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SUGGESTIONS FOR DEVELOPING A RELIABLE EVIDENCE BASE FOR THE EFFICACY OF DIMENSIONS OF LEARNING IMPLEMENTATIONS

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ABSTRACT

This paper advocates the development of an empirical evidence base to guide and enhance Dimensions of Learning (DoL) implementations. The discussion is two-fold. The American research evidence base supporting DoL is outlined and categorized in relation to specific Dimensions. The paper then discusses two approaches to how extant data might be used to shed light on the efficacy of DoL implementations in this country. The paper argues that using these approaches will enable the development of a situated, empirical evidence base reliable enough to guide and enhance DoL implementations in Australia.

INTRODUCTION

The purpose of this paper is to argue the need for research evidence to be collected about the efficacy of Dimensions of Learning (DoL) implementations. DoL is a pedagogical framework that has been featuring in Australian primary, secondary and tertiary educational settings since the mid-1990s. It was developed and first published in 1992 in the United States at the Mid-continent Research for Education and Learning (McREL) by Robert Marzano and a team of program developers. Two of the first Australian schools to implement DoL, initially quite independently of one another, were Brisbane Grammar School and Prince Alfred College in Adelaide (Allen & Smith, in press). Since that time, DoL has continued to attract the interest of educators across a number of states, schooling systems and educational sectors, and the number of institutions adopting DoL continues to grow. While there are, as yet, no official figures to indicate the number of institutions using DoL in Australia, the demand for professional development and strong collegial interest expressed in educational quarters suggests that the new millennium has seen an increase in the uptake of the framework, particularly in schools (Allen & Smith, in press).

Until recently, DoL’s uptake in the tertiary sector was sporadic and confined to individual staff members rather than as whole faculty or whole school initiatives. However, two Australian universities have now adopted DoL as an integrating pedagogical framework within their Schools of Education. These are Central Queensland University (CQU) and Charles Darwin University (CDU) in the Northern Territory. CQU first implemented the framework in 2004 and has recently been accredited by McREL to provide DoL training to educators throughout Australia. The university is also the nominated DoL training provider for members of the Australian Council of Educational Leaders (ACEL).

One of the reasons for the uptake of DoL in this country is that it is underpinned by a strong empirical evidence base. The following account provides an overview of this evidence base, including both the original research and theory that informed the
development of DoL as well as more recent research that supports the efficacy of the constructs within the five Dimensions.

BACKGROUND

Dimensions of Learning was developed by Marzano, Pickering and colleagues as an extension of their research-based framework on cognition and learning contained in *Dimensions of Thinking: A Framework for Curriculum and Instruction*, published in 1988. In *Dimensions of Thinking*, the authors sought to provide an organising framework for teaching thinking, “a latticework to systematically examine themes common to the different approaches and relationships among them” (Marzano et al., 1988, p. 3). They drew from contemporary educational and psychological work into how students learn and identified five dimensions or “threads” running through both research and theory (Marzano et al., 1988). The five Dimensions are:

- Dimension 1: Attitudes and perceptions
- Dimension 2: Acquire and integrate knowledge
- Dimension 3: Extend and refine knowledge
- Dimension 4: Use knowledge meaningfully
- Dimension 5: Habits of Mind

In the Dimensions of Learning framework, first published four years later in 1992, a team of project developers led by Marzano translated the Dimensions from this conceptual framework into a practical pedagogical framework for K-12 educators to use in any content area (Marzano et al., 1992). They did this by identifying and developing appropriate teaching and learning strategies based on the five Dimensions. These strategies were then field tested over a two-year period by a consortium of 90 educators representing various schools, districts and institutions of higher education across the United States and Mexico. Modifications were made to the framework to reflect the feedback and suggestions for improvement provided by the consortium (Marzano et al., 1997b). A second edition of the *Dimensions of Learning teacher’s manual* (Marzano et al., 1997a) was published in 1997. Major changes from the first edition, which reflected feedback from educators and findings from emerging research, included an added emphasis on identifying declarative and procedural knowledge, additional resources for Dimensions 3 and 4, and additional recommendations for addressing Dimension 5. We now turn to the evidence base of DoL.

