

Epistemological understanding and the development of intellectual values

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Abstract

We propose a concept of intellectual values as (a) shared within a group and defined by the extent to which intellectual engagement is regarded as worthwhile to the group's interests, (b) supported by an epistemological belief system, and (c) an important dimension of sociocultural practice and learning. A series of studies is described in which assessments of intellectual values and epistemological beliefs were found to show similar patterns of variation across cultural and subcultural groups of parents and children. Such groups may play a role in highlighting to their youth the intrinsic value of intellectual engagement (versus its instrumental value in achieving individual recognition and status). Intrinsically valued intellectual engagement, we suggest, provides the firmest basis for sustaining intellectual motivation through adolescence and into adulthood. Developing mature epistemological understanding, moreover, is key to this enterprise.

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1. Introduction

After a long period of orphan status, the study of epistemological understanding has finally shown signs of being assimilated into the mainstream of cognitive development research. Cognitive development research has focused increasingly on the origins of cognitive competencies in the early years of life. This fact, and a lack of obvious connection

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to other developing competencies, perhaps explains the failure of epistemological understanding to attract the attention of more than a handful of researchers. A further reason may have been the complexity of the coding schemes developed by the pioneers in the study of the topic (King and Kitchener, 1994; Perry, 1970). Like the moral development coding systems of Kohlberg and his colleagues that they resembled, these schemes are likely to have intimidated researchers seeking a simple measure of the construct that could be used in studies relating it to other aspects of cognitive or social development. Yet another reason, we propose, has been the lack of a clear sense of the mechanism responsible for progression through the proposed sequence of multifaceted stages. What holds each stage together as an integrated whole and how and why does movement through such a sequence occur?

In the last several years, this picture has changed dramatically, stimulated to a significant degree by the review article and volume published by Hofer and Pintrich (1997, 2002). We now find the development of epistemological understanding studied by a much broader group of researchers who employ a range of different methodologies over a wide age range. There have been three important outcomes of this work. The most important has been a broad convergence across different research groups as to what is developing. The second has been the effort to anchor this development in a context of the other dimensions of cognitive development taking place before and during the evolution of epistemological understanding. The third has been the effort to examine the implications of developing epistemological understanding.

1.1. *What develops and how?*

In our work we have characterized the underlying thrust of developing epistemological understanding as an effort to coordinate the subjective and objective aspects of knowing (Kuhn, Cheney, & Weinstock, 2000). This conceptualization links the development of epistemological understanding to the theory of mind developments that occur in early childhood. Preschool age children are *realists*. They regard what one knows as an immediate reading of what's out there. Knowledge is received directly from the external world, rather than constructed by the knower. Hence, it is a faithful copy of reality. There are no inaccurate renderings of events, nor any possibility of conflicting beliefs, since everyone is perceiving the same external reality.

Not until about age 4 does a subjective knower begin to emerge in conceptions of knowing and knowledge. Children become aware that a knower's mental representations of the known are products of the human mind that do not necessarily duplicate external reality (Perner, 1991; Wellman, 1988). Before children achieve this recognition of the possibility of divergent, inaccurate beliefs, they are unwilling to attribute to another person a belief that they themselves know to be false. Once they attain this understanding, the knower comes to life. The products of knowing, however, are still more firmly attached to the known object than to the knower. Hence, while inadequate or incorrect information can produce false beliefs, these are seen as easily correctable by reference to an external reality—the known object. If you and I disagree, one of us is right and one is wrong and resolving the matter is simply a matter of locating the facts that will show which is which. At this *absolutist* level of epistemological understanding (Hofer & Pintrich, 1997; Kuhn et al., 2000), then, knowledge is an accumulating body of certain facts (Table 1). Critical thinking is unnecessary because truth is readily discernable.

