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**Global Change as Contextual
Collaborative Knowledge Creation**

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Paper prepared for the Symposium on "The Organizational Dimensions of Global Change: Ushering in a New Era of Organization and Management Scholarship," OMT and OD Divisions, Academy of Management Meeting, Dallas, TX, August, 1994

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Abstract

The domain of international technology transfer studies has concerned itself with issues of global change for several years. However, the traditional models of transfer may be inadequate to represent the complexities involved in effective global change since they rely on an 'objectivist' conception of knowledge, that views knowledge as an objective commodity to be transmitted from source to receiver. We argue for a different set of assumptions about the nature of knowledge to guide global change- that knowledge is subjectively constructed and subjectively consumed; knowledge requires contextual modification to be adopted in the new context; and that effective contextual adaptation warrants a creative synthesis of different meaning systems to produce new knowledge. These alternate set of assumptions suggest that global change can be best viewed as a process of contextual collaborative knowledge creation achieved through mutual perspective taking.

Introduction

Until very recently in history people have responded to global change phenomena as if they were local and linear; that they did not require any transboundary learning, organizing or action (Cooperrider & Bilimoria, 1993).

A good illustration of this line of thought is reflected in the domain of international technology transfer studies, a discipline that has concerned itself with issues of global change over the past 30 years by seeking to transfer knowledge and innovations both technical and social from developed to developing countries. Examples include studies of diffusion of agricultural innovations (Rogers, 1983; Howes, 1980), birth control methods (Jacobson, 1988), disease control and eradication programs such as smallpox (Fenner et al., 1988) and poliomyelitis (Wright et al., 1991), and social technologies such as MBO (Hofstede, 1980).

Traditionally international technology transfer has operated under the predominant assumption that effecting change is primarily an issue of knowledge transmission from the expert source to the non-expert receiver (Tenkasi & Mohrman, forthcoming). If there were difficulties (or impedance) with the transmission then it was regarded as a problem of non-understanding by the user that can be remedied by better channel management (Reddy, 1979, and/or strategies such as guidance by an expert (Rogers & Kincaid, 1981; Williams & Gibson, 1990) to put this transferred knowledge to effective use in the recipient settings.

The stance that we take in this paper is that this 'knowledge transmission' model may be inadequate to facilitate the required alterations in environmental and human systems necessary to foster global change. This is particularly the case with technologies that directly intervene into human systems. However, it has been observed that even so called 'pure' technologies are not value-neutral (Moore, 1980). Instead we posit that global change may be best viewed as a process of 'contextual-collaborative' knowledge creation between different communities of knowing achieved through mutual learning.

The rest of the paper is organized in the following manner. We briefly review the traditional knowledge transmission models of change; point out the implicit assumptions underlying these traditions that rely on an objectivist conception of the nature of knowledge; propose an alternate set of assumptions that underscore the contextual and social nature of knowledge and provide the rationale for looking at change as a process of 'contextual collaborative knowledge creation'; locate mutual perspective taking as the basis of such collaborative learning; examine potential issues around mutual perspective taking; and conclude by discussing some ways of facilitating such learning.

Traditional models of Knowledge transmission

The conventional models of knowledge transmission for change in international technology transfer ventures can be classified into three major approaches; the 'appropriability model', the 'dissemination model' and the currently popular 'knowledge utilization' model (Williams & Gibson, 1990).

The appropriability model follows the logic that good knowledge as embodied in good technologies sell themselves since they appeal to the rational self-interests of the users. Once the researcher develops the right idea and makes the results available through various forms of mediated communication people will automatically accept it and therefore purposive transfer mechanisms are unnecessary (Kozmetsky, 1990). A classic example of the appropriability model is evident in the early attempts at controlling the third world population explosion (Waldrop, 1992). The standard approach at that time tended to place a heavy reliance on economic determinism. In order to achieve it's optimum population, all a country had to do was give its people the right economic incentives to control their reproduction, and they would automatically follow their own rational self-interest. The economic determinism approach was heavily sponsored by the United Nations in the early 1970s.

The knowledge dissemination approach popularized by Everett Rogers (Rogers, 1983; Roger and Kincaid, 1981) takes the view that diffusion of innovations is best facilitated when experts inform and train potential users of the technology (Williams and Gibson, 1990). The guiding assumption was that ; "Once the linkages are established, the new technology [knowledge] will flow from the expert to the non expert much like water through a pipe once the channel is opened" (Williams and Gibson, 1990; p. 15). A good example of such an approach is documented by Moore (1980) where international mariculture experts trained Malaysian fishermen in the use of mechanized fishing trawlers and advanced fishing apparatus.

The Knowledge utilization model is an increasingly popular view of change reflected in much of the current literature (Zacchea, 1992; Szakonyi, 1990). The knowledge utilization paradigm represents an evolutionary step that focuses on strategies to put knowledge to effective use in the recipient settings (Backer, 1991). According to this model interpersonal communication between researchers and clients plays an important role. It also attempts to identify the various barriers that can come in the way of the local populace putting this knowledge to effective use. Howe (1980) has illustrated such an example where Nigerian ecological conditions were simulated in an artificial laboratory environment to find the single and most suitable food crop that could realize the highest yields in the shortest period of time.