EVIDENCE

The most important research supporting the efficacy of constructs in Dimensions of Learning are two meta-analyses by Marzano. They are *A theory-based meta-analysis of research on instruction* (1998) and *A new era of school reform: Going where the research takes us* (2000). The first of these analyses provides a synthesis of a broad range of instructional research, much of which had been included in other meta-analyses, using categories considered specific and functional enough to provide guidance for classroom practice (Marzano, 1998). Three major implications about classroom instruction were
inferred from this meta-analysis, namely:

- Teachers should identify knowledge and skills that are targets of instruction;
- Teachers should identify and use specific instructional techniques for specific instructional goals; and
- Teachers should regularly use instructional techniques that apply to all types of instructional goals. (Marzano, 1998, p. 128)

In *A new era of school reform*, Marzano then attempted to synthesize and interpret prior research on the impact of schooling on students’ academic achievement. His analysis covered the four decades from 1960 to 2000 in which the effects of schooling had been systematically studied (Marzano, 2000). His focus was on the school-, teacher-, and student-level factors that influence student achievement. Of these factors, the importance of the teacher-level effect in general, and the category of instruction in particular, are of special interest because they tell us about the Dimensions of Learning. Marzano identified nine categories of instructional strategies that have a high probability of enhancing student achievement for all students in all subject areas in all grades. There is a strong correlation between these categories of instructional strategies and those included in the Dimensions of Learning framework (Marzano, Pickering & Pollock, 2001).

**Support of the Dimensions of Learning constructs**

For the purposes of this paper, the following discussion provides an indicative account of the research supporting DoL rather than an exhaustive account of all confirmatory research. As such, we will examine the ways in which some of the constructs in the Dimensions of Learning framework are supported by the nine categories of instructional strategies that affect student achievement. This discussion will be organized around two of the Dimensions, namely, Dimensions 2 and 3. After a brief overview of each of these Dimensions, we will select certain features of the respective Dimension and draw correlations between them and the relevant category/ies of instructional strategies.

**Dimension 2**

In Dimension 2 learners acquire and integrate knowledge. The primary understanding in this Dimension is that for learning to be meaningful, newly acquired knowledge must be integrated into the already existing knowledge base for each learner. That is, learning involves a subjective process of interaction between what the learner already knows and new knowledge (Marzano et al., 1997a). Dimension 2 distinguishes two types of knowledge called *declarative knowledge*—the facts, concepts and generalisations within content knowledge—and *procedural knowledge*—knowledge of how to perform some task or skill. When teaching, each of these types of knowledge can be divided into three phases of declarative knowledge, namely, constructing meaning, organising and storing, and three phases of procedural knowledge, namely, constructing models, shaping and internalising.
Constructing meaning is the first of three overlapping phases in acquiring and integrating declarative knowledge. A number of strategies can facilitate this process that helps learners access what they already know about information. First, learners use it to make predictions about what they are learning and then confirm or disconfirm their initial guesses. The important point is that before exposing students to new content, educators explicitly help each learner to tap into his or her prior knowledge and use that knowledge to guide understanding and comprehension (Marzano, 1992).

The second phase in teaching declarative knowledge is organising knowledge. This involves the learner representing information in a subjective way. It includes identifying what is important and not important in new information and then generating a semantic or symbolic representation of that information. When learning, we create our own internal representation (a macrostructure) of the information we comprehend (a microstructure) (Marzano, 1992). Organising declarative knowledge is also the phase in which the learner sees patterns of relationships among pieces of information. It is critical that students see information in patterns, as opposed to seeing pieces of information in isolation, sometimes referred to as infobits. If students see the information in patterns, they are more likely to retain and use that information (Marzano, 1992).

There are three instructional techniques affecting student achievement that support the design of these two phases of declarative knowledge. These techniques involve questions, cues and advance organizers, summarizing and note taking, and non-linguistic representations.

Questions, cues and advance organizers have been shown to assist students in constructing meaning and organising information. Students who are taught with these strategies show a 22 percentile gain over those who are not (Marzano et al., 2001). The three instructional techniques all assist students in retrieving what they already know about a topic. Drawing from their synthesis of the literature, Marzano et al. (2001) identified a number of generalizations in using these instructional techniques. These generalizations and some of the supporting literature are included in Table 1 (immediately below).

