

RESEARCH AREA & SOURCE	DESCRIPTION & MAIN FINDINGS/ARGUMENTS
<p>Curriculum Development / Assessment / Learning Skills</p> <p><i>The Curriculum Journal Vol. 18, No. 2, pp. 195 - 210</i></p>	<p><b>Csapo, Beno (2007) Research into learning to learn through the assessment of quality and organization of learning outcomes.</b></p> <p>This article summarizes the results of a number of studies conducted over nearly a decade in Hungary. The knowledge of students in Grade 7 and Grade 11 was assessed on four levels - (1) teacher grades (2) objective knowledge tests based on the curriculum (3) assessments of the quality of knowledge ( eg level of student understanding of content, ability to apply knowledge on novel contexts – this included assessment of Science application, misconceptions, Math understanding, spatial reasoning, historical reasoning etc.) and (4.) higher order thinking skills ( considered to be essential in order to acquire ‘high quality’ knowledge – this included assessment of inductive and deductive reasoning, correlative reasoning, critical thinking, verbal analogies etc.). Students were also given questionnaires to collect background information including information about their motivation and self-concept.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>● Teacher grades correlated highly with the results of knowledge tests in Math and Science but the correlation was quite low for history and literature.</li> <li>● Much lower and in many cases insignificant correlations were found between teacher grades and measures of understanding and ability to apply knowledge. No relationship was found between teacher grades and historical reasoning.</li> <li>● In general grading is more consistent in Math and Science but teachers seem to lack a firm basis for assigning grades in other subjects.</li> <li>● The mean result for student acquisition of knowledge was around 50% indicating that students do learn a significant proportion of what they are expected to learn. However, large variations were observed according to the level of education of parents indicating that student learning may be shaped more by factors outside the school than within it.</li> <li>● Student performance on assessments of understanding and application was low.</li> <li>● Analyses that studied the relationships between variables indicated that students appear to have two independent bodies of knowledge - one mastered within the context of school and another originating from everyday experiences. The school knowledge appears to be virtually unusable outside the school context and the everyday knowledge is more pragmatic but often leads to false generalizations. Transfer appears limited in both cases.</li> <li>● Correlational analyses revealed a major role for inductive and especially analogical reasoning in learning with understanding.</li> <li>● Comparisons of results of the two grade levels indicated that higher order thinking skills were found to develop very slowly and that some even decrease over the years. For example it appears that the longer students spend in school the less likely they are to be able</li> </ul>

	<p>to recognize and accept probabilistic relationships.</p> <ul style="list-style-type: none"> <li>● Affective variables also showed a negative tendency - the longer students were in school the more negative attitudes they had towards subject areas ( English as a foreign language was the only exception to this.)</li> <li>● In other studies by the same researchers it was found that specific training in higher order thinking skills within the context of the learning of subject matter clearly removes the obstacles that hinder 'high quality' learning.</li> </ul>
<p>Assessment</p> <p><i>The Curriculum Journal Vol. 18, No. 1, pp. 39 - 56</i></p>	<p><b>Buhagiar, Michael (2007) Classroom assessment within the alternative assessment paradigm: revisiting the territory.</b></p> <p>This article examines some of the key concepts related to assessment (such as validity, reliability, objectivity etc.) and relates them to ideas about assessment of learning as opposed to assessment for learning.</p> <p><b>Main Arguments:</b></p> <ul style="list-style-type: none"> <li>● Assessment developed historically for the purposes of selection and certification and therefore a premium was put on techniques that appeared to be fair and objective and on high levels of reliability.</li> <li>● Traditional assessment is <i>learning unfriendly</i> (narrow, sudden death, non-informative), <i>curriculum unfriendly</i> (emphasizes rote learning), <i>teacher unfriendly</i> (encourages a 'testlike' teaching program), <i>student unfriendly</i> (leads to labeling, unmotivating)</li> <li>● Assessment in the new paradigm accepts that assessment is inexact and not necessarily objective. It tells us what learners can do in particular circumstances.</li> <li>● Assessment for learning distances itself from traditional views of reliability and validity. The qualities of a trustworthy assessment are <i>credibility, transferability, dependability, authenticity.</i></li> <li>● The main difference between formative and summative assessment is not the assessment itself but the use to which the information is put.</li> <li>● Assessment for learning must include components of self- and peer assessment. No matter how good the feedback from the teacher is, students still need to become self-monitoring learners.</li> <li>● Learners must grasp the learning goals and be able to compare them with their present understanding. They must also progress in their strategic knowledge of how to improve their own learning.</li> </ul>
	<p><b>Black, P., McCorkick, R., James, M. and Pedder, D. (2006) Learning how to learn and assessment for learning: a theoretical inquiry.</b></p> <p>This article explores the construct 'learning how to learn' and relates it to assessment for learning based on the results of different pieces of</p>