While there is an appreciation of the complexities of knowledge transfer, it has been argued that the knowledge utilization model suffers from a linear bias (Dimancescu and Botkin, 1986). The stated or implicit notion is that basic knowledge moves from the researcher to client, in one direction, with some minor modifications to accommodate local conditions. This model reduces the transfer process to chronologically ordered one-way stages, whereas practice shows the process to be interactive and complex" (William and Gibson, 1990, p. 15). Further, it subscribes to a deterministic, universal theory of the

human condition (Waldorp, 1992), for example, transition to an industrial economy will result in reduced birthrates.

Understanding the operative assumptions of the traditional models

The major arguments against the predominant transfer approaches is that they entail a 'one-way transmission' of information, from source to destination or from originator to receiver. While this is a valid criticism, we posit further that the 'one-way transmission of information' is essentially a manifestation of three interrelated theses about the 'nature of knowledge' that serve as the operative assumptions for achieving global change. The three conjoint operative assumptions about the nature of knowledge are what we will term theses that 'knowledge can be objectively realized and will be objectively consumed', 'knowledge is universally applicable', and 'knowledge is complete'.

1. Knowledge can be objectively determined and will be objectively consumed:

The assumption behind this thesis is that truthfulness of knowledge can be empirically determined. There are universal constants and 'true' models of the world that correspond with the world as it is can be empirically realized. Such knowledge that has been empirically determined is objective, has validity, and will be seen so by others. An example would be where a research finding such as high performers are driven by the need to achieve is taken as truth and used to guide action. An alternate example would be theories of neoclassical economics that suggest that all human beings are driven by rational self-interests.

2. Knowledge is applicable across contexts:

An interrelated postulate is that knowledge that has been objectively determined will apply uniformly across contexts and time. An example would be the belief based on the above mentioned research that irrespective of the country, people trained in

achievement motivation will perform better or that economic incentives will control human reproduction rate.

3. Knowledge is complete:

The assumption here is that knowledge can be created in its complete form by people who have the expertise. A single individual or group can hold all the requisite knowledge necessary for productive action and the issue is one of transmission of this knowledge so that non-experts (users) can put it to productive use. This premise would be embodied in approaches to the diffusion of technology that involve 'packaging' or 'instrumenting' the technology. Following the above example, this assumption might lead the generators of the 'knowledge that high performers are driven by the need to achieve', base selection tests, training, and counseling interventions on this "truth" or develop standardized programs of economic incentives for population control.

The above operating beliefs about the nature of knowledge are well reflected in the appropriability and the diffusion models of transfer. In the first model the users simply absorb the knowledge/technology 'as-is' based on their rational self-interest and in the second instance the absorption of knowledge is facilitated through instructions by an expert. One can infer that these one-way transmissions of knowledge are guided by the implicit frames of 'objectivity', 'universal applicability' and 'completeness' of knowledge theses.

In the knowledge utilization model there is an element of two-way communication. However as Doheny-Farina (1992) and Dobrin (1989) argue, the two-way communication is primarily oriented towards maneuvering around the communication barriers between the originator group and the user group. The assumption still is that there is "a body of information, of objective facts, just lying there waiting to be communicated" (Dobrin, 1989, p. 60). The underlying tenet is that knowledge is an object that exists independently, is valid, is complete, and has universal applicability. It is the job of the implementers to transfer the knowledge correctly through the appropriate

channels. If there are problems with the user group adopting this knowledge it is because they do not understand. This would entail finding better ways of managing those channels to achieve better dissemination or diffusion of knowledge.

If the foregoing assumptions about knowledge (objectivity, universal applicability and completeness) were true then the knowledge transmission model is most appropriate. Then change would be a simple process of moving knowledge/innovations from the source to the receivers. However, there are several examples from international development projects that suggests that the change process is not so simple and the foregoing assumptions about knowledge may not be accurate.

Some of the early attempts at population control in third world countries which included a combination of economic incentives for not producing children and generous distribution of birth control devices are illustrative of the fallibility of the 'objectivity of knowledge' theses. As summarized by Waldorp (1992: 26) "[It was puzzling as to] why rural families were still producing an average of seven children a piece, even when modern birth control was made freely available- and even when the villagers seemed perfectly well aware of the country's immense overpopulation and stagnant development". This finding came as a shock to some of the economists studying population control- the idea that human beings will not respond to abstract economic incentives although it was in their best self-interests. Further, these studies showed that one could not settle upon an universal, deterministic theory of human fertility. Instead what they found was that fertility rates were a part of a self-consistent pattern of folkways, myths and social mores- a pattern moreover that was different for each culture. For example, the thesis that income will be directly related to birthrates did not hold true. As Waldorp (1992: 27) summarizes; "you could measure something like income and childbearing in one country, and find that another country had the same levels of one, and totally different levels of the other."

