Talking Technology: Language and Literacy in the Primary School Examined Through Children's Encounters with Mechanisms

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The Role of Language and Dedicated Terminology

Language plays a pivotal role in teaching and learning across the curriculum. This article embraces an examination of certain dedicated terms within technology education that children may encounter as part of their primary school experience. Four language-related issues are explored. The first of these concerns the difficulty that may be experienced in defining certain technological terms. The second concerns the ways in which primary school children use their own versions of terminology to describe specific artifacts and functions. The third issue concerns the role of some manufacturers and publishers in employing inappropriate terminology within educational products. The final issue revolves around the psycho-social development of language in young children and the contribution this may make to the acquisition of appropriate technical terms. These issues are woven together to form a complex linguistic tapestry with implications for classroom practice.

Language, when seen as the instrument of communication used by the speech community (Labov, 1994), provides the basic platform for the communication of ideas. Our language is packaged into words. These convenient vocal units express culturally-derived fragments of meaning, and indeed it seems that we all have an intuitive grasp of what constitutes a word as a distinct unit within our own language (Langacker, 1972). The use of the term "word" is qualified with culture, since it is the sharing of the meaning of our words in prescribed cultural settings that enables us to sustain the building blocks of our language. As Pinker (1994) said, "A word is the quintessential symbol. Its power comes from the fact that every member of a linguistic community uses it interchangeably in speaking and understanding…Words…are a universal currency within a community" (p. 151).

Within the community of the primary school, the core elements of language such as speaking, listening, reading and writing can be gained in all manner of subjects (DFE 1995, SCAA 1997a), including Design and Technology (SCAA, 1997b).

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Design and Technology has a significant stock of words that we could see as being of a "dedicated" nature. The words are often powerful and as "packets of meaning" we may assume that they need secure foundations upon which to erect complex structures of technological thought, language, and action. Many of the words employed in design and technology can be described as "terminology"—the naming of parts.

These technical terms are often a form of linguistic shorthand. We do not refer for example to "wheels which have machined or cast grooves disposed in a regular fashion around their periphery so they may interact with similar wheels in order to convey motion through the act of rotation." We simply talk about "gears."

The importance attached to individual words is recognized across curriculum documents in the United Kingdom. The national curriculum for England and Wales (DFE, 1995) suggests that pupils be taught "…to use the appropriate vocabulary for naming and describing the equipment, materials and components they use" (p. 59). Similar claims for the use of dedicated language are made in the Scottish Environmental Studies 5-14 program of the Scottish Office Education Department (SOED, 1993) and by the Department of Education for Northern Ireland (DENI, 1992).

On the basis of core directives such as these, if children are to begin to develop a design and technology vocabulary it seems important that the meanings of words that they accumulate are precise. Moreover, the vocabulary should be practiced regularly within appropriate settings to better embed them as core linguistic components. This dedicated stock of words, the terminology of design and technology, could be quite extensive even for children of primary age since curriculum expectations may embrace conceptual content of a relatively high order. Areas such as "mechanisms" and "control applications" carry a significant stock of technical terms which primary age children may encounter.

Words, Contexts, and Expectations

We do of course often see that certain words are used in one way in a subject-related circumstance but have different meanings when the context is more general. The term "energy" for example, has a specific, reserved meaning in science. Yet it has a very unscientific range of applications beyond that discipline when children in class claim they "have no energy today!" Nonetheless, effective teaching and learning should still have enabled the child to gain a grasp of the notion of the principle of the conservation of energy. The word "energy" in the dedicated scientific sense is loaded with meaning and shared across the scientific community.

Perhaps it is one of the features of higher language acquisition that we may employ various levels or domains of vocabulary usage. Through some subtle mechanism, terms can be shared in certain contexts, but when appropriate we are able to throw a subtle "linguistic switch" to accommodate an alternative set of meanings in different settings.