	<p>research.</p> <p><b>Main Arguments:</b></p> <ul style="list-style-type: none"> <li>● Learning how to learn is cannot be separated from learning itself and is best viewed as a set of ‘learning practices’ rather a set of separate learning skills that can be taught</li> <li>● Problem solving is central to learning. Learning as problem solving can be seen as a situation where the goal is to learn and problem solving is the vehicle. Students will not necessarily learn unless they are trying to learn - investing effort in both solving a given problem and transferring their learning to unassigned problems associated with their understanding. Learning must be <i>intentional</i>.</li> <li>● Learning to learn involves four elements: (1) knowledge about cognition - realizing the degree to which you understand (2) self-regulating strategies - planning what to do next and evaluating the progress (3) agency - taking responsibility for the direction of learning (4) collaboration - effective group interactions encourage students to think about their understanding</li> <li>● Three particular ‘learning practices’ have been shown by research to be effective: (1) lessons designed to challenge students’ ways of reasoning and thereby develop a set of reasoning skills (Shayer, 1999) (2) group tasks where students practice ways of collaborating in discussion to develop reasoning and problem-solving ( Mercer, 2000) (3) Assessment for Learning practices ( Black &amp; William, 1998).</li> <li>● Three of the Assessment for Learning practices that research has shown to be effective are: (1) encouraging teachers to frame their questioning so that it explores key features of learning (2) giving content-only feedback on written work, with the requirement that students respond to the comments by further work (3) the development of peer- and self- assessment.</li> <li>● Emphasis should be placed on practices that have the potential to promote learner autonomy as this would seem to be the most secure foundation for lifelong learning.</li> </ul>
<p><i>Assessment – Language</i></p> <p><i>Applied Linguistics</i> Vol. 26, No. 3, pp. 317 - 342</p>	<p><b>Ross, S. (2005) The impact of assessment method on foreign language proficiency growth.</b></p> <p>This study examined the effect of formative assessment on proficiency growth with foreign language learners. The subjects were eight cohorts of students (2215 in total) participating in a 320 hour, four-semester English for Academic Purposes course. The first four cohorts were assessed with mainly conventional end of term summative assessments and tests. The subsequent four cohorts participated in formative assessments including self-assessment, peer assessment, on-going portfolios and cooperative learning projects as well as more traditional summative assessments. Comparisons were made based on both student grade point averages over the four semesters and three TOEFL tests in reading and listening administered prior to entry into the program, at the end of the first academic year and again at the end of the second academic year.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>● Grades calculated with the inclusion of formative assessments were no less reliable than grades calculated using purely teacher-</li> </ul>

	<p>assessed summative tasks.</p> <ul style="list-style-type: none"> <li>• In the summative group, learners whose initial proficiency levels in both reading and listening were high showed the most improvement. In contrast, formative assessment seems to have neutralized some of the causal influence of initial proficiency on future achievement and (particularly with regard to listening) those who began with lower proficiency either progressed at the same or a greater rate than those who began with higher proficiency.</li> <li>• The formative cohorts demonstrated a rate of growth in proficiency that was 36% faster than the summative cohorts for listening and 3.2% faster for reading.</li> <li>• In reading the formative cohorts showed a higher gain in proficiency (as measured on the TOEFL test) at the end of the first academic year. This had tapered off by the end of the second academic year so that there was little difference between the groups.</li> <li>• In listening the formative cohorts showed a significantly higher gain in proficiency to the summative cohorts and this difference increased further by the end of the second year.</li> <li>• In general the researchers conclude that formative assessment has a substantive impact on proficiency growth, but that this seems to be domain-dependent. They speculate that proficiency growth in reading may be more associated with cross-referencing of reading materials in mainstream subject area courses.</li> </ul>
<p><i>Assessment</i>  <i>The Curriculum Journal</i> 18, 3 - 25</p>	<p><b>Miller, D. &amp; Lavin, F. (2007) 'But now I feel I want to give it a try': formative assessment, self-esteem and a sense of competence.</b></p> <p>This study investigated whether the use of formative assessment techniques had an impact on learners' self-esteem. Previous studies had indicated an improvement in achievement, but evidence of impact on self-esteem had been largely anecdotal. The study used the Rosenberg self-esteem scale as a pre- and posttest as well as qualitative data gained from interviews, focus group discussions and questionnaires conducted with both teachers and students. Self-esteem was operationalised as a combination of self-worth and self-competence and the measurement instrument allowed for the separation of components.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>● General - There were gains in both sub-constructs ( self-worth and self-competence) as well as in the combined measure of self-esteem. All gains were statistically significant.</li> <li>● Gender-specific – Both genders made gains in all three measures. The gain for boys was greater on all three measures. The gain for girls on the sub-construct of self-worth was not statistically significant but all other gains were.</li> <li>● Specific to ability groups – All groups made statistically significant gains on all measures but the gains for lower ability groups and higher ability groups were greater than those for middle ability groups. The gains for middle ability groups were not statistically significant.</li> <li>● Learners identified as having negative views of their ability – teachers identified learners who lacked confidence in ability to learn at the start of the intervention. This group made much greater gains in all measures when compared with other learners.</li> <li>● Learners with prior experience of formative assessment – gains in self-esteem were much lower for students with no prior experience of formative assessment and not statistically significant.</li> <li>● Qualitative data supported the findings of the pre- posttest on measures of self- esteem.</li> <li>● Qualitative findings also suggest that the use of formative assessment over time causes learners to focus more on the quality of their work.</li> <li>● The findings also suggest that the underlying basis of some learners' self-esteem shifts from performance relative to peers to a focus on</li> </ul>

	<p>improvement in their own work.</p> <ul style="list-style-type: none"> <li>● Teachers also noted that their beliefs about learning and their style of teaching had been affected by engaging in formative assessment.</li> </ul> <p>The researchers believe their data indicate that:</p> <ul style="list-style-type: none"> <li>● Those who may benefit most include learners who previously had a lack of self-competence.</li> <li>● The positive effects of formative assessment may take some time to become evident due to the need not only to train learners in procedures but also to allow them to come to value the idea of formative assessment.</li> <li>● Though it cannot be directly inferred from the data the self-esteem theory would indicate that gains in self-competence may cause a small increase in feelings of self-esteem, but if these are subsequently enhanced by positive comments from others they may further enhance self-worth, which depends on affirming messages from significant others. Thus the two-part construct of self-esteem is of particular value.</li> </ul>
<p><i>Curriculum Implementation / Curriculum Development</i></p>	<p><b>Schmidt, W., McKnight, C., Houang, R., Wang, H., Wiley, D., Cogan, L. &amp; Wolfe, R. (2001) Why Schools Matter: A Cross-National Comparison of Curriculum and Learning. San Francisco, CA: Jossey-Bass.</b></p> <p>This study is an analysis of data from the TIMSS (Third International Mathematics and Science Study) research. The analysis is on two levels. The data are analyzed to produce a model of curriculum which can be said to be a composite of the elements in an education system which together contribute to opportunities to learn for students. The elements of this model are : content standards ( as a measure of curriculum intent), amount of textbook space allocated to a topic ( as a measure of potential curriculum implementation), number of teachers teaching a topic within a country ( as a measure of curriculum implementation) and percentage of time in Grade 8 spent teaching a topic ( as a measure of curriculum implementation). All curricular indications were converted to quantitative measures for the purpose of the study. A further indication - namely, percentage of textbook space devoted to complex performance expectations is also used occasionally in the study though unfortunately is not included in the model. The model is then used to analyze the connections between various elements of the model itself and their cross-national variations. These cross-national variations in curriculum structure are then compared with gains in achievement during Grade 8 as represented by results on the TIMMS test in order to examine some of the costs / benefits of particular curricular structures. It is important to note two considerations of this study. Firstly, achievement was included as gains in achievement during the eighth grade rather than achievement status at a point in time so that it was possible to relate these to the eighth grade curriculum. Secondly the purpose of the study was primarily cross-national comparison so that drawing any conclusions for smaller units that national systems is fraught with difficulty.</p> <p><b>Main Findings:</b></p> <p>Interactions between elements of the curriculum model</p> <ul style="list-style-type: none"> <li>● In terms of intended curriculum, the number of topics in Math included in content standards ranged from 10 in Japan to all 44 of the TIMMS topics in the USA. Among those countries planning to cover the fewest topics, several were among the top seven performing countries.</li> <li>● There was considerable variation among countries in terms of textbook space devoted to complex performance expectations as well as</li> </ul>