Table 1: Generalizations about using questions, cues & advance organizers and supporting research

<table>
<thead>
<tr>
<th>Generalizations about using questions, cues &amp; advance organizers</th>
<th>Supporting research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cues and questions and advance organizers should focus on what is important as opposed to what is unusual</td>
<td>Alexander &amp; Judy, 1988; Alexander, Kulikowich, &amp; Schulze, 1994; Risner, Nicholson, &amp; Webb, 1994</td>
</tr>
<tr>
<td>“Higher level” questions and advance organizers produce deeper learning than “lower level” questions</td>
<td>Davis &amp; Tinsley, 1967; Fillippone, 1998; Guszak, 1967; Mueller, 1973; Redfield &amp; Rousseau, 1981</td>
</tr>
<tr>
<td>“Waiting” briefly before accepting</td>
<td>Gooding, 1983; Honea, 1982; Rowe, 1974;</td>
</tr>
</tbody>
</table>

1 All references cited in Tables 1, 2 and 3 can be found in Marzano et al., 2001.
responses from students has the effect of increasing the depth of students’ answers

| Questions are effective learning tools even when asked before a learning experience | Hamaker, 1986; Osman & Hannafin, 1994; Pressley, Symons, McDaniel, Snyder, & Turnure, 1988; Pressley, Tenebaum, McDaniel & Wood, 1990; Pressley, Wood, Woloshyn, Martin, King, & Menke, 1992 |
| Advance organizers are most useful with information that is not well organized | Martorella, 1991; Mayer, 1979; White & Tisher, 1986 |
| Different types of advance organizers (expository, narrative, skimming & illustrated) produce different results | Hattie, 1992; Lott, 1983; Stone, 1983; Walberg, 1999 |

Adapted from Marzano et al. (2001)

Summarizing and note taking are important techniques in organising declarative knowledge. They both require students to distil information, once acquired, into a synthesized form. There is a 34 percentile gain shown by students taught with these types of strategies over those who are not. Marzano et al. (2001) extracted from their synthesis of the research a number of major generalizations about summarizing and note taking. These are set out below in Table 2.

Table 2: Generalizations about summarizing & note taking and supporting research

<table>
<thead>
<tr>
<th>Generalizations about using summarizing &amp; note taking</th>
<th>Supporting research</th>
</tr>
</thead>
<tbody>
<tr>
<td>To effectively summarize, students must delete some information, substitute some information, and keep some information</td>
<td>Kintsch, 1979; van Dijk, 1980; Rosenshine, Meister, &amp; Chapman, 1996</td>
</tr>
<tr>
<td>To effectively delete, substitute, and keep information, students must analyze the information at a fairly deep level</td>
<td>Rosenshine &amp; Meister, 1994; Rosenshine, Meister, &amp; Chapman, 1996</td>
</tr>
<tr>
<td>Being aware of the explicit structure of information is an aid to summarizing information</td>
<td>Armbuster, Anderson, &amp; Osertag, 1987; Meyer, 1975; Meyer &amp; Freedle, 1984; Raphael &amp; Kirscher, 1985</td>
</tr>
<tr>
<td>Verbatim note taking is, perhaps, the least effective way to take notes</td>
<td>Beecher, 1988; Bretzing &amp; Kulhary, 1979; Marzano, Gnadit, &amp; Jesse, 1990</td>
</tr>
<tr>
<td>Notes should be considered a work in progress</td>
<td>Anderson &amp; Armbuster, 1986; Denner, 1986; Einstein, Morris, &amp; Smith, 1985</td>
</tr>
<tr>
<td>Notes should be used as study guides for tests</td>
<td>Carrier &amp; Titus, 1981; Carter &amp; Van Matre, 1975; Van Matre &amp; Carter, 1975</td>
</tr>
<tr>
<td>The more notes that are taken, the better</td>
<td>Nye, Crooks, Powlie, &amp; Tripp, 1984; Hattie, Biggs, &amp; Purdie, 1996</td>
</tr>
</tbody>
</table>

Adapted from Marzano et al. (2001)

The third instructional strategy that has been proven effective in enabling students to organise their knowledge is non-linguistic representations. This type of pedagogical strategy (alongside advance organizers) is a common instructional feature throughout the
entire Dimensions of Learning framework. Students who have non-linguistic representations incorporated into their learning show a 27 percentile gain over those who do not (Marzano et al., 2001). Drawing upon their findings from the research and theory about non-linguistic representations, Marzano et al. (2001) make two generalizations (outlined in Table 3).