Table 1
Levels of Epistemological understanding

Level	Assertions	Knowledge	Critical Thinking
Realist	Assertions are <i>Copies</i> of an external reality.	Knowledge comes from an external source and is certain.	Critical thinking is unnecessary.
Absolutist	Assertions are <i>Facts</i> that are correct or incorrect in their representation of reality.	Knowledge comes from an external source and is certain but not directly accessible, producing false beliefs.	Critical thinking is a vehicle for comparing assertions to reality and determining their truth or falsehood.
Multiplist	Assertions are <i>Opinions</i> freely chosen by and accountable only to their owners.	Knowledge is generated by human minds and therefore uncertain.	Critical thinking is irrelevant.
Evaluativist	Assertions are <i>Judgments</i> that can be evaluated and compared according to criteria of argument and evidence.	Knowledge is generated by human minds and is uncertain but susceptible to evaluation.	Critical thinking is valued as a vehicle that promotes sound assertions and enhances understanding.

Further progress in epistemological understanding can be seen as an extended task of coordinating the subjective with the objective elements of knowing (Kuhn et al., 2000). At the realist and absolutist levels, the objective dominates. By adolescence typically comes the likelihood of a radical change in epistemological understanding. In a word, everyone now becomes right. The discovery that reasonable people—even experts—disagree is the likely source of recognizing the uncertain, subjective aspect of knowing. This recognition initially assumes such proportions, however, that it eclipses recognition of any objective standard that could serve as a basis for evaluating conflicting claims. Adolescents typically fall into “a poisoned well of doubt” (Chandler, 2003), and they fall hard and deep. At this *multiplist* (or *relativist*) level of epistemological understanding, knowledge consists not of facts but of opinions, freely chosen by their holders as personal possessions and accordingly not open to challenge (Hofer & Pintrich, 1997). Knowledge is now clearly seen as emanating from knowers, rather than the known, but at the significant cost of any discriminability among competing knowledge claims (Kuhn et al., 2000). Indeed, this lack of discriminability is equated with tolerance: Because everyone has a right to their opinion, all opinions are equally right. That ubiquitous slogan of adolescence—“whatever”—holds sway, leaving critical thinking as irrelevant as it was at the earlier absolutist level.

Evidence suggests that hoisting oneself out of the “whatever” well of multiplicity and indiscriminability is achieved at much greater effort than the quick and easy fall into its depths (Chandler & Lalonde, 2003). The “whatever” stance of adolescence is commonplace and intellectually undemanding, but the same cannot be said of the next level of epistemological understanding. By adulthood, many, though by no means all, adolescents will have reintegrated the objective dimension of knowing and achieved the understanding that while everyone has a right to their opinion, some opinions are in fact better than others, to the extent they are better supported by argument and evidence. Justification for a belief becomes more than personal preference. “Whatever” is no longer the automatic response to any assertion—there are now legitimate discriminations and choices to be

made. Rather than facts or opinions, knowledge at this *evaluativist* level of epistemological understanding consists of judgments, which require support in a framework of alternatives, evidence, and argument (Hofer & Pintrich, 1997; Kuhn et al., 2000).

The preceding characterization leaves out many of the nuances of people's thinking about epistemological matters, but it gives us an overall idea of what is developing and why, and toward what end. Beyond the nature of the progression itself, a question that has been frequently asked about epistemological development is whether it is a singular evolution or is specific to different knowledge domains (Hofer & Pintrich, 2002). In our research (Kuhn et al., 2000), we investigated this question by comparing epistemological thinking in judgments of personal taste (e.g., whether the stew is spicy), aesthetic judgments (e.g., whether one painting is better than another), value judgments (e.g., whether lying is wrong), and social (e.g., how children learn language) and physical (e.g., what atoms are made of) truth judgments. Since progression from absolutist to multiplist thinking requires the integration of a subjective component of knowing, we reasoned, this should be easiest to achieve in the domains of personal taste, aesthetic, or value judgments and more difficult with respect to judgments of truth. Progression from the multiplist to the evaluativist level, in contrast, requires the reintegration of an objective component of knowing, and this should be easiest to achieve with respect to truth judgments and more difficult with respect to aesthetic, personal taste, or value judgments. These predictions were largely borne out in a sample that included fifth to 12th graders and several different adult groups. Participants were most likely to have made the transition to multiplist thought in the domains of personal taste or aesthetic judgments. The transition to evaluativist thought, in contrast, was most readily achieved in the domain of truth judgments. Value judgments proved intermediate in difficulty for most participants, and aesthetic judgments most difficult. Some, however, found value judgments the consistently most difficult domain, both in which to relinquish absolutist thinking in favor of a multiplist stance, and, if relinquished, in which to reintegrate the objective component needed to achieve evaluativist thinking.

