts where policy-makers and consultants are seeking educational reform and the introduction of new ideas and techniques. In addition, ethnocentric (and sometimes ideological) understandings may also be reinforced by powerful international agencies which, by means of financial incentives and inducements, can exert a significant influence on practice. Tabulawa (2003), for example, contends that democratic learning (also known as learner-centred pedagogy), an orientation that has been widely promoted by bilateral aid agencies, is not purely technical and value-free. Indeed, he suggests that such approaches to learning are underpinned by a particular ideological outlook suited to the fostering of those liberal democratic perspectives deemed important for the operation of free market economies.

This volume is concerned with aspects of western psychological and educational theory relating to educational practice around the world, and considers the extent to which western understandings are really applicable to a range of diverse settings. It also seeks to question, where appropriate, existing orthodoxies within western educational systems. The volume begins with a general introduction to the issue of culture and education, discusses possible applications of western approaches to education in diverse settings, and exemplifies issues raised by offering readers a journey across four continents (Africa, the Americas, Asia, and Europe).

That western modes of formal schooling, and understandings of intelligence and ability, may not necessarily be applicable to all cultures is the central component of Robert Sternberg's article. He argues that in some contexts, schooling may be seen as a distraction from the development of skills perceived to be necessary to thrive, or even to survive. In framing his article in the form of ten lessons, Sternberg draws on

his extensive theoretical and empirical work in the domains of intelligence, assessment, and instruction to underpin his message of the importance of rooting these domains in specific cultures. He shows how skilled performance may often be inadequately recognized because of western preconceptions of intelligent behaviour and respondents' unfamiliarity with standardized psychometric testing procedures. In his review of the relevant literature, Sternberg concludes that children's performance will be heightened when they are taught and assessed in meaningful ways appropriate to their culture.

In his role as Vice-Chancellor of a major African university, Robert Serpell has an academic (in every sense of this term) interest in the promotion of meaningful learning. He notes that western higher education 'tends to decontextualize the learning process by extracting learners from everyday life into a detached mode of full-time reflection, with an emphasis on structured exercises and analytical review of authoritative texts' (p.24). While noting some evolution in western universities (often for vocational rather than pedagogical reasons), Serpell contends that the traditional approach, with its remoteness from the cultural practices of everyday life, is particularly inappropriate for university education in Africa. In describing in some detail the operation of one educational approach, the project assignment, and in giving voice to his students, he illustrates how academic knowledge can be related to, and tested by, students' own life experiences.

Roland Tharp and Stephanie Dalton touch on a conceptual challenge that confronted several of the contributors to this volume, including the editors: what exactly are the parameters of the 'western' educational model? Tharp and Dalton note that studies of educational practices across the world show remarkable similarity, and suggest that, rather than being considered western, these might best be described as transnational. Tharp and Dalton espouse an alternative, universalist (rather than universal) approach that originally grew out of the first author's seminal work in Hawaii, and subsequent work with the Navajo. More recently this has been implemented within a diverse range of cultures and socio-economic groupings. Reflecting a Vygotskian perspective, their Five Standards for Effective Pedagogy emphasize joint teacher-student productive activity; an emphasis on language in the context of student linguistic competence; the centrality of the role of dialogue in the learning process; the importance of contextualizing learning by making it relevant to students' lives; and the need to teach higher-order, complex thinking. Tharp and Dalton's paper provides a model of educational practices and principles that may be applicable for most, if not all cultures, yet which permits the essential processes of application and contextualization, the absence of which are often seen as a weakness of the direct cross-cultural transfer of traditional approaches.