- considerable variation across topics within a country.
- Even in countries with national content standards determined by a central body, there was no country where the percentage of teachers who covered that topic in Grade 8 was close to 100%.
  - For Science textbook coverage affected instructional time, but content standards did not affect textbook coverage or instructional time, though they did increase the number of teachers teaching the topic. Textbook coverage, however, did influence instructional time.
  - For Math content standards influenced instructional time and teacher coverage both directly and indirectly through their influence on textbook coverage.
  - For both Math and Science the amount of textbook space devoted to a topic was the biggest influence on teacher implementation, increasing both the number of teachers who taught a topic and the percentage of time they allocated to a topic. The researchers conclude that textbook coverage is a strong indicator of teacher implementation.
  - Textbook space accounted for between 10 and 70 percent of the variance of instructional time in Math across countries and between 20 and 70 percent of the variance in Science.
  - The role of the textbook varies widely across countries.
  - Strong relationships exist between the 4 curricular indications examined when considering profiles of topics, hinting that curriculum should not be considered as a set of separate topics but as vectors of topics. Profiles of opportunities to learn across topics may be more relevant than considering single topics.
  - Generally the amount of textbook space allocated was greater in countries where the topic was included in the content standards.
  - One relationship was constant throughout different kinds of analysis - that of textbook space to teacher implementation.
  - The relationships between curriculum indications can be seen as a measure of the degree of coherence of curriculum or curricular alignment within a country.
  - In all cases countries where the content standards were set by a single central body had a higher level of curricular coherence, though the relation between content standards and teacher implementation may have been indirect via textbook space.

The relationship of curricular structures to achievement gains

- Four out of five of the topics in Math where student gains were the highest were also in the top five topics in terms of curricular emphasis indicating that opportunities to learn as actualized by the curricular indications in this study do make a difference in terms of student learning
- None of the top five topics in Science where student gains were highest were in the top five according to emphasis - this result is possibly related to the fact that there was far less agreement across countries as to what the top 5 topics were in Science as opposed to Math.
- In examining pair-wise relationships between curricular indications and achievement, every indication was related positively to achievement indicating that more emphasis in any area could lead to gains.
- When controlling for the other curricular indications, the relationship of instructional time to achievement gain for Math became only marginally significant, indicating that part of the increase in instructional time is related to inclusion in content standards or increase in allocation of textbook space.
- In general content standards in Math affect teacher implementation both directly and indirectly through textbook space.
- In Science increased textbook space was related negatively to achievement gain, but when some anomalous topics were removed, the relationship became insignificant.
- In Science content standards were not related to teacher implementation.
- In Math when other indications were controlled for, the indication which was related to gain for the largest number of countries was

- textbook space, though in some countries the main relationship to gain was defined by content standards.
- In Science the variable related to gain for the largest number of countries was the percentage of textbook space devoted to complex performances. An average of 25 percent of the variation in gain can be explained by this variable.
  - When the percentage of instructional time was converted to a figure in hours it was found that the rate of increase of achievement gain by hours of instruction was not constant. The rate of gain rapidly accelerated after 9 hours of instruction per topic. Prior to that there was no relationship between instructional time and achievement gain.
  - Though this analysis really pushed the limits of the available TIMMS data, the researchers used proportion of textbook space as an indicator of instructional time devoted to more demanding expectations in Math. In this analysis the rate of achievement gain was more linear and the researchers hypothesize that this variable leads to more learning.
  - For the topic of equations and formulas, the topic given the most emphasis in Grade 8 Math over all the countries in the study, the only curricular indication linked to achievement gain was the percentage of textbook space devoted to complex performances.
  - Analyses were conducted for each topic separately using whichever measure of opportunity to learn had correlated most strongly with gain in that subject, a measure of the country's GNP and a measure of how demanding instruction was created from items on the TIMMS teacher questionnaire relating to instructional activities. The results were that GNP related to gain in around half the topic areas, BUT in no case did controlling for GNP eliminate the effects of curriculum.
  - Up to 40% of cross-national variation in achievement gain in Math can be accounted for by the measures of curricular opportunities used in the study.
  - The aspects of curriculum most involved with achievement gain in individual Math topics were textbook space, textbook space devoted to more complex performance demands, no of teachers covering the topic and instructional time. Only content standards were not significantly related to variations in cross-national gains ( though they may have been related indirect via textbook space)
  - One interesting example topic was 'proportionality'. No curricular indicator was related to gain in this topic area in any of the analyses carried out. However, two other topic areas (congruence from geometry and slope and trigonometry from algebra) were related to gain in proportionality and the curricular indication most related to this gain was textbook space devoted to complex performances.
  - In Science all curricular indications were related to gain individual topics (though textbook space was in some cases negatively related), the most prominent being measures of teacher implementation. Content standards played a more prominent role than in Math.
  - One interesting example topic was 'Science, Technology and Society'. Amount of textbook space in this case was negatively related to achievement gain. However, study of the topic of 'natural disasters' was positively related to gain in 'Science, Technology and Society' and the curricular indication most related to this gain was textbook space devoted to complex performances.
  - The analyses showed clusters of countries with similar curricular structures.
  - Finally an analysis of learning within the US was carried out. The results were that opportunities to learn were significantly related to achievement gains. For 5 out of 20 topics, more demanding performance expectations were significantly related to gains. Using the strength of relationships on the curriculum model created increases in gains were predicted for various topics depending on increases in curricular opportunities to learn. The predicted increases were sizeable.