1.2. *Epistemology and values*

In the present article, we turn to the critical question of what difference epistemological thinking makes. If it reflects no more than people's naïve conceptions of esoteric matters in the field of philosophy, these conceptions are perhaps of little relevance and the topic does not warrant a place in the mainstream of cognitive development research. Here, we take a strong position to the contrary, arguing that epistemological understanding is an essential foundation for the development of intellectual values, as well as certain key intellectual skills. In earlier research (Kuhn, 1991), we identified a relation between level of epistemological understanding and skills of argument. In the present work, we focus on intellectual values, as a key dispositional construct. Dispositional constructs (Perkins, Jay, & Tishman, 1993; Stanovich, 1999) are critical in determining the extent to which intellectual skills are in fact used. We begin by describing what we mean by intellectual values, how we have undertaken to assess this construct, and the connection we see between it and epistemological thinking.

With academic motivation labeled as “a problem for the 21st century” (Hidi & Harackiewicz, 2000), the questions of how and why people become intellectually engaged are of more than passing interest. Despite the extensive study of motivation in psychology,

it remains a problematic construct, and explaining intellectual motivation is not straightforward. We can say that individuals find intellectual activities affectively rewarding (“enjoyable”) due to their association with external reinforcers or due to intrinsic motivation that renders them pleasurable in their own right. These explanations are compatible with a construct such as “need for cognition” (Cacioppo, Petty, Feinstein, & Jarvis, 1996). Incorporating a cognitive dimension leads to a recasting of intellectual motivation as intellectual values, with values understood to have both cognitive and affective components (Maio & Olson, 1998). Cognitive aspects that researchers have examined include beliefs about the self in relation to intellectual activity, such as one’s perceived competence and whether it is changeable (Dweck & Leggett, 1988), or whether an intellectual activity will help to meet one’s goals.

Here we explore another approach to intellectual values. Intellectual values are supported by a cognitive belief system, we claim, but they are not simply attributes of individuals, having the potential to predict and explain individual behavior. Intellectual values are embedded in cultural meaning systems and refer to the perceived value of intellectual activity to a cultural group as a whole. Value, in other words, exists at a group level and derives from a shared conception of the activity as worthwhile to the well-being or advancement of the group, rather than existing only at the individual level and associated with fulfillment of an individual’s needs or goals.

As demonstrated strikingly in work by Nisbett and his colleagues (Nisbett, Peng, Choi, & Norenzayan, 2001), meaning-making may differ across cultural groups in more fundamental ways than we have imagined. The variation in conceptions of intelligence observed across cultural groups (Dasen, 1984; Gill & Keats, 1980; [Serpell, 1977; Sternberg, Conway, Ketron, & Bernstein, 1981) suggests that the value attributed to intellectual activities may also differ across cultural and subcultural groups. Sociocultural approaches (Rogoff, 1998; Super & Harkness, 1986) have been instrumental in heightening awareness of cognitive activities as social practices acquired within a community in which one participates. Social appropriation processes encompass beliefs and values, as well as practices (Goodnow, 1990; Resnick & Nelson-Le Gall, 1997), all of which may be transmitted across generations within a cultural or subcultural group. Our conception of intellectual values as shared within a group makes the intergenerational transmission of intellectual values more likely than it would be if such values were solely attributes of individuals. It also suggests an approach to defining intellectual values as the extent to which members of a cultural group regard collaborative intellectual engagement as intrinsically worthwhile to its collective well-being or advancement. It is this approach that is pursued here.