The next two papers are each concerned with western educational and psychological influences in countries where Communism underpinned the modern system of schooling. Weihua Niu remarks on the current heavy emphasis on testing in China. Noting the Chinese saying, 'Chinese learning for essential principles and western learning for practical application', she illustrates how western testing practices have been gradually absorbed over the past century. Niu describes a shift in emphasis from

the testing of factual knowledge to the development of standardized aptitude measures, although the residual eminence of the former is seen as deleterious to the development of creativity and independent thought. Although she concludes that western influences on testing have largely proven helpful in guiding reforms in Chinese educational policy and pedagogy, she recognizes the less benign consequences that can result from an excessive belief in the power of testing. These include unduly heavy demands on students and the danger that estimates of an individual's abilities and potential may be reduced to those aspects that can be most easily tested.

Continuing with the theme of absorption and adaptation, Julian Elliott and Jonathan Tudge examine western influences on Russian education since the collapse of the Soviet Union. Rejecting any simplistic notions of straightforward transfer of educational practices or beliefs, they draw on Bronfenbrenner's ecosystemic theory of human development to help illuminate the ways in which students, parents, and teachers have responded in varying degrees to the modernizing agenda of increased individualism and autonomy.

As many of the contributions illustrate, the parameters of the physical or intellectual space that may be conceived as western frequently vary—often as a consequence of the particular domain under consideration. In psychology, as in mass culture, the United States is almost wholly the central point of reference. In education, however, western European countries, with their strong colonial past, have equal, if not greater, salience. However, as new alliances form, the boundaries of economic communities shift, and political reframing (for example, recent references to Old Europe and New Europe) all subtly alter our perceptions, so will our understandings of what we mean by the term *western* change. Thus, it is interesting that Sara Harkness and colleagues include Poland in their study of teachers' ethnotheories in five western countries. Arguing that the notion of the western mind may hinder understandings of differing ideas and practices across the US and Europe, their article considers teachers' perceptions of the ideal student. A key finding is that, despite their differences, teachers in all the countries surveyed placed significant emphasis on social competence. This may not surprise those who work closely with teachers on a regular basis. However it is more akin to some of the non-western notions of intelligence and competence that are discussed in other papers in this volume than it is to the heavily cognitive orientation of most western formal educational theories.

Utilizing the notion of 'western' in its broadest sense, Ricardo Godoy and his team examine the potentially negative effects of that noted western invention, formal schooling, on traditional cultures. Noting that schooling may have a deleterious effect on aspects of traditional culture, such as knowledge of the local environment, social organization, ethos, and local language, these researchers focus on schooling's effect on social capital. Examining studies of industrialized nations, they suggest that existing estimates of the effect of schooling on social capital may be inflated by the various methodological procedures employed. Subsequently noting the paucity of related work in pre-industrial societies, they seek to address both this gap and prior methodological weaknesses by means of an examination of the effects of schooling on

social capital in the native Amazonian society of the Tsimane'. In discussing the weak relationships obtained, the authors suggest that both methods and circumstances play a part. In their concluding remarks, the authors suggest that the future for the Tsimane' may be marked by disparity of educational provision and, potentially, a degree of social dislocation.

In the concluding article of this volume, Elena Grigorenko discusses a number of ways in which non-western cultures have adopted and used western educational approaches. She provides illustrations of each category in her typology, briefly presenting the history of the category, detailing its modern state, and discussing selected aspects of the effectiveness of a particular educational system.

Thus, issues concerning the general and specific applicability and value of western educational approaches in non-western countries and societies are central to this volume. We are thankful to the contributors for their willingness to share with us and other readers their thoughts and observations on this topic. Finally, we hope that lessons learned from these accounts will prove valuable not only for the particular contexts under examination but also for educational theorizing and practice more generally.

Reference

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Culture, instruction, and assessment

Robert J. Sternberg

There are many lessons to be learned about optimal instruction and assessment by studying how they interact with cognition, in general, and intelligence, in particular, in diverse cultures. In this article, I describe some of what we have learned in our own cultural studies.

What is culture?

Because the topic of this article is culture, instruction, and assessment, it is important to define at the outset what is meant by culture.