**Summary**

- Curriculum when defined as content standards, amount of textbook space allocated to a topic, number of teachers teaching a topic within a country and percentage of time spent teaching a topic does provide opportunities to learn and does result in achievement gains.

	<ul style="list-style-type: none"> <li>● Differences in the way these four indications are structured a related to differences in gains.</li> <li>● Learning in one topic can have a significant influence on learning in other topics and so curriculum topics should be considered as profiles of topics.</li> <li>● The structure and sequence of curriculum should make use of the logic of profiles of topics.</li> <li>● Quality of learning opportunities in the form of more demanding performance expectations is important, not just quantity. Drill and practice alone is not adequate.</li> <li>● The textbook exerts an extremely strong influence over teacher implementation and this should not be ignored.</li> <li>● Inclusion in content standards alone does not guarantee that content will be covered.</li> <li>● The degree of central control of an education system does help achieve curricular alignment, but on its own is not enough to ensure this.</li> </ul>
<p><i>Assessment / Leadership</i></p> <p><i>Phi Delta Kappan 77:3 p. 246</i></p>	<p><b>Cizek, G. (1995) The big picture in assessment and who ought to have it.</b></p> <p>In the opinion of Gregory Cizek the principal has the primary responsibility for systematizing assessment so that all assessments carried out have a well-articulated purpose, and assessment information is used to improve the school's program.</p> <p><b>Main Arguments:</b></p> <p>Principals Need to:</p> <ul style="list-style-type: none"> <li>● Have an intimate knowledge of what is happening in classrooms</li> <li>● Ensure that educational aims are clearly identified</li> <li>● Ensure that strategies are identified for assessing those aims ( including ensuring that assessments are devised for aims that currently lack them AND that redundancy is reduced)</li> <li>● Ensure that the information gleaned from assessments is reported in a real and relevant way to stakeholders and is ultimately used to further the educational mission of the school</li> </ul> <p>Cizek suggests that beyond becoming assessment-literate themselves, principals could set up an advisory committee to help them with the task of creating a 'planned assessment system'.</p>
<p><i>Curriculum Implementation + Assessment</i></p> <p><i>The Curriculum Journal 16, 193-206</i></p>	<p><b>Jones, A. &amp; Moreland, J (2005) The importance of pedagogical content knowledge in assessment for learning practices: a case-study of a whole school approach.</b></p> <p>A case study of the implementation of a new technology curriculum in a New Zealand Primary School. The researchers found that teachers did not have sufficient pedagogical content knowledge to implement the new curriculum and as a result of this were providing technology 'activities' with no conceptual substance and were unable to give feedback to students beyond praise-based feedback. Interventions included reflection on case studies of classroom practice, using a specific planning framework, workshops, classroom support, teacher agreement meetings, using student portfolios.</p>

	<p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>● There was significant change in teacher practice over the three years of the study including a shift from an ‘activity’ focus to providing for specific learning outcomes. This enabled teachers to give more specific feedback which in turn enabled students to identify their own knowledge gaps.</li> <li>● As teachers understood the subject and the intended outcomes better they were able to provide more relevant and specific feedback to students.</li> <li>● The use of specific planning frameworks forced teachers to articulate intended learning outcomes, and over time this helped them develop a framework for decision making.</li> <li>● Communicating clear purposes to students communicated to students what was important in the subject and helped them know whether they were meeting intended outcomes.</li> <li>● Teachers were keen to become involved as they saw other teachers achieving results and being recognized for it.</li> <li>● The ongoing reflection / action research was crucial to the success.</li> <li>● The long time frame of three years allowed for the development of relationships and for the ongoing reflection necessary to bring about change.</li> </ul>
<p><i>Assessment</i></p> <p><i>Educational Psychologist</i> 31, 133-140</p>	<p><b>Baxter, G., Elder, A. &amp; Glaser, R. (1996) Knowledge-Based Cognition and Performance Assessment in the Science Classroom.</b></p> <p>This piece of research was undertaken in a science classroom using a particular performance task. It describes how students’ performance on that task can be used to determine to what extent they have developed the underlying cognitive structures necessary to perform the task. Four criteria were used: quality of explanation, adequacy of problem-representation, appropriateness of solution strategies and frequency and flexibility of self-monitoring. Though all children had some relevant knowledge, most were unable to use it flexibly in a reasoning situation. The performance task and the way it was assessed helped highlight possible instructional interventions that would help students build the cognitive structures necessary to transfer the knowledge that they all had to some extent.</p>
<p><i>Assessment</i></p> <p><i>Learning and Instruction</i> 16, 1-11</p>	<p><b>Kalyuga, S (2006) Rapid cognitive assessment of learners’ knowledge structures</b></p> <p>A study done by Educational Assessment Australia in an attempt to see whether it is possible to probe learners’ underlying knowledge structures as used in solving arithmetic word problems. The research involved comparing results on traditional word problem tests with a test where learners were given only 30 seconds per item to write the first step they would take toward solving the problem. The theoretical underpinning rested on the idea that the more established a learner’s knowledge schema relating to a particular problem type was, the quicker they could retrieve and apply it. Points were therefore awarded based on the level to which particular schema (identified in a separate study) relevant to particular problem types were applied. Establishment of a schema would lead to a successful first step toward solving the problem. Automatic application of the schema would allow students to skip steps in the problem solving process. This being because schema allow students to ‘chunk’ information and thus reduce the cognitive load in working memory. Findings:</p> <ul style="list-style-type: none"> <li>● Scores on the cognitive structures test were lower than on the traditional test, interpreted by the authors as indicating that students were able to solve problems ‘ by any means possible’ when sufficient time was available.</li> <li>● The rapid test reduced testing time by a factor of 2.8</li> </ul>