Table 3: Generalizations about non-linguistic representations and supporting research

<table>
<thead>
<tr>
<th>Generalizations about using non-linguistic representations</th>
<th>Supporting research</th>
</tr>
</thead>
<tbody>
<tr>
<td>A variety of activities produce non-linguistic representations (creating graphic representations, making physical models, generating mental pictures, drawing pictures &amp; pictographs, engaging in kinaesthetic activity)</td>
<td>Alvermann &amp; Boothby, 1986; Armbruster, Anderson, &amp; Meyer, 1992; Aubusson, Foswill, Barr, &amp; Perkovic, 1997; Darch, Carnine, &amp; Kameenui, 1986; Druyan, 1997; Griffin, Simmons, &amp; Kameenui, 1992; Horton, Lovitt, &amp; Bergerud, 1990; McLaughlin, 1991; Macklin, 1997; Muehlherr &amp; Siermann, 1996; Newton, 1995; Pruitt, 1993; Robinson &amp; Kiewra, 1996; Welch, 1997; Willoughby, Desmarais, Wood, Sims, &amp; Kalra, 1997</td>
</tr>
</tbody>
</table>

Adapted from Marzano et al. (2001)

We now turn to some of the evidence supporting several of the complex reasoning processes in Dimension 3.

Dimension 3

In Dimension 3 learners extend and refine the knowledge that they have acquired and integrated. In effective learning situations, learners engage in mental processes that enable them to gain new insights about information, see new connections, and make new discoveries. They should also be required to engage in rethinking and reorganising current knowledge and in clarifying any misunderstandings (Marzano et al., 1997b). Dimension 3 involves the student in this type of learning through a number of complex reasoning processes (CRPs), namely, comparing, classifying, abstracting, inductive and deductive reasoning, constructing support analyzing errors, and analyzing perspectives.

Research evidence supporting the efficacy of these CRPs in enabling higher order thinking is documented in Marzano’s two meta-analyses (1998, 2000). As was the case above, in order to provide an indicative account of the research we will limit our discussion here to one aspect of this research and demonstrate how it supports the inclusion of specific CRPs in the Dimensions of Learning framework.
The processes of comparing, classifying and abstracting can be operationalized as follows:

- Comparing: Identifying and articulating similarities and differences
- Classifying: Grouping things into definable categories on the basis of their attributes or characteristics
- Abstracting: Identifying and articulating the underlying theme or general pattern of information

(Marzano et al., 1997a, p. 114)

The purpose of each of these CRPs is to enable the learner to identify similarities and differences in information via the identification of important characteristics. These characteristics are then used as the basis for which similarities and differences are identified (Marzano et al., 2001). Classifying involves organizing elements into groups based on their similarities. A critical element of classifying is the identification of the rules that govern class or category membership. Abstracting, in contrast, helps students understand unfamiliar information by recognizing that it contains patterns similar to information that is more familiar (Marzano et al., 2001).

Of the nine categories of instructional strategies that affect student achievement, the category shown to create the highest percentile gain in student achievement is identifying similarities and differences. Students taught to use complex reasoning processes to identify similarities and differences show a 45 percentile gain over those students who are not. According to Marzano (2000), researchers have found these mental processes to be basic to human thought and the core of all learning.

Marzano draws four salient generalizations from the research about identifying similarities and differences. These, and examples of the supporting literature, are provided below in Table 4.

Table 4: Generalizations about identifying similarities & differences and supporting research

<table>
<thead>
<tr>
<th>Generalizations about identifying similarities &amp; differences and supporting research</th>
<th>Supporting research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presenting students with explicit guidance in identifying similarities and differences enhances students’ understanding of and ability to use knowledge</td>
<td>Chen, Yanowitz, &amp; Daehler, 1996; Gholson, Smither, Buhman, &amp; Duncan, 1997; Newby, Ertmer, &amp; Stepich, 1995; Reeves &amp; Weisburg, 1994; Ross, 1984; Solomon, 1995</td>
</tr>
<tr>
<td>Asking students to independently identify similarities and differences enhances students’ understanding of and ability to use knowledge</td>
<td>Chen, 1996; Flick, 19992; Gick &amp; Holyoak, 1980; Mason, 1994, 1995; Mason &amp; Sorzio, 1996</td>
</tr>
<tr>
<td>Representing similarities and differences in</td>
<td>Chen, 1999; Cole &amp; McLeod, 1999; Glynn</td>
</tr>
<tr>
<td>Graphic or symbolic form enhances students’ understanding of and ability to use knowledge</td>
<td>&amp; Takahashi, 1998; Lin, 1996; Mason, 1994</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
</tbody>
</table>

Adapted from Marzano et al. (2001)

Thus far, we have sought to provide a sketch of the research which demonstrates the purported efficacy of some Dimensions of Learning constructs. However, while there is ample evidence to support the inclusion of the many constructs within DoL, there has been little work done in establishing whether implementing the framework in an educational setting actually improves student learning achievement.