There have been many definitions of culture (e.g., Kroeber & Kluckhohn, 1952; Brislin *et al.*, 1973). I define culture here as ‘the set of attitudes, values, beliefs and behaviors shared by a group of people, communicated from one generation to the next via language or some other means of communication (Barnouw, 1985)’ (Matsumoto, 1994, p. 4). The term *culture* can be used in many ways and has a long history (Boas, 1911; Mead, 1928; Benedict, 1946; see Matsumoto, 1996). Berry *et al.* (1992) described six uses of the term: descriptively to characterize a culture, historically to describe the traditions of a group, normatively to express rules and norms of a group, psychologically to emphasize how a group learns and solves problems,

structurally to emphasize the organizational elements of a culture, and genetically to describe cultural origins.

The theory motivating much of my colleagues' and my culturally-based work is the theory of successful intelligence (see Sternberg, 1985, 1997, 1999, for more details), which proposes its own definition of intelligence. I use the term *successful* intelligence to refer to the skills and knowledge needed for success in life, according to one's own definition of success, within one's sociocultural context. One acquires and utilizes these skills and this knowledge by capitalizing on strengths and by correcting or compensating for weaknesses; by adapting to, shaping, or selecting environments; through a balance of analytical, creative, and practical abilities.

Of course, there are many alternative theories of intelligence as well (e.g., Spearman, 1927; Thurstone, 1938; Cattell, 1971; Gardner, 1983; Carroll, 1993; Ceci, 1996), many of which are reviewed in Sternberg (1990, 2000). Some of these, such as Ceci's and Gardner's, are like the theory of successful intelligence in arguing for a broader conception of intelligence than typically has emerged from psychometric research. I do not claim that these theories are incapable of accounting for any or even many of my colleagues' and my results. I find the theory of successful intelligence particularly useful, however, because of its specification of a universal set of information-processing components complemented by culturally defined contexts in which these components are enacted.

Now, here are the lessons learned.

Lesson 1. The very act of assessing cognitive and educational performance affects that performance differentially across cultures

We tend to assume that an assessment is an assessment is an assessment. Not quite. The cultural meaning of an act of assessment can vary from one place to another. For example, Greenfield (1997) found that it means a different thing to take a test among Mayan children than it does among most children in the United States. The Mayan expectation is that collaboration is permissible, and that it is rather unnatural *not* to collaborate. Such a finding is consistent with the work of Markus and Kitayama (1991), suggesting different cultural constructions of the self in individualistic versus collectivistic cultures.

A study done in Tanzania (see Sternberg & Grigorenko, 1997, 2002; Sternberg *et al.*, 2002) points out the risks of giving tests, scoring them, and interpreting the results as measures of some latent intellectual ability or abilities. We administered to 358 school children between the ages of 11 and 13 years near Bagamoyo, Tanzania, tests including a form-board classification test (a sorting task), a linear syllogisms test, and a Twenty Questions Test ('Find a Figure'), which measure the kinds of skills required on conventional tests of intelligence. Of course, we obtained scores that we could analyse and evaluate, ranking the children in terms of their supposed general or other abilities. However, we administered the tests dynamically rather than statically (Vygotsky, 1978; Feuerstein, 1979; Brown & Ferrara, 1985; Lidz, 1991; Haywood &

Tzuriel, 1992; Guthke, 1993; Tzuriel, 1995; Grigorenko & Sternberg, 1998; Lidz & Elliott, 2000; Sternberg & Grigorenko, 2002).

Dynamic testing is like conventional static testing in that individuals are tested and inferences about their abilities made. But dynamic tests differ in that children are given some kind of feedback in order to help them improve their performance. Vygotsky (1978) suggested that the children's ability to profit from the guided instruction they received during the testing session could serve as a measure of children's zone of proximal development (ZPD), or the difference between their developed abilities and their latent capacities. In other words, testing and instruction are treated as being of one piece rather than as being distinct processes. This integration makes sense in terms of traditional definitions of intelligence as the ability to learn ('Intelligence and its measurement', 1921; Sternberg & Detterman, 1986). What a dynamic test does is directly measure processes of learning in the context of testing rather than measuring these processes indirectly as the product of past learning. Such measurement is especially important when not all children have had equal opportunities to learn in the past.