<p><i>Assessment</i></p> <p><i>Curriculum Perspectives</i> 1, 12 - 26</p>	<p>● Suggested first-step assessment could be used as a rapid diagnostic tool of students' mastery of knowledge structures</p> <p><b>Skalicky, J. (2006) Bringing quantitative literacy into a reform-based curriculum.</b></p> <p>After quoting research claiming that real-world tasks often involve busy work rather than an opportunity to learn target competences leading to transfer, the author discusses the meaning of authentic assessment. She states that it requires not only the application of knowledge to real-world situations, but demands the cognitive challenge of 'obtaining ones own knowledge and deep understanding of concepts and ideas by undertaking intellectual work within these real-world contexts'. Using the Tasmanian Essential Learnings Framework as a base, the author goes on to propose a unit of work with a complex and detailed assessment task involving a learning targets from each of the areas of the Framework, including a mathematical component.</p>
<p><i>Assessment</i></p> <p><i>Research Papers in Education</i> Vol. 21, No. 2, pp. 133 - 149</p>	<p><b>Marshall, B., Drummond, M.J. (2006) How teachers engage with Assessment for Learning: lessons from the classroom.</b></p> <p>A set of case studies of teachers examining their use of Assessment for Learning (AfL) strategies in the classroom and relating these to the teachers' beliefs as obtained from interview data. The study attempted to determine whether it was sufficient to merely implement strategies associated with AfL or whether the interpretation of the strategies as influenced by an individual teacher's belief system affected the effectiveness of the way strategies were implemented.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>➤ Only about a fifth of the 27 lessons observed appeared to capture the 'spirit of AfL' as opposed to merely adhering to the 'letter of AfL' by using the strategies (strategies come under four headings - questioning, feedback, sharing criteria and self-assessment)</li> <li>➤ The development of autonomy was dependent on the kinds of tasks teachers set and the way they were sequenced.</li> <li>➤ Tasks - The typical sequence of tasks leading to autonomy involved learners framing their own notions of quality, negotiating and refining these within the group, applying these principles to a piece of work, then finally using this understanding to reassess their own work in the light of the judgments about quality.</li> <li>➤ Dialogue - In the lesson sequences leading to greater learner autonomy, dialogue pushed learners to think in greater depth about the judgments they make and through discussion, deepen their understanding of what good looks like.</li> <li>➤ Teachers who believed strongly in learner autonomy and who believed all learners could become autonomous and that it was their responsibility to develop this, tended to develop the kind of open task sequences which described above.</li> <li>➤ Teachers who believed that some fixed entity ( eg. student attitude, ability or readiness) affected the development of autonomy were less likely to take responsibility for the success or failure of the development of autonomy and tended to develop more closed, controlled lesson sequences that were less likely to develop autonomy. These teachers also had a lesser sense of self-efficacy.</li> <li>➤ In general, beliefs about agency were crucial. The belief that neither the circumstances, nor learner dispositions were beyond change led some teachers to have a greater sense of agency than those who tended to see constraints as beyond their control.</li> </ul>
<p><i>Assessment</i></p> <p><i>Educational Measurement: Issues and Practice</i> Vol.</p>	<p><b>Andrade, H., Du, Y. &amp; Wang, X. (2008) Putting rubrics to the test: The effect of a model, criteria generation, and rubric-references self-assessment on elementary school student's writing.</b></p> <p>Researchers in the US examined the effect of using models and rubrics on student writing. The test treatment involved: (1) reading a model piece of writing and discussing its strengths and weaknesses, followed by generating a list of qualities of effective writing; (2) giving students a written rubric for the writing task; and (3) using the rubric to self-assess a first draft. Learners in a comparison group also generated a list</p>

<p>27, No. 2, pp. 3 - 13</p>	<p>of qualities of effective writing, but without the support of a model and without receiving a rubric or engaging in self-assessment. Prior rubric use, previous achievement in language and gender were examined for the effect they might have on results. The rubric used to assess writing was based on the 6 + 1 Writing Traits (traits include: ideas, organization, paragraphs, voice, words, sentences and conventions).</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>• Prior rubric use did not significantly affect writing scores ( possibly because though most learners had been given rubrics in previous classes, they had not used them to self-assess)</li> <li>• Girls achieved slightly better writing scores than boys, but the difference was not significant.</li> <li>• Previous achievement in language was positively related to writing scores.</li> <li>• The treatment group’s writing scores were significantly higher than those of the comparison group on all of the writing traits assessed except for ‘sentences’ and ‘conventions’. This was true even when controlling for previous achievement in language. The average grade for the treatment group was a low B and for the comparison group a high C.</li> </ul>
<p><b>Assessment</b></p> <p><i>Phi Delta Kappan, October 2007, pp. 140 - 145</i></p>	<p><b>Heritage, M. (2007) Formative Assessment: What do teachers need to know and do?</b></p> <p>The article defines formative assessment and the knowledge and skills teachers need to implement formative assessment practices.</p> <p><b>Main Arguments:</b></p> <p>Definition:</p> <ul style="list-style-type: none"> <li>• Formative assessment is a systematic process to continuously gather evidence of student learning. The data are used to identify a student’s current level of learning and to adapt lessons to help the student reach the desired learning goal. There are three broad types: 1. <i>On-the-fly assessment</i>; 2. <i>Planned-for interaction</i> and; 3. <i>Curriculum-embedded assessments</i>.</li> </ul> <p>Elements:</p> <ul style="list-style-type: none"> <li>• There are four core elements: 1. <i>Identifying the gap</i>; 2. <i>Feedback</i>; 3. <i>Student Involvement</i> and; 4. <i>Learning progressions ( clearly articulated subgoals that constitute progress toward the ultimate goal)</i></li> </ul> <p>The knowledge teachers need</p> <ul style="list-style-type: none"> <li>• Four basic elements of teacher knowledge are critical: 1. <i>Domain knowledge</i>; 2. <i>Pedagogical content knowledge (knowledge of what instructional strategies are appropriate in particular domain-specific contexts)</i>; 3. <i>Knowledge of students’ previous learning</i> and; 4. <i>Assessment knowledge</i></li> </ul> <p>The skills teachers need</p> <ul style="list-style-type: none"> <li>• Teachers need to be able to: 1. <i>Create the conditions that allow for successful achievement</i>; 2. <i>Teacher the students to assess their own learning and the learning of others</i>; 3. <i>Interpret the evidence</i> and; 4. <i>Match their instruction to the gap</i>.</li> </ul>
<p><b>Assessment /Educational Change</b></p> <p><i>Assessment in Education, Vol. 13, No. 3, pp. 239 - 264</i></p>	<p><b>Tierney, R. (2006) Changing practices: influences on classroom assessment.</b></p> <p>The paper notes that despite the increasing evidence for the potential of classroom assessment to support student learning, in practice changing traditional assessment practices has proved far from straightforward. 24 pieces of research on assessment (representing research from 8 different countries) are reviewed to determine trends and examine the influences of knowledge generating sources (evaluative inquiry, large-scale assessment, educational research) and mediating sources (educational policy, professional development, teachers’ beliefs) on classroom assessment practices.</p> <p><b>Main Findings:</b></p>