In the primary years of education, from the perspective of published guidance, there seems to be something of a presumption that accumulation of a precise technological vocabulary should be undertaken. Moreover, since there is not much evidence to the contrary, it would appear to be a straightforward process. Thus in primary schools where there can be a considerable repertoire of activities in designing and making, it would seem that children, while engaging in these various tasks, should have access to teachers, support texts, and perhaps even software that could introduce "appropriate" vocabulary. These assumptions may, however, not be consistent with what actually happens in primary school practice.

Developing a Technical Vocabulary Through the Concept of Mechanism

For the purposes of this article, the linguistic focal point will be two terms which are central to the understanding of aspects of mechanics at primary education level. Encounters with mechanisms play a part in United Kingdom primary schools from the early years with simple vehicles to later, more complex engagements with control technology (Järvinen, 1998). At a conceptual level, mechanisms are part of our technological society and embrace core ideas on the transfer of energy and the application of force. Engagement with mechanisms in school settings can be one of the very practical routes by which scientific understanding can be gained through interaction with technology.

Intimately bound up in the conceptual areas of force and energy relating to mechanisms is the idea of relative motion. Parts move relative to each other and do so predominantly by describing circles or parts of circles. Two terms, which are important in the understanding of the vocabulary related to mechanisms, are "shaft" and "axle." There is a body of evidence to suggest that terms such as these, in certain texts, lack clear meaning. As a result, published support materials may be unable to use the terms in an appropriate manner in teaching and learning situations.

Problems of Definition—The Meaning of "Shaft" and "Axle"

The origins of the terms shaft and axle are based in antiquity. Partridge (1958) indicated the origins of the term *schaft* from Middle English, from Old English as *scaeft* and Old Norse as *scapt.* In the case of Old Norse, the term refers to a long handle—usually that of a spear. Further into the past one can find the Latin term *scapus* and the Doric Greek term *skapon,* both meaning "staff." A modern source such as Chambers 20th Century Dictionary (1983) refers to a shaft as "anything long and straight: a stem: an arrow: a missile…a rotating rod that transmits motion" (p. 1189).

Beyond the basic qualities of "long and straight" the term "shaft" then, clearly has a range of meanings and these are often context-dependent. From a structural perspective, the term shaft could embrace the long and straight pieces that contribute to a framework. On the other hand, a shaft can describe a long, straight *void* such as a mine shaft. And then there is the mechanically dedicated meaning. In this instance the long, straight component is further qualified in that it rotates and thus can transmit motion.

The term “axle” was shown by Partridge (1958) to have Greek (*axon)* and Sanskrit (*aksas)* origins, and modern dictionary definitions such as the Chambers 20th Century Dictionary (1983) clearly relate *axle* to *axis* and describe it as “…a line about which a body rotates, or about which a figure is conceived to revolve” (p. 86). The Collins English Dictionary (1991) specifies the term in the context of mechanics such as “a bar or shaft on which a wheel or pair of wheels, or other rotating member revolves” (p. 107).

From these core definitions, in the contexts of mechanisms, it can be established that shafts can be long straight rods that transmit rotary motion. Axles on the other hand, although they *may* be long and straight, do not turn. Rather, things turn around them.

There is a contradiction however. Perhaps as the ultimate reference, the Oxford English Dictionary (1989) describes an axle in a mechanical context as “The centre pin upon which a wheel rotates, or which revolves along with it” (p. 839). From the Oxford English Dictionary reference it seems that an axle may be fixed *or* it may rotate.

This confusion is intensified by terms used in the realms of engineering. For example, an engineer may speak of a “live” axle or a “dead” or “fixed” one. However, in this respect at least the term is qualified so that the user is aware of the implications of the “types” of axles. In engineering terms, especially within the automotive industry, this qualification “live” is used in the description of, for example, a “live rear axle.”

As a final complication to this picture, in the heavy transport sector, a railway carriage or wagon will be seen to have “axleboxes” on the outside of frames, and yet, turning within these bearing structures are rods (shafts) which firmly connect pairs of wheels!

Examples of Definitions from Texts to Support Technology Education

As a means of supporting primary teachers, the UK-based Design and Technology Association has published a useful guide for primary educators regarding terms used in Design and Technology activities that may be encountered in the classroom. From this source, The (British) Design and Technology Association (DATA) (1995) offers the following definitions: “Axle - Rod on which one or more wheels can turn” (p. 22) and “Shaft - A rod which transmits motion” (p. 25).