Other attempts at change relying on these traditional assumptions about knowledge have demonstrated negative impacts on the user community. Howes (1980) describes the replacement in certain parts of Nigeria of multi-cropping systems of certain food crops with the monocultural cropping of a high yielding variety of a single crop developed in agricultural laboratories in the West. While the introduction of a single crop was a success in the short-run producing higher yields and higher cash return per acre of farmland cultivated, in the long run it proved to be a disaster. The intensity with which a given unit of land was exploited increased tremendously, showing decreasing returns over time. Further the monocultural crops were more susceptible to invasions from pests. The mixed cropping systems of earlier times included several plant species with different stem lengths that showed varied degrees of resistance to various pests and served to optimize ecological stability and long term productivity of the land.

Similarly, Moore (1980) has documented a case where mechanized fishing trawlers and new fishing apparatus introduced in some Malaysian fishing villages wiped out the local population's fishing reserves in a short period of time. For one, the new apparatus and methods failed to distinguish between mature and immature fish. In addition the trawlers' nets cut the fish and drained their blood and because consumers did not like the taste, cut fish did not sell in the market.

Based on the above and several other examples (Brokensha, Warren & Werner, 1980), we believe that a different set of theses about the 'nature of knowledge' are better able to capture and manage the complexities of technology adoption and global change. These alternate set of assumptions presents us with a rationale to understand global change as a process of contextual knowledge creation through collaborative learning. In the next section we will examine these alternate set of assumptions and provide case examples to illustrate how they may more accurately guide attempts at global change.

An alternate set of assumptions about the nature of knowledge

In contrast to the generally accepted views of knowledge, we posit that three different assumptions can provide a more relevant set of operating assumptions to comprehend the global change process: 'knowledge is subjectively constructed and may be subjectively consumed'; 'Knowledge requires contextual adaptation'; and 'knowledge is incomplete'. These are described below:

Knowledge is subjectively constructed and may be subjectively consumed:

Knowledge is a belief or set of beliefs about a segment of reality that is socially constructed by a community of knowing. It is based on a set of assumptions about the nature of such a segment of reality (Denzin, 1989; Fleck, 1935; Barnes, 1983; Fish, 1980; Gurvitch, 1971; Holzner & Marx, 1979; Giddens, 1974). Distinct communities of knowing develop unique social and cognitive repertoires that guide their interpretations of their world. It is through these socially situated judgments of reality that individual and social knowledge is constituted.

Fleck's (1935/1979) concept of 'thought worlds' is one such notion that emphasizes the unique interpretive repertoire of a distinct community of knowing. A thought world or the unique interpretive repertoires of a distinct community of knowing is characterized by two aspects; 1) their 'fund of knowledge', or what they know, and 2) their 'systems of meaning' or how they know. What is already known influences the method and content of cognition. A thought world evolves in a community of knowing as an internally shared system of meaning that provides a readiness for directed perception.

Barnes (1983) also underscores the social nature of knowledge and learning. He argues that knowledge is socially constituted and that learning in a community is always mediated by its social process. To learn is to classify, and to classify is to employ the specific classifications of some community or culture. Concept acquisition and application, or knowledge, is a social activity that is determined by this culturally given classification of reality. Cognitive operations of classification and concept formation are shaped by the unique linguistic operations of a culture or community.

The 'subjectivity' of knowledge theses that the nature of knowledge is based on a culturally given classification of reality has been illustrated in several domains (Brokensha, Warren & Werner, 1980). A telling example is a study conducted by Burton and Kirk (1980) on the ethnoclassification of body parts among three cultures. Their central thesis was that different cultures construct different models of the body which in turn determine belief systems concerning disease, conception and contraception, and mental illness. For example the Gourma tribe of Upper Volta (Swanson, 1980) visualize the human body as an amalgamation of ancestor soul, communal soul, guiding spirit, god consciousness and personal destiny. And their approach to healing locates the origin of the disease within this social context of the afflicted individual (Howes, 1980). Likewise the Dutch phenomenologist Van den Berg (1961) has vividly illustrated that the Europeans and Chinese due to their differing conceptions of the human body have invented two divergent forms of medicine, allopathy and acupuncture, equally valid in their own right.

Since each community of knowing base their definition of reality on their unique interpretive conventions, any information or knowledge, irrespective of how well it is empirically determined by an outside authority, may still be subjectively consumed in reference to their community's interpretive repertoire . It has been observed that even within a distinct community of knowing there could be sub-communities that have their distinct interpretive conventions, whether they be a "community of nuclear physicists, cabinet makers, high school classmates, street corner society..." (Brown and Duguid, 1991; p. 48). Kuhn (1970) calls this the 'incommensurability' of meaning systems among different communities of knowing, while Fleck (1935/1979) addresses this as the "inherent tenacity" of thought worlds..

Dougherty (1992) drawing on Fleck has examined this incommensurability of meaning systems within organizational communities. A fund of knowledge can be for example be primarily 'conceptual' (such as research and development) acquired through

education, training and laboratory experimentation, or 'practice based' (such as marketing) acquired through direct interaction with customers. Ideas cannot be easily shared across thought worlds with different funds of knowledge and systems of meaning. People in different thought worlds will attempt to interpret each other's ideas based on their unique thought worlds. If such interpretation fails then they may view the other's central issues as esoteric, if not meaningless.