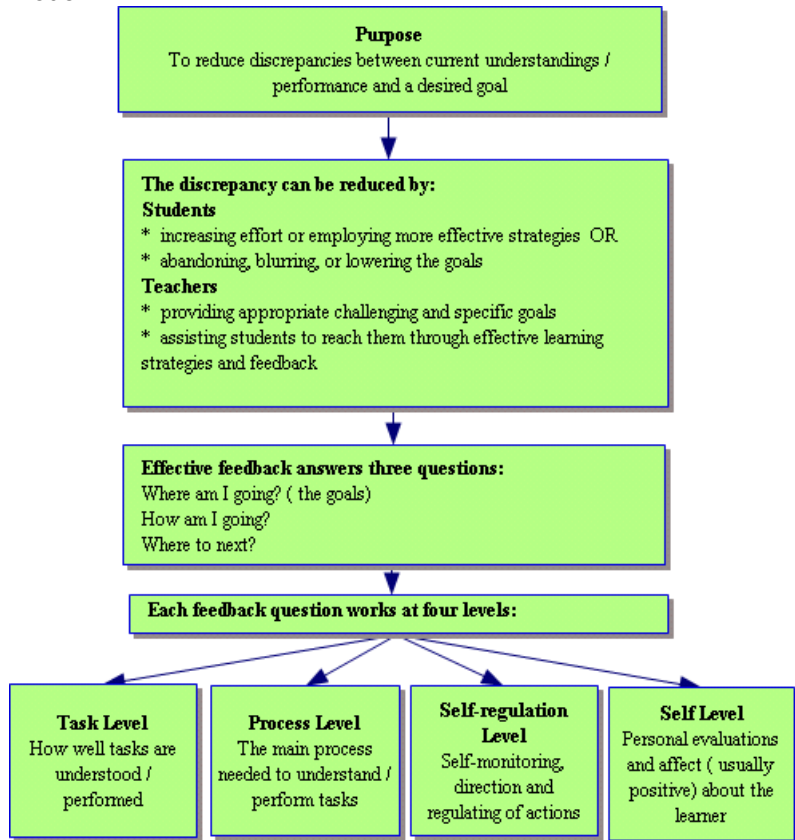
	<ul style="list-style-type: none"> <li>• No link was found where educational research directly affected classroom practices. At least one other source of influence always sat between research and practice.</li> <li>• There was generally a weak link between large-scale assessment, as a source of information for potential change, and classroom practice. The researchers attribute this to generally low levels of assessment literacy.</li> <li>• Central policy seems to be heavily mediated through local school administrators. Schools where change efforts were more successful exhibited high levels of support from the school's leadership.</li> <li>• Studies where university researchers collaborated with classroom teachers on action research projects demonstrated significant changes in teacher's professional beliefs and assessment practices.</li> <li>• Most studies related to professional development suggest that the flow from PD to classroom practice is not direct and immediate, but diffuses into 'multiple branches' in the encounter with teacher's existing beliefs.</li> <li>• Change in assessment practices usually entailed a change in teacher beliefs about teaching and learning. Critical reflection on beliefs was found in one study to be a precursor to changes in practice. In cases where teacher beliefs are supported by contextual or cultural factors they can prove extremely resilient.</li> <li>• Teacher understandings about assessment are central to the change process.</li> <li>• Time has proved to be a significant factor in many of the studies both from the perspective that real change takes time ( those studies that demonstrated change had time frames of 2 – 5 years), and from the perspective that changing assessment practices is time-consuming.</li> <li>• Change proved most difficult in communities where traditional beliefs about teaching and learning dominated.</li> <li>• Most teachers who were successful in changing practice mention supportive colleagues and leaders.</li> <li>• The use of information is critical in changing practice and most teachers exhibit a preference for information that is immediate and contextually relevant. Teachers often identify their colleagues as the most important source of information. This suggests that opportunities for interaction, knowledge sharing and collaboration must be part of the change process.</li> </ul>
<p><b>Assessment</b></p> <p><i>American Journal of Education, Vol. 112, pp. 572 - 588</i></p>	<p><b>Sharkey, N. &amp; Murnane, R. (2006) Tough choices in designing a formative assessment system.</b></p> <p>Interviews were conducted with various stakeholders in a US school district attempting to implement a systematic approach to formative assessment. Two commercial formative assessment instruments were selected for piloting. Additionally, a group of teachers developed a formative assessment instrument directly tied to the district's math curriculum and this was also piloted. The article identifies the primary issues faced by the district as they attempted to make decisions as a result of the pilot programs.</p> <p><b>Main Findings / Arguments:</b></p> <ul style="list-style-type: none"> <li>❖ Prior research has identified three ways in which educators use the results of formative assessments:             <ol style="list-style-type: none"> <li>(1) Instrumental - for decision-making ( eg. which students will be required to attend summer school)</li> <li>(2) Symbolic - either to justify a decision that has already been taken or to support a predetermined stance</li> <li>(3) Conceptual - to enrich dialogue about what students know, can do, understand, and how effective instruction has been</li> </ol> </li> <li>❖ The district sees four roles for formative assessment:             <ol style="list-style-type: none"> <li>(1) To provide teachers with timely information on student achievement to inform instruction</li> <li>(2) To provide principals with the information they need to develop improvement plans for students whose achievement is falling behind</li> <li>(3) To provide the superintendent with timely information to help identify schools that need additional help</li> <li>(4) To allow the superintendent to predict the scores of district students on upcoming state math tests</li> </ol> </li> </ul>