With core dictionary definitions in mind, one might be compelled to ponder the meanings of the terms and wonder what ideas they convey to primary teachers. The DATA shaft definition is a little less specific than core dictionary definitions. While a shaft clearly *is* a rod that transmits motion, this motion is not qualified as being rotational.

Not *all* rods which transmit motion may be shafts. Rods which transmit motion by moving to and fro, such as a push-rod or a connecting rod, exist. In the language of mechanical engineering, then, the term “rod” seems to have a range of applications when given further qualification.

“Rod” is a rather useful non-committal term, for a rod is long and straight, and if it rotated it *could* act as a shaft. On the other hand it could be the axis upon which something else rotates in which case it would make a useful axle. Rods could even be used to describe long, straight structural elements.

The term "axle" under the DATA definition *may* be inexact, depending upon which definition one adheres. Certainly the extended understanding of axle that is used in some sectors of engineering may need further qualification via "dead" or "fixed" and "live." The whole basis of ascribing meanings to multi-sense words is a discipline in itself and the process of establishing the senses of words for dictionary entries is a complex business for the domain of a specialist. Large, general language sources offer the lexicographer a resource which can provide a systematic approach to establishing senses. Atkins (1987) for example provides an insight into the use of objective (syntactic and lexical) evidence to support dictionary senses.

On the basis of complexity, the "naming of parts," or terminology, is relatively straightforward and at the "easy" end of the semantic scale. However, even at this level, a set of definitions that is the basis for constructing a technological vocabulary seems quite difficult to achieve. In light of this, is it realistic to expect that teachers will comprehend a range of meanings and be able to pass on accurate information to children?

Terminology Used by Primary School Children Based on Work with Moving Things

Much design and technology activity in the primary classroom centers around moving things for they are quite simply a source of inspiration for children and teachers alike. Even before the text of a national curriculum for England and Wales began to specify the skills and content of design and technology at the start of the 1990s, teachers and children had been engaging in the process of making things "go" for years. The justification was simple. Wheeled vehicles were interesting in their own right and perhaps reflected the aspirations of an increasingly mobile "car-centered" population (Parkinson, 1998). Young children pushed simple wheeled toys and went on to make things "go" very often from the assured platform of success offered by construction kits. As manipulative skills developed, children were able to represent and create a wide variety of wheeled vehicles using a range of reclaimed materials.

Perhaps in the broadest sense there is an element of progression in all of this. First, children are able to relate to aspects of motion by wheels interacting with a flat surface such as the ground or a desktop. Play activities enable them to gain an intuitive understanding of the differences between sliding and rolling friction and the key role that wheels play in all of this. At some point in a learning sequence, children become able to handle the more abstract notion of wheels *interacting with other wheels*. This interaction occurs either by wheels turning on fixed axles or the wheels may be attached to shafts (or "live" axles). In the latter case, there is an advantage to be gained from shaft-driven elements in that once a shaft is turning then specialized wheels of different sizes, such as gears, can occupy places on the *same* shaft. Thus they can transfer motion from one shaft to another in a complex sequence of drive relationships we call a gear train.

In a study of primary children engaged in problem solving with gear trains using LEGO Technic, Bennett (1996) provided an account of the descriptive terms employed. He stated that, "It was interesting to note the reluctance or inability of the children to use the technical vocabulary in discussions. Axles were variously called *'stick things'…'spars'…'that bit there'… 'Little things-what's it called?'…*and yet this did not necessarily diminish the children's practical capabilities or willingness to explain their understanding" (p. 228). The Bennett study was undertaken with a small group of children in a spare classroom and videotaped. This controlled setting may have, of course, influenced the language-related outcomes.