How is developing epistemological understanding relevant to the valuing of intellectual activity? Hofer and Pintrich (1997) and Pintrich (2002) suggest that an individual’s epistemological beliefs function as implicit theories that lead to personal goals and guide self-regulatory cognition and behavior. Here we explore a similar connection but at the level of group beliefs and values. Are there differences in epistemological beliefs across groups that correspond to differences in the intellectual values characteristic of these groups? We predict such associations for the reason that the lower levels of epistemological understanding do not provide the rational base needed for sustained intellectual engagement (see Table 1). If facts can be ascertained with certainty and are readily available to anyone who seeks them, as the absolutist understands, or, alternatively, if any claim is as valid as any other, as the multiplist understands, there is little point in

expending the intellectual effort that the debate of claims entails. It is only at the evaluativist level that justification and debate of claims becomes a worthwhile enterprise. The evaluativist understands that it is the investment entailed in intellectual debate that provides the soundest basis for choosing between competing claims. This aspect of evaluativist epistemology leads us to hypothesize it as a critical underpinning of the development of intellectual values.

We did a preliminary study, which we briefly summarize, suggesting that American subcultural groups differ in intellectual values and that these differences are transmitted across generations. In the main study described here, we examine these differences more deeply by expanding our assessment and the populations assessed, including going back to the original cultures to determine if similar differences are evident there.

2. Preliminary study

Participants in the preliminary study (Kuhn, Clark, & Huang, 2000) were middle school and high school students and their mothers in three subcultures in the Northeastern USA: one suburban upper-middle class Caucasian and two middle class urban Asian-American (Chinese-American and Korean-American). (Number of mothers in each group was 20 or 21, with one to three children of each mother participating.) Asian-American mothers were immigrants (with an average 15 years residence in the USA). Most Asian-American mothers chose to be interviewed in their native languages. All participants completed an assessment of epistemological beliefs (Kuhn et al., 2000) and three parallel questions about intellectual values, of which this is one:

Many social issues, like the death penalty, gun control, or medical care, are pretty much matters of personal opinion, and there is no basis for saying that one person's opinion is any better than another's. So there's not much point in people having discussions about these kinds of issues. Do you strongly agree, sort of agree, or disagree? (If disagree) What do you think?

Topics of the two remaining parallel items that together constituted the intellectual values measure were political candidates (suggested to be not worth discussing because choices are a matter of personal preference) and world peace (suggested to be not worth discussing because the problem is too difficult to solve).

Consistent with our conceptualization of the essence of developing epistemological understanding as the coordination of objective and subjective dimensions of knowing, the instrument used to assess epistemological understanding was the one designed by Kuhn et al. (2000) to focus on what we propose to be the key elements in achieving this coordination for each of the transitions (from absolutist to multiplist and from multiplist to evaluativist) examined. To assess the transition from absolutist to multiplist, two contrasting claims within a particular knowledge domain are presented (e.g., Robin thinks one book's explanation of why the Crimean wars began is right; Chris thinks another book's explanation of why the Crimean wars began is right") and the individual is asked whether only one could be right or whether "both could have some rightness," with the first option taken as indicating an absolutist level of epistemological understanding. To assess the transition from multiplist to evaluativist (given the second option is chosen in response to the initial question), the individual is asked whether one judgment might be regarded as having any more merit than another.