In the assessments, children were first given the ability tests. Experimental-group children were then given an intervention. Control-group children were not. The intervention consisted of a brief period of instruction in which children were able to learn skills that would potentially enable them to improve their scores. For example, in the twenty-questions tasks, children would be taught how a single true-false question could cut the space of possible correct solutions by half. Then all children—experimental and control—were tested again. Because the total time for instruction was less than an hour, one would not expect dramatic gains. Yet, on average, the gains from pre-test to post-test in the experimental group were statistically significant and significantly greater than those in the control group.

In the control group, the correlations between pre-test and post-test scores were generally at the .8 level. One would expect a high correlation because there was no intervention and hence the retesting was largely a measure of alternate-forms reliability. More importantly, scores on the pre-test in the experimental group showed only weak although significant correlations with scores on the post-test. These correlations, at about the .3 level (which were significantly less than those in the control group), suggested that when tests are administered statically to children in developing countries, they may be rather unstable and easily subject to influences of training. The reason could be that the children are not accustomed to taking western-style tests, and so profit quickly even from small amounts of instruction as to what is expected from them.

Of course, the more important question is not whether the scores changed or even correlated with each other, but rather, how they correlated with other cognitive measures. In other words, which test was a better predictor of transfer to other cognitive performances on tests of working memory, the pre-test score or the post-test score? We found the post-test score to be the better predictor of working memory in the experimental group. Children in the dynamic-testing group improved significantly more than those in the control group (who did not receive intervening dynamic instruction between pre- and post-tests).

In work in Jamaica (Sternberg *et al.*, 1997), we had failed to find effects of an anti-parasitic medication, albendazole, on cognitive functioning. Might this have been because the testing was static rather than dynamic? Static testing tends to emphasize skills developed in the past. Children who suffer from parasitic illnesses often do not have the same opportunities to profit from instruction and acquire skills that well children do. Dynamic testing emphasizes skills developed at the time of test. Indeed, the skills or knowledge are specifically taught at the time of test. Would dynamic testing show effects of medication (in this case, albendazole for hookworm and praziquantel for schistosomiasis) not shown by static testing?

The answer was yes. Over time, treated children showed an advantage over children who did not receive treatment, and were closer after time had passed to the control (uninfected) group than were the untreated children. In other words, conventional static tests of intelligence may fail fully to reveal children's intellectual potentials. Thus, when tests are modified in different environments, one may wish to modify not only their content, but the form in which they are administered, as we did in our dynamic testing.

Lesson 2. Individuals in different cultures may think about concepts and problems in different ways. The result is that teachers of one culture teaching students of another culture may not understand how their students think about concepts and problems

Nisbett (2003) has found that some cultures, especially Asian ones, tend to be more dialectical in their thinking, whereas other cultures, such as European and North American ones, tend to be more linear. And individuals in different cultures may construct concepts in quite different ways, rendering results of concept-formation or identification studies in a single culture suspect (Atran, 1999; Coley *et al.*, 1999; Medin & Atran, 1999). Thus, groups may think about what appears superficially to be the same phenomenon—whether a concept or the taking of a test—differently. What appear to be differences in general intelligence may in fact be differences in cultural properties (Helms-Lorenz *et al.*, 2003). Helms-Lorenz *et al.* (2003) have argued that measured differences in intellectual performance may result from differences in cultural complexity; but complexity of a culture is extremely hard to define, and what appears to be simple or complex from the point of view of one culture may appear differently from the point of view of another.