In a similar mechanism-related setting for studying primary-age pupils' linguistic behavior and responses, Schoultz (1997) reinforced this view of children choosing to use their own terminology. He did this from the perspective of technological language not being seen as a native language. Within this study, children were invited to interact with a "black box" containing a mechanism and then to provide explanations for what was presumed to happened within. When interviewed about what might have been happening within the black box, Schoultz stated that, "The pupils in the study used few words from the technological field, instead they used words like that one, this one, this stick and that spike etc. This is not unusual as technology for many people is a long list of words and terms which have been extracted from their context" (p. 28).

The picture starting to emerge here is that children are not using "correct" technical terms. This observation is underlined in England and Wales by the government Office for Standards in Education (1995) inspection force which raises this issue of the acquisition of technical vocabulary from their own particular observation-based perspective, pointing out for example that in infant schools (Key Stage 1) "…technical vocabulary was rarely developed adequately" (p. 6).

Data collected specifically for this article from a small sample of institutions in Kent, UK, supports the view that pupils—and their teachers—show limited application or understanding of the terms axle and shaft. To assess pupil and adult understanding of these terms, timber artifacts featuring a wheel which turns on a yellow axle and wheel attached to a red shaft were produced.

Samples of children and adults were randomly selected from co-operating institutions. The subjects were asked to explore the artifact and then give a name to the red component and the yellow component.

Reactions from children

The initial response from children regarding the naming of parts was in many ways secondary to their reaction to the artifact itself. Most children wanted to provide a name—or perhaps a context for the whole artifact. Even though the wheels were offset on opposing corners of the artifact, and only one wheel was evident on each rod, many children ventured that "*this is a car isn't it?*" Some ventured further that "*some wheels are missing*."

The children were initially unwilling to accept the abstraction and detachment required to focus on individual components; these had to be related to the whole artifact and to them, the device seemed to be "incomplete" without a name or purpose.

Analysis relating to the categories of name offered by children for the red and yellow components was undertaken under the denotational structure described by William Labov in 1978, cited by Allan (1986). Labov indicated ways in which descriptive terms might be applied to a set of containers. His evidence suggested that decisions on the how to assign various names might be made according to the criteria of shape, material from which the containers were made, the purpose of the container, and the location of the container.

On a small sample of children (*n*=18) in UK primary years 5 and 6, an analysis was carried out upon data provided in the naming activity. Since the Labov criterion of "place" seemed inappropriate (although this was perhaps a pointer to the matter or "context" which was not pursued further for the purposes of this study), the classification was attempted using the criteria of shape, material and purpose.

This task proved to be largely ambiguous for it was often impossible to clearly assign the terms used for the red shaft and yellow axle to the Labov criteria. Children used terms such as "handle"—which could apply to either (or both) criteria of "purpose" or indeed of "shape." Similarly, some children referred to the rods as a "wooden pole." This could be classified under "material", "purpose" and "shape!"

From the sample, one child referred to the fixed and moving rods as a "shaft." No children used the term "axle." The terms most frequently used were "piece/bit of wood" (5 responses, two for the shaft and three for the axle) and "stick" (4 responses, two each for the shaft and axle).

A second sample (*n*=31) was collected from younger children. These were drawn from UK primary years 3 and 4. The pattern of data reflected that found with the previous sample. The most frequently used term was "wood" (15 responses, seven for shaft and eight for axle) and "stick" (11 responses, seven for shaft and four for axle). No children used the terms "axle" or "shaft."

The sheer *range* of words used by children as descriptors was extensive in both samples, and provided a glimpse into the richness and diversity of language upon which they were able to draw. This could be seen as a stage in children's concept development in which, according to Vygotsky (1986) the children were able to use concrete and factual bonds to associate with components, rather than adult abstractions and logic.

Comparison with data from adults

For purposes of comparison, data were also collected from serving teachers. Volunteers in two primary schools (*n*=28) teaching the 5-11 age range in Kent, UK, kindly provided information. The overwhelming finding was that of the use of the preferred term "axle" for both the red shaft and the yellow axle. These data from serving teachers was further supported by data volunteered from students (*n*=108) in the first few weeks of a primary teacher training course at a higher education facility in Kent. Again, the overwhelming response was that of the use of the term "axle" to describe both the red shaft and the yellow axle. In fact, for the red shaft, 46% opted for the pure term "axle" while a further 20%

used the term, but in qualified form such as “ moving axle.” For the yellow axle the use of the term “axle” was slightly less emphatic, with 24% using the unqualified pure term and a further 26% using it with qualification.