Table 2
Percentages of preliminary samples

	Caucasian-American	Chinese-American	Korean-American
<i>(a) Consistently endorsing discussion (all three items) on the intellectual values measure, by subculture</i>			
Mothers	65	09	00
Children	47	20	30
<i>(b) Exhibiting predominantly evaluativist epistemological beliefs, by subculture</i>			
Mothers	90	19	45
Children	60	36	54

The resulting simplicity of the instrument, while sacrificing examination of many of the nuances and range of thinking about epistemological issues, has the practical advantage of making it feasible to assess epistemological understanding across multiple kinds of judgments and content. In addition, its simplicity makes it more appropriate for children than the long and complex interview format in which epistemological thinking has typically been assessed. More fundamentally, however, it offers the theoretical benefit of conceptual (as well as empirical) clarity as to what is being alleged to develop. Details of patterns of response and consistency across content domains are reported by Kuhn et al. (2000). In addition, they report good consistency between this measure and a longer, interview-based assessment, the Livia task (Kuhn, Pennington, & Leadbeater, 1983; Leadbeater & Kuhn, 1989) not suitable for younger participants.

As seen in Tables 2a and b, considerable subcultural variation is evident in the epistemological understanding measure and in the intellectual values measure, with patterns similar for each and with children's variation similar in pattern but less pronounced than that of mothers. Children's data are collapsed across the two age groups as differences were small and nonsignificant. Variation across the three items that constitute the values measure was low, although somewhat greater in the adult groups; in the Caucasian group, for example the percentage of mothers endorsing each of the three items ranged from 70% to 100%; for children the range was 67–93%.

We postpone discussion until we have described Study 1, which was conducted in an attempt to corroborate the patterns suggested by the preliminary study. For the main study we extended our assessment of intellectual values, adding a second measure. Also, we reasoned that the patterns that emerged in immigrant samples would likely be more pronounced if we went back to the original cultures. The main study therefore includes a native Korean sample and a native Japanese sample (to examine generality across Asian cultures), as well as an expanded Caucasian American sample. We also included fathers where possible.

3. Study 1

3.1. Method

3.1.1. Participants

Caucasian American sample: In an effort to broaden this group beyond one specific community, a sample from a second community was added to a sample of new participants

from the population drawn from in the preliminary study. The original population is an upper-middle class Caucasian community in a near suburb of New York City that contains one of the premier public schools in the nation. It is a community in which parents and children enjoy substantial economic advantage, parents are highly educated (most have postgraduate training) and heavily invested in their children's education, and expectation and achievement levels are exceptionally high. Families are mostly Protestant and some Catholic, with very few other ethnic or religious groups represented. The second population is a similar community in suburban New Jersey, again with an excellent public school system and high achievement on the part of parents and children. The major difference is that the predominant religious faith is Jewish. Responses of the two groups were found to be very similar and results are therefore reported for the combined group. The total sample consisted of 27 high school and 25 middle school students and their 35 mothers and 21 fathers (59% of parents came from the first community and 41% from the second). As reflected in these numbers, not all fathers were available, and some families had multiple children. Boys and girls were equally represented in each of the student age groups.

Korean sample: Participants were 41 middle and 41 high school students and their mothers and fathers from an upper-middle class community near Seoul, Korea. The school was selective and served the most academically able segment of the population, with most graduates going on to college. Families were largely upper-middle class, with fathers employed in professional occupations.

Japanese sample: Participants were 71 tenth grade girls from a private girls' high school outside of Tokyo and their mothers. The school was ranked in the top 20% of Japanese high schools, with 90% of its graduates going on to college. Families were upper-middle class, with family incomes in the top 20% nationally. Roughly 85% of the mothers had college education, though few were employed at the time. The sample was thus roughly equivalent in socioeconomic and educational background to the Korean and American samples.