**THE EFFICACY OF DoL IMPLEMENTATIONS**

Thompson (1999) used a quantitative approach to evaluate the efficacy of Dimensions of Learning in improving student outcomes in a boys’ independent secondary college in South Australia. Through examining the scores achieved in the Australian Schools Science Competition over several years, Thompson concluded that exposure to the Dimensions of Learning program produced a measurable advantage. The research method used involved Rasch-scaling the scores from five year levels of students over a number of years before and after the implementation of Dimensions of Learning. This was followed with multi-level analysis, enabling statistical control of such variables as year level, measured IQ and the student cohort of each level. Thompson showed that over five years, students exposed to the Dimensions of Learning program experienced an improvement in academic performance equivalent to six months of extra schooling (Thompson, in press).

Two American studies also shed light on the practices associated with Dimensions of Learning. In the mid 1990s, action research, using survey questionnaires and interviews, was conducted to evaluate the Dimensions of Learning program in the Concord-Carlisle School District (Cooper et al., 1996). The reported benefits included increased student learning of course content, increased student metacognition and enhanced curriculum planning by teachers.

In a study of a school district in Kirkland, USA, Apthorp (2000) conducted a survey of approximately 70 teachers and their students about Dimensions of Learning practices and outcomes. Survey items focused on Dimensions 1 and 5. Results from the survey reflected teachers’ self-assessed level of use of practices and strategies from Dimensions
1 and 5, classroom mean ratings of intended outcomes of Dimensions 1 and 5—as reported by students—and possible linkages between the two. Apthorp (2000) found that teachers, on average, demonstrated advanced levels of implementation for Dimension 1 practices, but they demonstrated only beginning levels of use for Dimension 5. Students reported practices and strategies associated with Dimension 1 to a moderate or great degree, but reported moderate qualities associated with Dimension 5 and in the upper grades only.

In light of the paucity of evidence substantiating the value of DoL implementations, we now discuss some methodological approaches to generating credible evidence about the efficacy or otherwise of DoL implementations.

**A METHODOLOGY FOR OBTAINING RELIABLE EVIDENCE**

There is insufficient scope in this paper to provide a comprehensive exposition of all factors relevant to research validity. Therefore, we focus only on reliability, namely synchronic and diachronic reliability. Synchronic reliability refers to research designs that use the same method to investigate phenomena (Silverman, 2004). Research designs targeting specific aspects of an implementation over time require synchronic reliability if they are to produce credible results. In contrast, diachronic reliability refers to research designs that utilise a variety of methods in order to bring data to bear on particular phenomena (Silverman, 2004). Whole-of-school implementations suggest research designs that are diachronically sound. The scope and range of research are key practical determinants of whether it is worthwhile to attempt research of both types, a matter we now discuss in more detail.

Individual classroom implementations tend to imply research designs using the same research method over time (synchronously reliable studies). For example, teachers routinely collect attendance data that are monitored over the year and reported. It follows then that a classroom implementation focused on Dimension 1 ought to yield changed patterns of attendance over time, especially in the case of less engaged pupils. Other indicators of enhanced classroom climate that are systematically monitored at the classroom level are things such as time-outs, withdrawals, detention, suspension and expulsion. These indicators all bear on the broad phenomenon of “behaviour” and thus are congruent in principle with tracking attendance and drawing inferences over time about the efficacy or otherwise of a Dimension 1 implementation in a particular classroom.

Of course, additional factors inhere in the robustness of such research. Ideally, there ought to be a clear starting point for the implementation. This means that the classroom climate prior to the implementation must be understood in terms of the same data sources that will be used to track the implementation. There should also be an absence of, and/or controlling for, intervening variables. That is, no other changes to classroom climate other than those intended by implementing Dimension 1 should be made. Where external factors intervene these should be noted.
Following protocols such as these increases the likelihood that the behavioural and attendance patterns tracked over time will lend themselves to drawing inferences that are plausibly attributable to the implementation. However, this example of synchronic reliability at the classroom level has implications for determining the efficacy and durability of whole-of-school initiatives.