Lesson 3. Behaviour that is viewed as smart in one culture may be viewed as not so smart or even stupid in another

People in different cultures may have quite different ideas of what it means to be smart. One of the more interesting cross-cultural studies of intelligence was performed by Michael Cole and his colleagues (Cole *et al.*, 1971). They asked adult members of the Kpelle tribe in Africa to sort terms. In western culture, when adults are given a sorting task on an intelligence test, intelligent people will

typically sort hierarchically. For example, they may place names of different kinds of fish together, and then the word 'fish' over that, with the name 'animal' over 'fish' as well as 'birds', and so on. Less intelligent westerners will typically sort functionally. They might sort 'fish' with 'eat', for example, because we eat fish, or 'clothes' with 'wear', because we wear clothes. Members of the Kpelle tribe generally sorted functionally even after investigators tried indirectly to encourage them to sort hierarchically.

Finally, in desperation, one of the experimenters directly asked one of the Kpelle to show how a foolish person would do the task. When asked to sort in this way, the Kpelle had no trouble at all sorting hierarchically. He and the others had been able to sort this way all along. They just had not done so because they viewed it as foolish. Moreover, they probably considered the questioners rather unintelligent for asking such foolish questions. Why would they view functional sorting as intelligent? In ordinary life, we normally think functionally. When we think of a fish, we think of catching or eating it. When we think of clothes, we think of wearing them. However, in western schooling, we learn what is expected of us on tests. The Kpelle did not have western schooling. They had not been exposed to intelligence testing. As a result, they solved the problems the way western adults might do in their everyday lives but not on an intelligence test.

Thus, what North Americans might think of as sophisticated thinking—for example, sorting taxonomically (as in a robin being a kind of bird)—might be viewed as unsophisticated by the Kpelle, whose functional performance on sorting tasks corresponded to the demands of their everyday life (as in a robin flying). In a related fashion, Bruner *et al.* (1966) found that among members of the Wolof tribe of Senegal, increasingly greater western-style schooling was associated with greater use of taxonomic classification.

Lesson 4. Students do better on assessments when the material on which they are assessed is familiar and meaningful to them. But items on cognitive test batteries are differentially meaningful to individuals from different cultures

Cole's work built, in turn, upon earlier work, such as that of Luria (1931, 1976), which showed that Asian peasants in the Soviet Union might not perform well on cognitive tasks because of their refusal to accept the tasks as they were presented. Indeed, people in diverse cultures are presented with very diverse tasks in their lives. Gladwin (1970), studying the Puluwat who inhabit the Caroline Islands in the South Pacific, found that these individuals were able to master knowledge domains including wind and weather, ocean currents, and movements of the stars. They integrate this knowledge with mental maps of the islands to become navigators who are highly respected in their world.

In related work, Serpell (1979) designed a study to distinguish between a generalized perceptual-deficit hypothesis and a more context-specific hypothesis for why children in certain cultures may show inferior perceptual abilities. He found that English children did better on a drawing task, but that Zambian children did better

on a wire-shaping task. Thus, children performed better on materials that were more familiar to them from their own environments.

Wagner (1978) had Moroccan and North American individuals remember patterns of oriental rugs and others remember pictures of everyday objects, such as a rooster and a fish. There was no evidence of a difference in memory structure, but the evidence of a lack of difference depended precisely upon using tests that were appropriate to the cultural content of the individuals being studied. Moroccans, who have long experience in the rug trade, seemed to remember things in a different way from participants who did not have their skill in remembering rug patterns. In a related study, Kearins (1981) found that when asked to remember visuospatial displays, Anglo-Australians used verbal (school-appropriate) strategies whereas aboriginals used visual (desert nomad-appropriate) strategies.

Goodnow (1962) found that for tasks using combinations and permutations, Chinese children with English schooling performed as well as or better than Europeans, where children with Chinese schooling or of very low income families did somewhat worse than did the European children. These results suggested that form of schooling primes children to excel in certain ways and not others (see also Goodnow, 1969).