3.1.2. Instruments

A paper-and-pencil instrument was administered, after being translated into the appropriate languages and back-translated to insure accuracy. The instrument included three major parts. Each participant independently completed all three parts. Part 1 consisted of the previously described intellectual values measure from the preliminary study. Part 2 consisted of the epistemological understanding measure administered in the preliminary study. Part 3 consisted of a new intellectual values measure designed to assess the same construct as the one assessed in Part 1. The first item presented in Part 3 was as follows (with names changed to culturally appropriate, gender neutral ones for each sample):

Pat, Lee, and Chris disagree. In general, would it be best if they

- a. Don't discuss their views, and agree to disagree
- b. Reach agreement by letting the majority rule
- c. Talk it over to try to understand each other's views
- d. Talk to other people to find out their views
- e. Talk to an expert

The respondent was asked to explain his or her choice, as well as to select the second best option and the least desirable option. The respondent then turned to a new page which began, “You may have found it hard to make a choice without knowing what Pat, Lee, and Chris disagree about,” followed by six more specific issues on which there was alleged to be disagreement, with the same set of options regarding each. These issues, covering the range from factual to value to personal taste, were whether food additives affect health, how children learn language, which candidate to vote for, whether lying is permissible in certain circumstances, which author’s novel is better, and what food is best for a picnic.

3.2. Results

Results across the three cultures are summarized in Tables 3a–c: Table 3a for the original values measure (employed in the preliminary study), Table 3b for the second values measure, and Table 3c for epistemological beliefs. Regarding the first values measure (Table 3a), reasons offered for disagreement with the statement (and hence valuing of discussion) were similar and referred to values of discussion in enhancing individual and/or collective understanding, solving problems, and/or resolving conflicts. Reasons offered for agreement with the statement tended to be of two types. The following response by one participant is typical: “It’s not worth it to discuss it because you’re not going to get anywhere; everyone has a right to think what they want to.” Others took a position like this participant: “It’s not worth it to discuss it because it’s not something you can get a definite answer to.”

Regarding the second values measure (Table 3b), participants who did not choose the middle alternative (discussion) were most likely to choose appeal to an expert. Other choices were infrequent. Across the six specific items, this choice was more likely (in all groups) for the physical science (food additives) and social science (how children learn language) items than any of the other four items (for which it was about equal). Regarding the epistemological measure (Table 3c), responses not in the evaluativist category were a mixture of absolutist and multiplist and varied across the domains represented in the different items, consistent with previous work (Kuhn et al., 2000). Responses were most

Table 3
Results across three cultures

	Caucasian-American	Korean	Japanese
<i>(a) Percentages of sample consistently endorsing discussion (all three items) by culture</i>			
Parents	77	08	38
High School	52	10	13
Middle School	40	13	—
<i>(b) Mean number of items (of seven) for which discussion is the chosen option by culture</i>			
Parents	5.00	2.34	2.87
High School	5.04	1.78	2.66
Middle School	4.28	1.88	—
<i>(c) Percentages of sample exhibiting predominantly evaluativist beliefs, by culture</i>			
Parents	82	40	12
High School	70	24	19
Middle School	60	17	—

likely to remain at the absolutist level in the domains of physical knowledge and values and were more likely to remain absolutist among younger participants.

Because the American and Korean samples included both genders, as well as parents of both genders, we were able to examine results by gender. Gender differences did not emerge, however, in either parent or child generations. Among the large sample of Korean parents, for example, results for mother and fathers were within two percentage points of one another on every measure.

These findings indicate that intellectual values, and the beliefs that support them, vary significantly across individuals and groups. The differences that appear across cultural groups, and the relations between parents' and children's responses within groups, support the validity of our measures and suggest the importance of examining values, and specifically intellectual values, as a central, although not immediately visible, dimension of sociocultural practice and learning (Goodnow, 1990; Rogoff, 1998). The process of intergenerational value transmission may be particularly important to examine in the intellectual domain, where parents are less likely to verbally communicate the explicit standards they do in the domain of social behavior.

Moreover, attainment of an evaluativist level of epistemological thought and the valuing of intellectual engagement show very similar patterns of variation across subcultural and cultural groups, supporting the claim that they are connected. Also, both dimensions appear subject to some degree of intergenerational transmission. Patterns of variation across parent groups are replicated across the child groups. Although further development toward an evaluativist level of epistemological understanding (and possibly toward intellectual valuing as well) can be expected among the child age range sampled, note that children's levels remain below those of the parents in the Asian samples in the main study. In the Asian-American samples, in contrast, children have moved beyond their parents' levels in the direction of the levels shown by the Caucasian-American sample. This pattern of results suggests that parents do matter in transmitting values to their children, but, at the same time, that children to a significant degree construct these values anew in a context of their peer culture, especially when the values of the culture outside the home deviate from those within the home.