In the situations described so far, primary pupils could be seen to be participating in an informal labeling process. Descriptive terms could be seen to be woven into terse phrases so that meanings can be shared within a practical setting, often rooted in problem solving. When we observe children working in group situations at mechanism-related tasks, body language such as pointing plays a significant role in addition to spoken language. Johnsey (1998) elaborates on this aspect of body language which augments, extends, or substitutes speech as a transfer medium for ideas. He suggested that, “Hand gestures can describe the dimensions and shape of a model and how parts of it function and move. The method is a quick and effective way of communicating ideas to others and of manipulating an image held in the mind’s eye” (p. 62).

An Analysis of Shaft and Axle Terminology in Mechanical Kits

The basis for definitions has been seen to be somewhat problematic. A review of selected literature does nothing to clarify this situation. Three examples concerned with publications intended to educate students in matters mechanical were selected for study.

The first example is drawn from the work of the Rev. Robert Willis, Jacksonian Professor of natural and experimental philosophy at the University of Cambridge in the mid 1800s. Willis developed a special construction kit which could be used a means of demonstrating principles of mechanisms to his students. It was devised so that mechanical components could be added, removed, or re-positioned with speed and accuracy during a lecture-demonstration.

This demonstration apparatus was described in great detail (Willis, 1851) and provides insight into the basic terminology used. Willis suffered no confusion between axles and shafts. His explicit text makes it very clear that within the context of mechanisms, shafts can rotate and need suitable bearing points and sometimes a means of inhibiting undesirable to and fro motion along the long axis. He wrote, “To prevent the endlong motion of the shafts, which are mere plain cylinders unprovided with shoulders or necks, rings must be employed. This device is usual in manufacturing mechanism when a shaft requires to be often taken out for cleaning or adjustment. It is plain…the shaft will be free to revolve, but prevented from sliding endlong” (pp. 24-25).

The Willis example has been chosen since it was something of a benchmark in education in mechanics. Willis was a clear leader in his field, established a novel, practically-based teaching mode, and communicated his ideas to an influential cadre of future engineers. Moreover, for the benefit of his students, Willis did not use the qualified term “live” axle, he used the dedicated and specific term “shaft.”

A second example is drawn from an instructional handbook concerned with the product “Mecanno.” Meccano, a set of metal parts originating from the start of this century, was in many ways the first construction kit to gain mass appeal both for children and indeed for many adults. It held a leading place in the global market until being displaced by construction kits made from injection-molded plastics in the 1960s.

The example drawn from the Meccano Constructors Guide (Love, 1971) then, represents a significant point of accumulated knowledge and application of the Meccano product. It featured the most modern Meccano set, one that used electric motors and lights. In many ways, this was ground-breaking territory for the late 1960s and early 1970s. Here was a product, with supporting literature, that could influence a whole generation of potential engineers.

The Guide is confusing on the issue of specific mechanism-related terms. Within the metallic domain of Mecanno, wheels, gears, and pulleys can be fixed to metal rods with small screws. This implies that rods could be given the specific term “shafts,” for they can rotate in holes in the structure provided by the perforated strips and plates which are characteristic of the Meccano construction system. Alternatively, the rods could have been described as “free” or “live” axles.” The Guide features copious illustrations of mechanisms with shafts. In the text however, these shafts are referred to as *Axle Rods*. To simply have called them *rods* would have been acceptable, but to qualify the term “rod” with a further descriptor seems difficult to justify and indeed rather clumsy.

Rod has an almost elegant simplicity as a term. Perhaps the author wished to qualify the general term rod with an indication of motion, and chose axle to do this. Nonetheless, did this rather ponderous piece of language-giving affect a generation of Meccano-inspired potential engineers?

The third example in this historical succession is drawn from what could be seen as one of the successors to Meccano. This product is LEGO Dacta, which became popular in the 1960s and 70s as a children’s toy. Later, this product achieved significant penetration into the formal education market.