There are several examples of this subjective consumption of received knowledge in international development projects. Moore (1980) describes the construction of overhead water storage tanks in villages in Indonesia. The tank water was purer and more convenient than the traditional pond water. However, the villagers did not accept it. To them the tank water was not "the real water which fell from the sky". Further, the ponds served as social meeting places which the overhead tanks could not fulfill.

Another example can be drawn from the experiences of medical personnel from the World Health Organization (WHO) in attempting to start disease eradication programs in the Gourma tribe of Upper Volta. The physicians from WHO tried to unsuccessfully convince the community that the disease was really due to infection by germs. Since the Gourma tribe's view of the human body was meshed into the social context, all forms of individual diseases were also attributed to relationships in the social context and the germ theory went against such attributions (Howes, 1980).

2. Knowledge may require contextual reconfiguration to be adopted in the new context, otherwise it could be rejected outright:

For a community of knowing to adopt an idea, information or knowledge from a different community of knowing, the information or knowledge may have to be reconfigured or adapted to fit in with the recipient community's meaning system. External ideas that may not fit in with one's system of meaning may be rejected outright (Fleck, 1979).

Giddens's (1974) theory of structuration, provides insights on the nature of such meaning systems and the process of such reconfiguration which is termed 'appropriation' (Poole & DeSanctis, 1994). The theory of structuration essentially argues that human understanding and behavior is contextual. Knowledge, cognition, and behavior in any social system is guided and constrained by the contextual rules and resources resident in the social structures. Actors use these rules to make sense of their own acts and those of other people. The structural conventions that condition human understanding, behavior, and practices are constituted by three interdependent structures, what Giddens (1974) terms as the 'modalities of structuration'. These interdependent structures are interpretive schemes, norms and power relationships.

Interpretive schemes are standardized, shared stocks of knowledge and beliefs that actors in a setting draw upon to interpret behavior and events. Norms are the rules governing sanctioned or appropriate conduct. Power enters into human interaction by providing humans the capabilities to accomplish outcomes, and most social systems are marked by an asymmetry of power distribution. Frequently there is a defined pattern of power relationships within a social system.

Technology or for that matter any external knowledge or information may be appropriated by a social system within the context of its structural conventions. The structural conventions can mediate the appropriation process. If an idea is too antithetical to a system's structural conventions then the system could reject it. So the task becomes one of reconfiguring the knowledge or technology to fit the situational contextual requirements (or changing the structural conventions of the recipient group).

Kelly et al. (1993) illustrate how social norms of certain communities stifle the adoption of technologies intended to combat HIV infection. They argue that social and peer norms that favor risk taking behaviors have come in the way of accepting safe sex

practices and technologies. The drive now is to try and create new norms of social responsibility to foster openness to safe sex practices.

Holzner and Marx (1979) offer specific insights into how local knowledge systems interact with received knowledge. Their argument is that societies use a set of 'epistemic criteria' or truth tests, that are socially accepted by the community and integrated into their daily practices to ratify experience as knowledge. These epistemic criteria can be interpreted from two perspectives; at one level they are the **knowledge forms** or 'objects of knowledge' of a community of knowing (including being storehouses of knowledge), and at another level they can also be employed as criteria to **validate or reject** any received wisdom and knowledge.

Stefflere (1972), a cognitive anthropologist hypothesized and found evidence that the acceptance of new knowledge or innovation by a local community would vary depending upon the innovation's location in a semantic space consisting of 'local cultural objects of knowledge' of varying degrees of similarity to the proposed innovation. He predicted that people would behave towards 'new objects or received knowledge' in similar ways as they behave toward existing cultural objects that were judged to be similar to the new objects. He provides the example of how all efforts by Peace Core Volunteers to introduce social change programs in some parts of Peru was met with resistance. The reason as the Peace Corp people realized subsequently was that the only Western people that the natives had come into contact with previously was a fundamentalist religious group that had tried to convert them. The Peace Core volunteers were associated with this fundamentalist religious group.

According to Holzner and Marx (1979) a wide variety of 'epistemic criteria' can be distinguished. However, just like the 'modalities of structuration' they are not distinct categories but intermingle with each other. The following are examples of major epistemic criteria in any community of knowing.

1. **Ritualistic/Superstitious** criteria for truth are commonplace in most societies including high technology Western societies. Barley (1988) identified a variety of problem-solving routines used by radiological technicians that were purely ritualistic, in the sense that they reflected a blind faith that a given action has a beneficial consequence (eg. banging on a machine in a particular way). The actual efficacy of such procedures need not be demonstrated, they are part of the common stock of knowledge since they are simply there.

2. **Authoritative criteria** are best exemplified in religious beliefs. The basis for justification of a great many beliefs in many societies is simply that a trusted, respected or feared individual says that this is the "truth".