4. Study 2

4.1. Method

The data that have been described here are consistent with the claim that mature epistemological understanding supports the development of intellectual values within social groups. They do so, however, by comparing patterns across different groups, rather than examining individuals within a group. Each of the groups examined has been homogenous with respect to the dimensions of interest to an extent that precludes examining within-group associations due to the limited variance within any group.

For this reason, we sought a population in which group members were of heterogeneous backgrounds. We found such a sample in a Parochial girls' high school in Queens, New York, which serves a population of ethnically, socioeconomically, and academically diverse students.

A total of 23 students from this school, and one parent of each of these students (usually the mother), were assessed, using the same measure of epistemological understanding and

the first of the two measures of intellectual values described earlier. The students' ethnic backgrounds included White, African-American, Hispanic, Chinese, Filipino, and Indian, with no group representing a majority. The school offered Advanced Placement courses and served a college bound population as well as students who were bound for community colleges or vocational specialties.

4.2. Results and Discussion

Students and parents performed at about the same level on the original intellectual values measure, with 39% of the students and 35% of the parents showing consistent endorsement of discussion (all three items). They also performed similarly on the epistemology measure, with 43% showing predominantly evaluativist thinking.

The major question of interest with respect to this sample is the relation between the two measures, and here the results indicate only a very modest relationship examined at the group level and no relationship at the individual level. Examining the 46 participants as a whole (parents and children combined), an association appears between the attainment of predominantly evaluativist thinking and consistent endorsement of discussion. Of the predominantly evaluativists, 45% show consistent endorsement of discussion. Of the remaining participants, who showed predominantly absolutist or multiplist epistemological thinking, 27% showed consistent endorsement of discussion. All of these 27% had attained at least multiplist thinking—none of the six participants who remained at the absolutist level showed consistent endorsement of discussion.

At the individual level, however, of parent–child pairs, no association appeared between the performance of parents and performance of their children for either measure, as would be expected according to an intergenerational transmission model. Cross-tabulations of parents' and their children's levels indicated no association for level of epistemological thinking and similarly no association for the intellectual values measure. Thus, the intellectual exchange that occurs, to a greater or lesser extent, within a family's interaction does not appear to explain the development of intellectual values on the part of younger family members. This negative conclusion suggests the possibility that it is at the level of the group or subculture, rather than the nuclear family, that these mechanisms may be identified. We explore these issues further in the general discussion of this research.

5. Developmental and educational implications

The lack of intergenerational associations in Study 2 suggests that in a diverse environment, adolescents' development of epistemological understanding and their development of intellectual values are mediated by more than family influence. At the broader level of cultural and subcultural groups, however, the hypothesis of intergenerational transmission, at the group level that we proposed at the outset, receives support. Comparison of the Asian and Asian-American samples in the studies described earlier is illuminating in this respect. Children's levels remain below those of the parents in the Asian samples. In the Asian-American samples, in contrast, children have moved beyond their parents' levels in the direction of the levels of their new culture.

Exactly how to interpret differences across cultures is less clear. The importance Asians attribute to academic achievement is well known (Okagaki & Frensch, 1998). Moreover,

although cultural belief and value systems must be understood as highly complex (Li & Fischer, 2004), Asians are well known for their collectivist, rather than individual, values (Nisbett, 2003). Why, then, would they not value collaborative engagement directed to the solution of problems and the enhancement of collective well-being?