For the purpose of the LEGO example, two publications produced by the LEGO organization were selected. The first publication is the *Teacher’s Guide to TECHNIC 1* (LEGO Group, 1985) for children of the ages of seven and upwards. This product marked a departure of LEGO away from the interlocking building blocks with a focus on modeling structures and into the modeling of mechanisms. This transition clearly put them into the educational market.

Moving parts in the LEGO system, particularly in the *TECHNIC 1* set, are characterized by the use of precision-made, black, splined rods onto which various types of wheels can be pushed so that they hold their position by friction. These splined rods can then rotate freely in the regularly pierced plastic structural members of LEGO. These splined, black rods are shafts (or “live” axles).

However, according to the Teacher’s Guide for TECHNIC 1 the black rods are known simply as “axles.” This seems like an educational opportunity missed. A dedicated term could have been used, but the unqualified “axle” was employed instead.

Have things changed since 1985? Very little it would seem. The text of a later guide, the LEGO DACTA Motorized Systems Teacher’s Guide (LEGO, 1994) is part of a class resource which demonstrates the full capability of a precision-made injection molded plastic kit. This resource is for use by secondary school pupils. The Guide acknowledges that the Motorized Systems set has arisen out of international collaboration between LEGO Dacta teams in Denmark, Australia, and the UK. In a situation perhaps similar to Meccano of the late ‘60s and ‘70s, one is dealing with a construction kit at its zenith.

As before, the text of the Guide however refers to the black splined shafts which characterize LEGO mechanisms as unqualified “axles.” The reader is advised for example that “Axles should be run as freely as possible to reduce friction…” (p. 13).

One is forced to repeat the reservations expressed regarding the construction guide for Meccano. How will this affect the language acquisition of a generation of engineers who have grown up using LEGO Dacta materials? The situation has further implications since the instructional materials are for teachers. As a consequence, teachers could acquire unqualified and inappropriate technical vocabulary and convey it to the children they teach.

Reflections on Evidence in Relation to Psycho-Social Influences

From the standpoint of the diversity and range of names produced by children for “putting a name to” unfamiliar components, it is useful to reflect on the self-devised informal terms used by children in the previous examples. Shape and function certainly play major roles as descriptors for the construction of informal labels. These are “working” labels which serve the children in their own particular context and socio-linguistic setting.

The investigations on children’s performance on thinking and language in controlled, perhaps unfamiliar, laboratory-like investigations described earlier (for example contrived pieces of problem solving and children responding to interviews and the handling of unfamiliar artifacts), require careful reflection. Lave (1988) offers a reminder that the learning process itself can be seen as part of an interaction between complex mental process and the totality of the learning environment. Data recorded from contrived learning situations may not represent the broader, more complex picture. This is not to say that children’s engagement with the unfamiliar is of no value. Within the field of problem solving, Hennessy and McCormick (1994) provide a reminder that changing familiar aspects of tasks (such as introducing the frames with yellow and red rods or the “black boxes” described earlier) can assist in the development of decontextualised knowledge, enabling learners to master complex situations.

A significant factor to consider regarding the complex overall picture of language learning is that of *assumptions* about the use of use of everyday language. Rix and Boyle (1995) raise the issue of children having alternative meanings for *everyday* words. From the context of primary science they said “…we became intrigued by the number of times children appeared to have alternative meanings for everyday words which we took for granted needed no further explanation to make the meaning explicit” (p. 19). The notion of *alternative* meanings signals the inclusion of another strand in the understanding of learning and key role of language, for it is primary science that has left an indelible mark on the research landscape with ideas on constructivism. This rests on the notion that learners assemble their own frameworks of meaning (Driver et al., 1985) in order to explain the circumstances of their surroundings. Moreover, scientifically incorrect, yet plausible explanations may lead to the development of alternative frameworks. These must be challenged and appropriately reconstructed if scientific ideas are to take root and flourish.