	<p><u>Issues around designing a system</u></p> <ul style="list-style-type: none"> <li>❖ Make or buy? – Commercial systems can be quickly implemented but can be expensive, and do not always test the same material as in the curriculum. They are also almost exclusively made up of multiple choice questions. In particular topics may be in a different order so students may be tested on something not yet covered. In-house systems depend on the capacity of the school / district to develop them, but have the advantage of buy-in and direct ties to the curriculum. Those involved in development and scoring also perceived this as a huge PD opportunity.</li> <li>❖ Computer-based or paper-based? - Computer systems can be rapidly and easily scored and can quickly generate graphic summaries of data, but are exclusively based on multiple-choice questions. Paper systems can include open-ended questions. Though these can present scoring difficulties, collaborative scoring processes can also become valuable PD opportunities.</li> <li>❖ Computer-adaptive? - Computer systems which adjust the questioning based on the way a student is answering have the advantage of being able to give more accurate information on students with varying abilities. They can also quickly provide information on growth over time. It can take a long time for higher ability students to be tested, however. In this district, higher ability students using computer adaptive assessments tended to take 2 – 3 times as long to be tested as other students.</li> <li>❖ One problem in this district was that the purposes they were trying to achieve were varied, some conceptual, others more instrumental. This meant it was difficult to find one system that achieved all the purposes.</li> <li>❖ In summary the researchers suggest two factors that are central to deciding how the various trade-offs can be managed to decide on a system:             <ol style="list-style-type: none"> <li>(1) The relative importance of the goals / purposes of formative assessment within the school / district</li> <li>(2) The capacity within the school / district to develop systems, analyze and use data.</li> </ol> </li> </ul>
<p><b>Assessment / Using Data / Professional Development</b></p> <p><i>Journal of Education for Students Placed at Risk, Vol. 10, No. 3, pp. 269 - 280</i></p>	<p><b>Murnane, R., Sharkey, N. &amp; Boudett, K. (2005) Using student-assessment results to improve instruction: Lessons from a workshop</b></p> <p>This authors conducted a series of fourteen workshops on using data from standardized tests to improve instruction conducted over a year in the Boston public school system. Feedback on the workshops was collected using: the writings of workshop participants; debriefing sessions; online surveys; a report written by participants in the final workshop session.</p> <p><b>Main Findings:</b></p> <p><b>Lesson related to structuring workshops</b></p> <ul style="list-style-type: none"> <li>• Many groups did not initially function well and benefitted greatly from the introduction of structured approaches to conversation such as the question formulation technique developed by the Right Question Project ( <a href="http://www.rightquestion.org">http://www.rightquestion.org</a>) and a protocol from the Coalition of Essential schools ( <a href="http://www.essentialschools.org/cs/resources/view/ces_res/54">http://www.essentialschools.org/cs/resources/view/ces_res/54</a>)</li> <li>• Groups found it most useful when the activities were focused on real data from their own schools rather than more abstract case studies. They appreciated the opportunity to apply structured approaches to data-based problem-solving to their own data questions.</li> <li>• Groups found it useful to have workshop time specifically set aside for them to work on data projects from their schools.</li> <li>• Groups found it useful to share problems and insights across schools and across groups. One activity required participants to read and write about the reports prepared by other schools and participants felt this provided valuable insights.</li> </ul> <p><b>Lessons related to data use</b></p> <ul style="list-style-type: none"> <li>• The workshop had focused on a particular external assessment used in Boston public schools and as part of the workshop participants actually completed the assessment itself under test conditions. Participants perceived this as a very valuable way of coming to understand the structure and content of the assessment itself. Many of them took away from this an understanding of the importance of all sections of the schools working together to identify the skills and strategies that were important on the test and the</li> </ul>