Children from non-European or non-North American cultures do not always do worse on tests. Super (1976) found evidence that African infants sit and walk earlier than do their counterparts in the United States and Europe. But Super also found that mothers in the African cultures he studied made a self-conscious effort to teach their babies to sit and walk as early as possible. At more advanced levels of development, Stigler *et al.* (1982; see also Stevenson & Stigler, 1994) found that Japanese and Chinese children do better in developed mathematical skills than do North American children.

Carraher *et al.* (1985) studied a group of children that is especially relevant for assessing intelligence as adaptation to the environment. The group was of Brazilian street children. Brazilian street children are under great contextual pressure to form a successful street business. If they do not, they risk death at the hands of so-called 'death squads', which may murder children who, unable to earn money, resort to robbing stores (or who are suspected of resorting to robbing stores). Hence, if they are not intelligent in the sense of adapting to their environment, they risk death. The investigators found that the same children who are able to do the mathematics needed to run their street businesses are often little able or unable to do school mathematics. In fact, the more abstracted and removed from real-world contexts the problems are in their form of presentation, the worse the children typically do on the problems. For children in school, the street context would be more removed from their lives. These results suggest that differences in context can have a powerful effect on performance. (See also Saxe, 1990; Ceci & Roazzi, 1994; Nuñez, 1994, for related work.)

Such differences are not limited to Brazilian street children. Lave (1988) showed that Berkeley housewives who successfully could do the mathematics needed for comparison-shopping in the supermarket were unable to do the same mathematics when they were placed in a classroom and given isomorphic problems presented in

an abstract form. In other words, their problem was not at the level of mental processes but at the level of applying the processes in specific environmental contexts.

In sum, a variety of researchers have done studies that suggest that how one tests abilities, competences, and expertise can have a major effect on how 'intelligent' students appear to be. Street children in Brazil, for example, need the same mathematical skills to solve problems involving discounts as do children in the United States about to take a high-stakes paper-and-pencil test of mathematical achievement. But the contexts in which they express these skills, and hence the contexts in which they can best display their knowledge on tests, are different. My colleagues and I have also done research suggesting that cultural context needs to be taken into account in testing for intelligence and its outcomes.

Lesson 5. Children may develop contextually important skills at the expense of academic ones. So they may have developed adaptive skills that matter in their environment, but that teachers do not view as part of 'intelligence'

Many times, investigations of intelligence conducted in settings outside the developed world can yield a picture of intelligence that is quite at variance with the picture one would obtain from studies conducted only in the developed world. In a study in Usege, Kenya, near the town of Kisumu, we were interested in school-age children's ability to adapt to their indigenous environment. We devised a test of practical intelligence for adaptation to the environment (see Sternberg & Grigorenko, 1997; Sternberg *et al.*, 2001). The test of practical intelligence measured children's informal tacit knowledge for natural herbal medicines that the villagers believe can be used to fight various types of infections. Tacit knowledge is, roughly speaking, what one needs to know to succeed in an environment, that is usually not explicitly taught, and that often is not even verbalized (Sternberg *et al.*, 2000). Children in the villages use their tacit knowledge of these medicines an average of once a week, in medicating themselves and others. More than 95% of the children suffer from parasitic illnesses. Thus, tests of how to use these medicines constitute effective measures of one aspect of practical intelligence as defined by the villagers as well as their life circumstances in their environmental contexts. Note that the processes of intelligence are not different in Kenya. Children must still recognize the existence of an illness, define what it is, devise a strategy to combat it, and so forth. But the content to which the processes are applied, and hence appropriate ways of testing these processes, may be quite different.

Middle-class westerners might find it quite a challenge to thrive or even survive in these contexts, or, for that matter, in the contexts of urban ghettos often not distant from their comfortable homes. For example, they would know how to use none of the natural herbal medicines to combat the diverse and abundant parasitic illnesses they might acquire in rural Kenya.