From this standpoint, a parallel line of inquiry can be followed. If it is accepted that children may construct their own meaning, then it may follow, given the interaction of meaning and language, that they may construct elements of their own language too. This might well include an array of informal names supported by the qualification of concrete descriptors. Within this linguistic construction process the accuracy of words will be significant. Indeed, as Sutton (1992) crucially pointed out, it will occur at times of episodes of new thought that *shades of meaning* will be at their most significant. He stated that, “a shift of attention from one shade of meaning to another is what initiates new understanding” (p. 57).

Halliday (1975) brings a further dimension to the notion of informal labeling. In describing two “macro-functions” of language, a distinction between functional components of the semantic system is made. The first of these macro-functions, the “ideational” components, where the speaker expresses experiences about the external world, would seem to match well with the labeling process—the notion of matching parts to informal “name plates” based on criteria such as shape and substance.

The second of these macro-functions within the semantic system refers to “interpersonal” components. This function is characterized by participation in a speech event where elements of personal judgements and attitudes can exert effects on the listeners. Is this process also at work when informal labeling is undertaken? Within the nuances of spoken language, then *how* things are said may be as relevant as *what* is said. Phrases such as “little things,” “what’s it called?” and “stick things” may convey interpersonal overtones into the informal labeling process. Medway (1994) identified the ideational component in a positive light in the context of architects engaged in building projects. He described types of communication scenarios in which architects engage with each other and suggested that the ideational and interpersonal linguistic strands weave together to form a textual web with “…strands of meaning appearing and reappearing in successions of contexts” (p. 92).

Situated Learning

Lave (1991) added another dimension to this aspect by taking a de-centered view between the polarity of constructivism, and individual and socially shared cognition. Lave suggested that children may develop language and learning within what is termed a “situated community of practice.” This may share some similarity with the architects’ office with its community of specialized engineers and designers sharing tasks, contexts, and a stream of specialized language.

From a classroom perspective, this may have implications for the way that teachers organize practical learning situations, such as engagement with mechanisms. Perhaps the role of pupil *participation* needs further exploration with a greater emphasis on organizational strategies that enable pupils to situate themselves both as observers and as managers with responsibility for practical activity (Lave & Wenger, 1991). Rogoff (1995) reinforced this view as one of the basic notions concerning the transfer of knowledge and made the point that it is the transfer between situations of say, “observer” and “responsible organizer” that allows participants to construe relations between purposes and meanings. Indeed, Rogoff described this process in a profound way as being “…inherently creative, with people actively seeking meaning and relating situations to each other” (p. 159). The situated learning environment can thus enable episodes of “reflected” dialogue in which ideas are tested by bouncing them onto other participants to gauge levels of acceptance.

Conclusion

We are left with a number of problems. First, from one perspective it would seem that linguistic possession of sets of appropriate technical terms is a desirable curriculum aim. Second, as has been demonstrated from the selected examples, there is some inconsistency in the very definition of technical terms themselves. In the limited setting of the cases presented, for example, one cannot be sure what “right” terms actually are! Third, the guidance materials that could influence and direct the actions of teachers reflect the general uncertainty over the use of technical terms. They are inconsistent. Finally, from limited research evidence based on observations of what children do in schools, children appear to want to use their own terms rather than prescribed ones anyway. They are able to construct their own terms based, for example, on perceptions of form and function. This in itself is a valuable learning experience which may serve to develop technological capability.

What effect does all this have on development of language and literacy within the primary classroom? It may be that children are not necessarily “technologically deprived” if their technical vocabulary is not as sound as curriculum documents might incline us to believe is desirable. Perhaps the technical “home grown labels” produced by children within the design and technology “situated community of practice” contributes to a growth of understanding that is, as yet, not recognized nor understood. A body of further research from primary classrooms needs to contribute to the overall picture. Indeed perhaps the pursuit of a true technical vocabulary at an early age is, to an extent, undesirable and special terms are best used in the more refined atmosphere of the secondary school. Here technology-dedicated staff can use appropriate terms and convey these to children consistently within relevant contexts. It is possible that the “misuse” of technical terms in settings that educate young minds has itself contributed to the occurrence of “linguistic drift” which seems to surround the terms specified in this account.

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