3. **Pragmatic criteria** or practical experience is a major source of knowledge in any social group. Success is the critical test for many kinds of knowledge. Frequently pragmatic criteria are based on the efficacy of demonstrated procedures without understanding the reason "why". Mulkey (1984) offers the example of a British surgeon using strips of paw-paw fruit to clear up a post-operative infection after a kidney transplant. The doctor could not explain "why" the tribal remedy worked, but he had seen it work before and that was enough.

4. **Scientific criteria**, especially in the Western world have a strong grip on scholars and scientists (Kuhn, 1970). In contrast to pragmatic criteria, scientific criteria seeks for 'explanatory theory'. This is the case for both Western science and ethnosience. The term ethnosience is viewed as the set of concepts, propositions, and theories unique to each particular cultural group in the world- "its particular ways of classifying its material and social universe". Thus Western science is one of a number of types of ethnosience of culture groups throughout the world (Meehan, 1980).

Formal Western science and ethnosience share a lot of common characteristics. They both are based on a common "quest for explanatory theory" , and an accounting for the apparent diversity, complexity, disorder, and regularity in the environment (Knight,

1980). Both systems contain theory which builds a wider causal context than just pragmatic criteria or common sense. Both systems also abstract, analyze and synthesize, with frequently analogies providing the basis for explanation. However, ethnoscience can differ from formal science in some respects (Horton, 1967). Ethnoscience, frequently, may attach a magical attitude towards their explanations. This is because ethnoscience can be occasion bound rather than built from ideas to further ideas. In other words ethnoscience does not address the nature of 'it's own thought processes'. It does not have a philosophy of it's own science and is therefore a relatively closed system. However, while ideally formal Western science is supposed to be open with respect to the acquisition of new knowledge, it seldom is. It clearly reflects the interests, motivations, and the attitudes of the society in which it is embedded (Kuhn, 1970).

As Levi-Strauss (1966) tellingly observed "the thirst for knowledge is one of the most neglected aspects of the thought of the people we call "primitive". Even if it is [not] directed towards facts of the same level as those with which modern science is concerned it implies comparable intellectual application and methods of observation. In both cases the universe is an object of thought, at least as much as it is a means of satisfying needs" Knight's (1980) conclusions are similar; "Not all ethnoscience is hocus-pocus, nor is all formal science truth. Thus in spite of dissonance between these systems, there exists commonality that is the basis for comparison" (p.222).

A good example of contextual adaptation is illustrated in the global campaign to eradicate smallpox where received knowledge was reconfigured to conform to the local epistemic criteria (Joseph, Tenkasi and Cooperrider, 1994). Smallpox, a dreadful disease known to mankind since 12th century B.C, was successfully eradicated globally. As the result of a ten year effort spearheaded by the smallpox eradication unit instituted by the World Health Organization, the last case of smallpox was detected in Somalia in 1977. However the technology (in the form of a vaccine) to eradicate smallpox had been in existence for over 177 years. In fact several earlier attempts to

combat the dreadful disease failed; "a century and a half of vaccination attempts yielded only modest results" (Fenner, et al., 1988, p. 1346). One of the major barriers to the earlier campaigns was that in many countries the indigenous system of medicine held beliefs and advocated practices that interfered with the concept of vaccination.

The earlier programs tried to force the vaccination technology without understanding or acknowledging these local belief systems. However, in the case of the successful campaign some of the WHO personnel along with the local leaders recognized this problem and made an attempt to present the vaccination technology as complementing the local knowledge and belief systems in almost every country. The new knowledge was configured within the context of ritualistic, authoritative (local leaders) and ethnoscientific or local causal knowledge.

For example, in India the folk goddess of smallpox was a deity named Shitala Mata. She was represented as riding on a donkey with a basketful of grain on her head. In one hand she had a pitcher of water and in the other a broom. The belief was that when she shakes her head the grains that spill turn into smallpox pustules. The victim survived if she cleaned the spilt grain with water, but did not if she only used the dry broom. To incorporate the vaccination technology within this local meaning system, hundreds of large posters were created where the water in the goddess's hand was replaced by a large syringe containing the vaccine. As observed by Holzner and Marx (1979) and as illustrated in the example, epistemic criteria or forms of knowledge intermingle with each other. The smallpox deity had symbolic-ritualistic significance while at the same time it also represented 'causal knowledge' of smallpox.

There are other examples of successful contextual reconfiguration of received knowledge within the context of local epistemic criteria. The previously cited example of the Gourma tribe in Upper Volta is a case in point. The WHO personnel were initially unsuccessful in their attempts to convince the tribe about the germ theory of disease since the local community located the causes for disease within the social context of the

afflicted individual. However, subsequently both types of explanations were assimilated, and the diagnostic and healing practices associated with both systems were employed (Howes, 1980; Horton, 1967).

Bruce and Peyton (1990) argue that such reconfiguration of received knowledge is essential for successful innovation adoption. They posit that the so called distortion of innovations is in reality adaptation of innovations to suit the local context. These perceived distortions are an integral part of 'appropriating' the knowledge or fitting it to the situational context of the transfer domain. This might well be a pre-requisite for successful adoption of an innovation.