We measured the Kenyan children's ability to identify the medicines, where they come from, what they are used for, and how they are dosed. Based on work we had done elsewhere, we expected that scores on this test would not correlate with scores

on conventional tests of intelligence. In order to test this hypothesis, we also administered to the 85 children of the study the Raven Coloured Progressive Matrices Test (Raven *et al.*, 1992), which is a measure of fluid or abstract-reasoning-based abilities, as well as the Mill Hill Vocabulary Scale (Raven *et al.*, 1992), which is a measure of crystallized or formal-knowledge-based abilities. In addition, we gave the children a comparable test of vocabulary in their own Dholuo language. The Dholuo language is spoken in the home; English in the schools.

To our surprise, all correlations between the test of indigenous tacit knowledge and scores on fluid-ability and crystallized ability tests were *negative*. The correlations with the tests of crystallized abilities were significantly so. For example, the correlation of tacit knowledge with vocabulary (English and Dholuo combined) was $-.31$ ($p < .01$). In other words, the higher the children scored on the test of tacit knowledge, the lower they scored, on average, on the tests of crystallized abilities (vocabulary).

This surprising result can be interpreted in various ways, but based on the ethnographic observations of the anthropologists on the team, Prince and Geissler (see Prince & Geissler, 2001), we concluded that a plausible scenario takes into account the expectations of families for their children. Many children drop out of school before graduation, for financial or other reasons, and many families in the village do not particularly see the advantages of formal western schooling. There is no reason they should, as the children of many families will for the most part spend their lives farming or engaged in other occupations that make little or no use of western schooling. These families emphasize teaching their children the indigenous informal knowledge that will lead to successful adaptation in the environments in which they will really live. Children who spend their time learning the indigenous practical knowledge of the community may not always invest themselves heavily in doing well in school, whereas children who do well in school generally may invest themselves less heavily in learning the indigenous knowledge—hence the negative correlations.

The Kenya study suggests that the identification of a general factor of human intelligence may tell us more about how abilities interact with cultural patterns of schooling and society and especially western patterns of schooling and society than it does about the structure of human abilities. In western schooling, children typically study a variety of subject-matters from an early age and thus develop skills in a variety of skill areas. This kind of schooling prepares the children to take a test of intelligence, which typically measures skills in a variety of areas. Often intelligence tests measure skills that children were expected to acquire a few years before taking the intelligence test. But as Rogoff (1990, 2003) and others have noted, this pattern of schooling is not universal and has not even been common for much of the history of humankind. Throughout history and in many places still, schooling, especially for boys, takes the form of apprenticeships in which children learn a craft from an early age. They learn what they will need to know in order to succeed in a trade, but not a lot more. They are not simultaneously engaged in tasks that require the development of the particular blend of skills measured by conventional intelligence tests. Hence it is less likely that one would observe a general factor in their scores, much as we discovered in Kenya.

From the standpoint of an academic test, the rural Kenyan children would not look very bright. But, in fact, they had learned knowledge that was important in their own cultural context. A teacher might be inclined to 'write off' such children because of their underdeveloped academic skills, without appreciating that the children had developed other skills that were, arguably, more important for adaptation in their own cultural milieu. Ideally, the teacher would attempt to capitalize on what the children do know, using it as a starting point or scaffolding upon which other knowledge could be built. But certainly, the children could not be faulted for lacking learning skills. They merely had applied these skills to content other than that sanctioned by the schools.

Lesson 6. Children may have substantial practical skills that go unrecognized in academic tests

We have found related although certainly not identical results in a study we have done among Yup'ik Eskimo children in south-western Alaska (Grigorenko *et al.*, 2004). We assessed the importance of academic and practical intelligence in rural and semi-urban Alaskan communities.