One possible path to resolution of this paradox lies in integrating the characteristics noted with another dimension frequently associated with the Asian personality—a desire to avoid hostility and maintain harmony. Herein may lie a clue to the puzzle of the Asian identity, specifically with respect to the high value placed on intellectual achievement. Collaborative cognition is a recognized path to intellectual advancement. Yet the attempt to identify and coordinate disparate viewpoints that is a part of collaborative intellectual engagement comes with what may be a high cost from the Asian perspective—the risk of at least temporary sacrifice of agreement and harmony.

Correspondingly, Asian parents' high academic expectations for their children tend to be focused on individual achievement of academic credentials. The achievement levels of Asian students attest to the impact of these family values. Asian-American parents, compared to European-American and, Hispanic-American parents, are the only group whose expectations are that their children will obtain graduate degrees (Okagaki & Frensch, 1998). Yet, there is arguably a downside to the high levels of academic motivation that result. The drawback is that the relation between investment and outcome is an instrumental, rather than an intrinsic, one. Means and end bear only an arbitrary connection. No intrinsic connection exists between activity and outcome. The value of intellectual activity, then, derives solely from its role in a means-end relationship that is arbitrary. Here lies the downside. Once an activity becomes identified as merely a means to an end, it becomes easy to devalue it as without significance in its own right. One undertakes it because it produces some totally different dividend that is valued. Should the young person become skeptical of this connection, the activity immediately loses its purpose.

The value of an intrinsically valued activity, in contrast, lies in the activity itself. The benefits of the activity emanate directly from it. One engages in it because it is experienced as valuable in its own right. Continued commitment to the activity becomes likely. It is not dependent on external maintenance of a relation between the activity and some independently valued outcome. For this reason, it can be argued, the development of intrinsic valuing of intellectual activities stands to provide the firmest basis for sustaining intellectual motivation through childhood and adolescence and into adulthood.

Educators in Asian countries have begun to raise concerns about their educational systems that are consistent with these considerations (Rothstein, 2001). A major goal of a \$12.8 billion school reform in Korea is to “train instructors to teach more creatively and to encourage discussion” (Ihlwan, 2001). In the 1999 TIMSS international comparison of math and science achievement, eighth-grade students in Japan and Korea ranked near the top in mathematics. When asked if they felt math was important and if they would like to do work that involved it, however, students from these two countries showed the lowest proportion of affirmative answers (about 10%) of 38 participating countries (with Americans, at about 33%, in the middle). Thus, parents may desire high educational achievement for their children and be willing to make great sacrifice toward this end, but their valuing of it for the status and rewards it is perceived to bring, rather than for its intrinsic value, has a cost. The children who internalize these ambitions may not fully appreciate the intrinsic value of their endeavors.

To the extent this is so, it becomes important to support children's developing understanding of the value of intellectual engagement, not simply as a means to personal advancement but as an intrinsically valuable activity in its own right. In addition to a supportive social context, the cognitive, and specifically epistemological, foundation that supports development of this value is critical. The supportive social context is achieved by providing children of all cultural backgrounds with experiences that demonstrate that intellectual engagement and debate can enhance understanding, improve decisions, and solve problems. Elsewhere (Kuhn, 2005), one of us spells out in more detail the proposal that from an early age students must be involved in the kinds of intellectual activities (notably inquiry and argument) whose value and power become self-evident as they are engaged. Much of what students do in schools today simply does not have this quality. We thus sacrifice a brief window of opportunity in children's lives to gain (or lose) their trust that the things we ask them to do in school are worth doing.

At the broadest level, the cross-cultural findings described here imply that educational reform efforts, in all cultures, stand to enhance their potential by attending to students' intellectual values, as well as their intellectual skills. We have attempted to make the case here that epistemological understanding is a key construct in this enterprise. In the absence of sufficient development of epistemological understanding, students are unlikely to be willing to invest the effort that sustained intellectual engagement entails. Our other major point has been that epistemological understanding and intellectual values are not constructs located primarily at the individual level. Rather, they are constructs that have social and cultural meaning. It is in this social cultural context that they are experienced and in this context that they must be examined and understood.

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