3. Knowledge is incomplete and effective contextual adaptation may require a creative synthesis of different thought worlds to produce new knowledge:

Frederich Hayek (1945), a Nobel price laureate in Economics, has argued that the knowledge necessary for productive action rarely resides in any one place, person, or group, but is divided throughout society. The knowledge challenge society faces is how best to tap into and communicate the additional knowledge required for effective action.

Likewise, Adaptive systems theory (Ormrod, 1974) argues that the greater the universe of perspectives the greater the opportunity for productive solutions to be found. Multiplicity of problem definitions, solutions, and experiments can lead to eventual answers. Knight (1980) uses an adaptive systems framework to analyze the negative aspects of the replacement of traditional agricultural practices in many countries by modern, western technologies. He concludes that "we [must] view traditional practices as a source of innovation, it is clear that they greatly enhance potentials for local agricultural improvement, as well as multiply the numbers of potential "solutions" to the world-wide food supply problems." (p. 212).

This premise implies that mere contextual reconfiguration of 'received' knowledge is not enough. Knowledge for effective action requires a fusion of 'received'

knowledge with 'local' knowledge. As Dougherty (1992) found in her research, thought worlds can selectively filter information and insights. Because of different funds of knowledge, a certain thought world is likely to best understand certain issues and further ignore information that is equally essential to the total task. Relying on such partial knowledge may result in ineffectual 'contextual adaptation'.

There are several examples of fusing 'received' knowledge with local causal and pragmatic knowledge to produce instances of enduring change. In a project by Richards (1975) on preservation efforts of some plant species in Philippines, it was revealed that locals had superior ethno-botanical knowledge. An average adult could identify a staggering 1600 species that were 400 more than previously recorded in a systematic botanical survey. Similarly, other projects have suggested that indigenous observers had superior empirical understanding of the localized eco-system as a whole (Barker et al, 1977). In this particular instance local elders could accurately predict the attack on a certain type of Cassava crop introduced, by a particular type of grasshopper. Further they could provide detailed knowledge on cyclical ecological changes.

Another interesting example is the case of bamboo tubewells which appeared first in Bihar in India and rapidly spread both nationally and internationally (Dommen, 1975). Faced with the problem that water supply from canals were unreliable, the government scientists introduced iron tube wells. However, the iron tube wells were expensive and tended to rust. Confronted with this problem, the local farmers came up with an ingenious solution. Their alternative that was much cheaper and reliable comprised of locally available bamboo shoots, nailed together with iron rings, and covered with bamboo coir.

These examples attest to the fact that effective contextual adaptation was best achieved when there was a creative synthesis of distinct knowledge domains. Successful change efforts as in the case of bamboo tubewells involved a fusion of 'conceptual knowledge' of the scientists and the 'practice based knowledge' of the farmers that bamboo shoots can be a good conductor of water.

The problem with soft technologies

The subjectivity of knowledge and the need for contextual adaptation, take on more acute proportions with soft or disembodied technologies. Soft technologies such as procedures or systems can be conceived of as essentially 'social practices' that may reflect a specific system's structural conventions or epistemic criteria about how to organize, work, or manage people. They are more abstract than hard technologies and the developer's contextual assumptions behind the nature of the technology have to be explicated and their relevance has to be examined in light of the contextual background of the recipient. This combined approach may result in creative approaches to contextualize the technology productively.

Hofstede (1980) extends an interesting example of how attempts to introduce 'Management by objectives' (MBO) to some other countries failed miserably. He argues that MBO presupposes that subordinates are sufficiently independent to negotiate meaningfully with their boss, and that performance is seen as important by both.

When MBO was first introduced in France in the 1960s people expected that this new technique would result in the long overdue improvements in productivity. However by 1970 MBO was severely discredited in France. The reason, argues Hofstede, is that the French culture encourages dependency relationships among superiors and subordinates. The traditional hierarchical structure protects against anxiety, while MBO generates anxiety.

As Hofstede (1980; p. 325) elucidates;

"The reason for the anxiety in the French cultural context is that MBO presupposes a depersonalized authority in the form of internalized objectives; but French people, from their early childhood onward, are accustomed to large power distances, to an authority that is highly personalized. And in spite of all attempts to introduce Anglo-Saxon management methods, French superiors do not easily decentralize and do not stop short-circuiting intermediate hierarchical levels, nor do French subordinates expect them to."

Perspective taking as the basis for collaborative learning

These alternate sets of assumptions about the nature of knowledge provide us with a different view of change. If innovations have to be adopted successfully then knowledge has to be contextually adapted which could entail the creation of new knowledge. Collaborative learning is necessary for purposes of reconfiguration of received knowledge to fit within local meaning systems as well as enable new insights and new knowledge through creative synthesis of distinct knowledge domains.

The basis of collaborative learning rests in a process of mutual 'perspective taking'. It is a process where distinctive individual knowledge, values, meanings, assumptions and beliefs are exchanged, evaluated, and, integrated with that of others (Duncan and Weiss, 1979; Shrivastava, 1983; Tenkasi & Mohrman, forthcoming).