This research was motivated by an observation we made while working both with the Eskimo children and with their teachers. The teachers made it clear that they considered the children not to be particularly bright. And indeed, in terms of the knowledge and skills emphasized in traditional schooling, the children did not fare well. But at the same time, the children had developed superior skills of other kinds. They possessed knowledge about hunting, fishing, gathering, herbal treatments of illnesses, and other topics that their teachers did not possess. For example, they could take a dog sled from their village to another village in the dead of winter and find their way. Their teachers, in contrast, if they tried to do the same in the dead of winter, would end up dead. They would not be able to discern the landmarks the children can use to find their way. They quickly would get lost. So the children had adaptive skills relevant to their own environments that the teachers did not have. But of course, it is the teachers whom society sanctions to do the evaluations, not the students.

A total of 261 children were rated for practical skills by adults or peers in the study: 69 in grade 9, 69 in grade 10, 45 in grade 11, and 37 in grade 12. Of these children, 145 were females (74 from the rural and 71 from the semi-urban communities) and 116 were males (62 were from the rural and 54 were from the semi-urban communities). We measured academic intelligence with conventional measures of fluid (the Cattell Culture Fair Test of *g*, Cattell & Cattell, 1973) and crystallized intelligence (the Mill-Hill Vocabulary Scale, Raven *et al.*, 1992). We measured practical intelligence with a test of tacit knowledge of skills (hunting, fishing, dealing with weather conditions, picking and preserving plants, and so on) as acquired in rural Alaskan Yup'ik communities (the Yup'ik Scale of Practical Intelligence, YSPI). The semi-urban children statistically significantly outperformed the rural children on the measure of crystallized intelligence, but the rural children statistically significantly outperformed the semi-urban children on the measure of the YSPI. The test of tacit

knowledge skills was superior to the tests of academic intelligence in predicting practical skills as evaluated by adults and peers of the rural children (for whom the test was created), but not of the semi-urban ones.

This study, like the Kenya study, suggests the importance of practical intellectual skills for predicting adaptation to everyday environments. Here, as in Kenya, the processes of intelligence do not differ from those in the environments in which most readers of this article live. The Eskimo children need, for example, to plan trips, just as you or I do. But the constraints of planning these trips, often by dog sled in environments with no landmarks you or I would recognize, are very different, and hence different tests are needed.

Lesson 7. Failure of children to thrive in school may reflect ill health, not lack of ability. Teachers need to know children's health status before assuming their performance reflects a lack of cognitive or educational skills

In interpreting educational outcomes, whether from developed or developing cultures, it is always important to take into account the physical health of the participants one is testing. In a study we did in Jamaica (Sternberg *et al.*, 1997), we found that Jamaican school children who suffered from parasitic illnesses (for the most part, whipworm or *Ascaris*) did more poorly on higher level cognitive tests (such as of working memory and reasoning) than did children who did not suffer from these illnesses, even after controlling for socio-economic status. The children with parasitic illnesses did better on fine-motor tasks, for reasons unknown to us.

Thus, many children were poor achievers not because they innately lacked abilities, but rather, because they lacked the good health necessary to develop and display such abilities. If you are moderately to seriously ill, you probably find it more difficult to concentrate on what you read or what you hear than if you are well. Children in developing countries are ill much, and even most, of the time. They simply cannot devote the same attentional and learning resources to schoolwork that well children have to devote. Here, as in Kenya, their health knowledge would be crucial for their adaptation to the environment. Testing that does not take into account health status is likely to give false impressions.

Lesson 8. Children may fail to do well in school not because they do not understand the material, but because they do not understand the instructions regarding what to do with the material

In our work in Zambia (Grigorenko *et al.*, 2003), we investigated following of instructions. Children in school and outside it continually need to be able to follow instructions. Often they are not successful in their endeavours because they do not follow instructions as to how to realize these endeavours. Following complex instructions is thus important for the children's success. A test of following instructions has dynamic elements, in that one learns the instructions at the time of test.