Two limitations of research into classroom implementations are durability and generalizability. Limited durability is inevitable because primary school teachers rarely take a cohort of children from one year level to the next. Similarly, secondary teachers divide their efforts across numerous student cohorts simultaneously within any given year. Thus, it is highly unlikely that individual classroom studies of student cohorts can be conducted over a period greater than one year. This is not to say that a teacher’s classroom climate cannot be reliably researched over a number of years, but a study of one teacher’s classroom climate over time would at best constitute a series of Case Studies rather than an unbroken implementation narrative. Similarly, there will always be variability or teacher affects on classroom implementations. Thus, it is methodologically prudent to compare and contrast all classrooms over time if reliable inferences are to be drawn about generalizable effects of an implementation.

Moreover, at the whole school level a study using a test/control methodology would arguably be more robust than a simple tracking study. That is, if some classrooms implemented a Dimension 1 approach (test) while others did not (control), one would presumably discern correspondingly different classroom climates over time. Notably, this approach could create a behavioural divide within the school between test and control classrooms that might in turn cause unintended consequences such as conflict between pupils and/or teachers in relation to what constitutes appropriate behaviour within the school’s classrooms.

The foregoing discussion brings us to the matter of diachronic reliability. Presume for argument’s sake that a whole-of-school Dimension 1 implementation occurs and that data sets for individual classrooms and all classrooms are collected from the sources listed above and are then compared and contrasted within and between classrooms. This is a synchronically reliable research design. However, a diachronic design suggests at least two additional layers of research could add both robustness and complexity to efforts aimed at discerning the efficacy of the implementation. The first layer would involve gathering evidence from the pupils themselves and/or their parents about perceived changes to classroom/school climate. Pupils (depending on age) as well as parents could be surveyed and/or interviewed about their perceptions and their perceptions in turn could be compared and contrasted with attendance and behavioural data. A similar exercise could be conducted with teachers and other relevant school personnel. These additional comparisons would lend credence to any overall inferences drawn about the implementation’s efficacy. However, the research logistics involved as well as the complexity of comparing “objective” data such as attendance patterns with “subjective” data derived from informants’ “perceptions” make this exercise a much larger scale undertaking. The second diachronous layer is even more complex.
While one might presume that improvement in classroom climate translates into better student engagement and ultimately into better student learning outcomes, there is no necessary connection between any of these three variables. Rather, in order to determine if they are in fact connected additional data about student engagement and outcomes are required. This entails a diachronic research design drawing on data derived from techniques such as classroom observations of student engagement/on-task behaviour as well as evaluations of student performance. These data would then need to be triangulated with data derived from the first mentioned tracking systems and/or surveys and interviews with pupils and/or parents. Any attempt to draw inferences about associations between enhanced student learning outcomes and a Dimension 1 implementation would require more comprehensive pupil/parent/teacher surveys and more in-depth and refocused interviews of these informant groups. The added complexity highlighted here remains constant in the case of DoL implementations related to other Dimensions as well.

For example, imagine an implementation focused solely on the basics of Dimension 2. A diachronic research design aimed at evaluating the efficacy of such an implementation would ideally refer to students’ acquisition and demonstration of declarative and procedural knowledge across all subject areas and year levels. Similarly, in the case of implementations involving Dimensions 3 and 4 the most robust design would be diachronic and ideally would refer to students’ acquisition and demonstration of the 14 complex reasoning processes. The same applies to Dimension 5, students’ internalisation and use of critical, creative and self-regulated thinking processes.

Returning to our discussion of the specific techniques used in Dimensions 2 and 3 at the level of the classroom, it would be wise to focus research on no more than a couple of these. For example, at the classroom level synchronic designs would correlate things such as attendance/engagement with student performance on assessments that evaluate a particular complex reasoning process. Alternatively, a whole-school approach may evaluate the same complex reasoning process, but might do so across a discipline area and a year level in one year, followed by evaluations of different discipline areas and year levels in the following year. These data could be cross-referenced with different sets of student/parent/teacher perceptions.

CONCLUSION

In this paper, we have outlined the American research evidence base supporting Dimensions of Learning and categorized it in relation to specific Dimensions, namely Dimensions 2 and 3. In so doing, we conclude there is a dearth of evidence about the efficacy of DoL implementations. The implication is that a reliable approach to gathering and interpreting evidence of the efficacy of DoL implementations is a necessary first step toward providing a comprehensive and compelling case for using DoL. This could be achieved through collaborative research involving school and university personnel.
REFERENCES