Much of social behavior is predicated upon the assumptions an actor makes about the knowledge, beliefs and motives of others. The knowing of what others know is a necessary component for coordinated action to take place. As Brown (1981) observed, understanding another requires that the point of view of the other be realistically imagined. The fundamental importance of taking the other's point of view into account is seen in Mead (1934) who referred to it as taking the attitude of the other and equated our ability to be fully human with our ability to maintain an inner conversation with a generalized other. This is the essence of the process of 'perspective taking' (Bakhtin, 1981; Clark, 1985; Krauss and Fussell, 1991).

Issues in perspective taking

Mutual perspective taking of each other's knowledge and background into account is fundamental for collaborative learning. However, it is a complex process and can frequently break down. There are three principle and interrelated issues to mutual perspective taking. First, the knowledge and meaning systems of a community of knowing are often 'tacit and taken for granted'. Second, because such knowledge and meaning systems are 'tacit and taken for granted' and one's interpretative procedures are

so automatic, most people assume that the rest of the world's perspectives are more similar to one's own than they actually are. Third, various communities of knowing (cultures) adopt various expressive and instrumental modes for making sense of their social and material universe and that could aid or inhibit in understanding the perspective of the other. These modes could range from formal education, to folk tales, music, debate, drama, dance, tales, visual representations, rituals and mime (Compton, 1980). These modes are both the storehouses or 'structures of knowledge' as well as the 'mediums' of knowledge acquisition.

Knowledge as tacit and taken for granted: At least part of the knowledge, beliefs, meaning systems and norms that form the structural or interpretive conventions, or 'epistemic criteria' of any group or community of knowing are tacit in nature.

Understanding and interpretation involve a great deal that is not explicit or explicable, is framed and embedded in communal conventions, and that one is not aware of in the daily conduct of life (Brown and Duguid, 1991).

As Giddens (1974) elaborates, there are at least two levels of consciousness in any social system; 'discursive' consciousness that involves knowledge which actors are able to express at the level of discourse, and 'practical' consciousness' that involves tacit stocks of knowledge which actors are normally not able to formulate discursively, but draw upon in the constitution of social conduct.

Collins (1983) also notes the hidden nature of such processes. He argues that many times it is only when the rules go wrong that a community of knowing examine the nature of their interpretation. "Otherwise, our giving of meaning to objects- out interpretative practices are so automatic that we do not notice that any interpretation is involved" (Collins, 1983; p. 90).

In particular for many non-western societies knowledge is not a 'rational product or process' that is represented formally as in the canons of western science (Howes,

1980). Ethnoscience knowledge, whether, ritualistic, authoritative, pragmatic or ' explanatory theories' have different forms of organization than is found in Western societies. It is frequently stored in folk arts, stories, tales, and other narrative modes (Compton, 1980). Folk media serve as a storehouse as well as an important medium for transmission of cultural knowledge between individuals and through succeeding generations (Howes, 1980).

False assumption that other's knowledge and meaning systems are more similar to one's own than they actually are: Since a group's knowledge and meaning systems can operate outside the bounds of day-to-day consciousness there is a tendency to automatically assume that others' world views are more similar to one's own than they actually are. Fleck (1979) calls this the 'inherent tenacity' of thought worlds to focus on their own perspectives.

The false consensus effect, in which subjects assume that others are more similar to themselves than is actually the case (Ross, Green and House, 1977) is a form of bias particularly relevant to the perspective taking process. Steedman and Johnson-Laird (1980) have proposed that "the speaker assumes the hearer knows everything that the speaker knows about the world and about the conversation, unless there is some evidence to the contrary" (p. 129). This heuristic should lead to overestimates of the extent to which a speaker's knowledge is shared by others.

Denzin (1989, p. 11) elucidates how this false consensus effect can come in the way of designing effective social change programs:

"In social life there is only interpretation. That is everyday life revolves around persons interpreting and making judgments about their own and others' behavior and experiences. Many times these interpretations and judgments are based on faulty, or incorrect understandings. Persons for instance mistake their own experiences for the experience of others. These interpretations are then formulated into social programs that are intended to alter and shape the lives of troubled people....But often the understandings that these programs are based on bear little relationship to the meanings, interpretation, and experiences of the persons they are intended to serve. As a consequence there is a gap or

failure in understanding. The programs don't work because they are based on a failure to take the perspective and attitude of the person served."

Others have suggested that the failure in perspective taking is not due to a 'false consensus bias' which may be well intentioned but rather a form of knowledge arrogance. In particular Western societies have been criticized of taking an unidirectional approach toward issues of knowledge. Howes (1980) summarizes the 'knowledge arrogance' notion in his analysis of many agricultural development programs including the green revolution. His primary observation is that the overall western philosophical position rests on the unilateral perspective that knowledge is to be transmitted from the researchers in the West to the farmers elsewhere. If this simplified model breaks down as it frequently does then the response is not to ever question the validity of the model itself. This unidirectional model, with a tendency to denigrate indigenous knowledge, he adds, is not simply one of ideology but also reflects fundamental patterns of economic inequality, "which in turn has been responsible for the destruction of indigenous knowledge, and the reduction in the number of options open at the grass root level" (p. 354).

Modes of knowledge acquisition: For perspective taking to succeed in terms of substantive issues, the medium of knowledge acquisition has to be first understood (Compton, 1980). Cultures differ in the way they organize their knowledge structures which is also the way they acquire knowledge. Formal acquisition of knowledge as in classroom instruction and books is not prevalent in many other parts of the world.

For example, in Africa the telling of folk tales is the primary medium through which cultural knowledge is transmitted. Village story-tellers who are the repositories of cultural knowledge develop their skills over a number of years through an apprenticeship arrangement between an elder and a young aspirant. Similarly, folk dance has often been observed to transmit knowledge on themes such as agriculture, occupations, courtship, marriage, religious observance and war (Compton, 1980).

Creating contexts for perspective taking

Facilitating perspective taking requires what we will summarily term as **interpretive spaces** for mutual learning and joint meaning making. According to Denzin (1989) interpretation or the act of interpreting creates the conditions for understanding. Thus interpretive spaces are interactional mechanisms that create the conditions for understanding by intervening at the level of knowledge structures, interpretive schemes or 'thought worlds' and bringing them to conscious awareness and facilitating their exchange in a process of mutual dialogue. They provide for the opening of one's preconceptions, assumptions, and meaning systems to oneself and to others (Habermas, 1981). Becoming aware of tacit consciousness requires self-reflexivity on the part of the actors. In Schutz's (1964) terms, reflexivity is the ability to periodically suspend our 'natural attitude'. Interpretations normally given in a matter-of-course, taken-for-granted 'natural' way should be suspended so that one will be able to notice the assumptions, beliefs, and meanings that are the basis of our knowledge. Perspective taking best happens when individuals interact with each other at the level of interpretive dynamics and approach each other with a sense of hermeneutic openness (Habermas, 1981).

Comprehensive mutual understandings of a situation can be best developed by making it possible for individuals to portray their original understandings of a situation, self-reflect, re-examine these displays in the process of exchange with others and come away from these re-examinations with different interpretations and perspectives of what they might mean (Weick, 1990). Some examples of such interpretive spaces are available in the literature.

Cognitive anthropologists in international development studies have experimented with various knowledge elicitation and knowledge exchange techniques that use local modes of knowing as the primary medium. One creative example is where a local African board game called Ayo was used to understand and exchange farming problems and

issues on environmental preservation (Barker, 1980). The process resulted in genuine dialogue and mutual learning between the farmers and research workers.

Paulo Friere (1973) is well noted for his dialogical method of mutual education. His basic premise rests on a process of mutual perspective taking: "subjects engaged in dialogue express themselves through a system of linguistic signs. For the act of communication to be successful... the expressions of one of the subjects must be perceptible within a frame of reference that is meaningful to the other subject" (p. 138). His dialogical method opens up a reflexive attitude on the part of various parties involved in the interchange

Search Conferencing, is a promising approach for mutual perspective taking that has shown impressive effects in many cultures (Thachankery, 1994). A community development approach popularized by Weisbord (1987), 'search conferencing' is a powerful method to "excite, engage, produce new insights, and build a sense of common values and purpose" (p. 285). It is an exercise in learning, awareness, understanding, and mutual support.

Frequently in a search conference all parties who are stakeholders to a decision are brought together; representing the whole system to the extent possible. Next the groups go through a series of activities to examine their past and present, with a specific emphasis on laying bare their understandings, assumptions, beliefs and meanings to themselves and one another. Participants use different devices such as stories, pictures and skits to help them explicate their tacit understanding to oneself and to others. The whole system looks at this information, interprets what they find, and draws conclusions for action for the future. Successful search conferences always uncover shared values, new possibilities, and congruent action plans for the future.

Interpretive interactionism (Denzin, 1989) is an approach to social research that renders to clarify meanings. By producing meaningful descriptions and interpretations of social processes from the subjective point of view of different actors, interpretive

interactionism attempts to create conditions of understanding and "translate what is said in one language into the meanings and codes of another language" (p. 32). It is a mode of research that can expose and reveal the assumptions that support competing definitions of a problem where key individuals from different cultures can act as "semiotic brokers" (Lyotard, 1984).

The interpretive researcher(s) uses naturalistic inquiry methods such as case studies and biographical approaches to identify different definitions of a problem and competing models of truth that may operate in an interactional setting. Armed with this rich data the researcher then facilitates the process of mutual perspective taking and collaborative learning among the different parties.

Conclusion

In this paper we have called for a reorientation of our understanding of global change especially in relation to international technology transfer. This shift is based on a different set of assumptions about the nature of knowledge- one that appreciates knowledge as subjectively constructed and consumed, that knowledge may require contextual modification to be adopted in the new context, and that effective contextual adaptation may warrant a creative synthesis of different thought worlds to produce new knowledge. This mindshift implies a move away from the traditional knowledge transmission approaches that rely on a universalistic theory of knowledge to one that appreciates collaborative learning through a process of perspective taking as a fundamental component of global change.

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