	<p>importance of cross-disciplinary collaboration in helping learners develop these skills.</p> <ul style="list-style-type: none"> <li>• Some schools, particularly those whose results on the assessment overall were not good focused their data questions more on increasing the scores of those students who feel just below the minimum passing score, largely ignoring other groups of students.</li> <li>• In implementing the projects designed during the workshop all groups highlighted the critical importance of the role of the school leadership in setting a tone and supporting the use of data to improve instruction.</li> <li>• Overall, groups recognized the importance of allowing data questions to evolve over time.</li> </ul>
<p><b>Assessment</b></p> <p><i>Theory into Practice Vol. 48 No. 1, pp. 36 - 43</i></p>	<p><b>Davidson, J. (2009) Exhibitions: Connecting classroom assessment with culminating demonstrations of mastery.</b></p> <p>In this article, Jill Davidson from the <i>Coalition of Essential Schools</i> describes the use of exhibitions as culminating assessments at <i>The School of the Future</i> in New York.</p> <p><b>Main Arguments:</b></p> <p><b>Definition</b></p> <ul style="list-style-type: none"> <li>• An exhibition is a student presentation of their own work through verbal, written or other means, often incorporating technology. Exhibitions generally cover a large chunk of learning, often a year or more.</li> </ul> <p><b>The SoF system</b></p> <ul style="list-style-type: none"> <li>• Students must complete four exhibitions to graduate</li> <li>• In each exhibition students must demonstrate knowledge of, and critical thinking about, a particular topic using five Habits of Mind: Point of View, Evidence, Connections, Alternatives, Significance. They must also demonstrate communication skills. These habits of mind are assessed as part of the exhibition using dedicated rubrics.</li> <li>• The assessors include experts from outside the school</li> </ul> <p><b>The value of exhibitions</b></p> <ul style="list-style-type: none"> <li>• A close association between assessment and instruction</li> <li>• Assessment is <i>authentic</i>, because it simulates the kinds of open-ended challenges people face working in a field of study</li> <li>• Students receive frequent feedback on their work and have multiple opportunities to revise before they finally submit it.</li> <li>• Schools that focus on exhibitions and other forms of performance-based assessment have lower drop-out rates, higher college-entry rates and improved college performance and persistence</li> </ul> <p><b>Conditions supportive of exhibitions</b></p> <p>With the right conditions exhibitions “can function as a fulcrum for ongoing school improvement”. These conditions are:</p> <ul style="list-style-type: none"> <li>• School-wide, exhibitions-aligned instructional and assessment processes</li> <li>• Structure that support sustained collaboration and inquiry among students and teachers</li> <li>• Strong connections with community outside school</li> <li>• Active participation in a system or network of other exhibition-driven schools</li> </ul>
<p><b>Assessment</b></p> <p><i>Review of Educational Research, Vol. 77, No. 1, pp.</i></p>	<p><b>Hattie, J. &amp; Timperley, H. (2007) The power of feedback.</b></p> <p>The authors review the evidence from numerous studies of the effects of feedback on student learning and use their findings to build a model of feedback that identifies the particular properties and circumstances that make it effective.</p> <p><b>Main Findings / Arguments:</b></p>

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Model

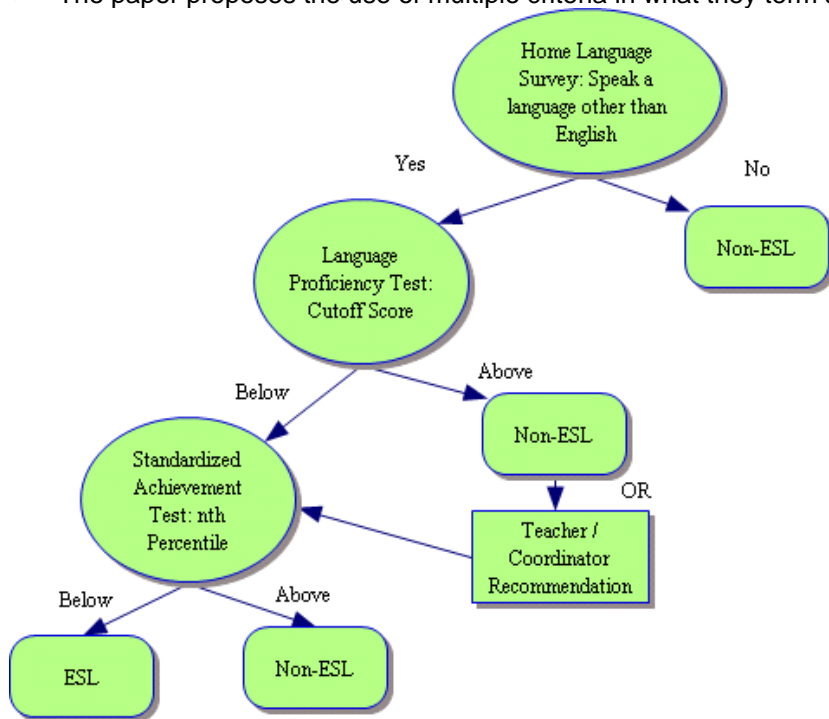


- In 12 different meta-analyses of studies on feedback in classrooms (including 196 studies), feedback fell into the top 5 – 10 highest influences on achievement.
- The purpose of feedback according to the model is to reduce discrepancies between current understandings / performance and a desired goal.
- Kluger and DeNisi (1996) found that learners are more likely to increase effort when the intended goal is “clear, when high commitment is secured for it, and when belief in eventual success is high”.
- Feedback is effective when it contains information about progress and / or how to proceed as encapsulated in the three questions in the model.
- Feedback at the task level is more powerful when it is about misconceptions or misinterpretations, not lack of information. If students lack the necessary knowledge, further instruction is more powerful than feedback.
- Feedback at the task level often does not generalize to other tasks.

	<ul style="list-style-type: none"> <li>• Butler (1988) found that feedback through comments alone led to learning gains, whereas grades alone or a combination of comments and grades did not.</li> <li>• Feedback at the task level alerts students to the relationships between cues (such as the use of a graphic organizer) and how the cue can lead to more successful performance.</li> <li>• Feedback at the process level seems to be more effective than feedback at the task level for deeper learning.</li> <li>• Feedback at the self-regulation level addresses the way students monitor, direct and regulate actions towards the learning goal. It involves both self-appraisal (reviewing and evaluating own abilities, knowledge states and cognitive strategies) and self-management (monitoring and regulating own behavior through planning, correcting errors, and using fix-up strategies).</li> <li>• There can be negative effects on feelings of self-efficacy when students are unable to relate the feedback to the cause of their poor performance.</li> <li>• Feedback at the self level usually contains little task-related information. Various studies have demonstrated the ineffectiveness of praise in raising achievement as it can direct attention away from the task to the self. It should be noted that praise related to the task and its performance (as opposed to the self) may be effective in enhancing self-efficacy.</li> <li>• When feedback draws attention to the self, students tend to attempt to avoid the risks involved in tackling challenging assignments.</li> <li>• Most feedback in classrooms is at the level self or task.</li> <li>• “Ideally feedback should move from the task to the processes or understandings necessary to learn the task to regulation about continuing beyond the task to more challenging tasks and goals”.</li> </ul>
<p><b>Assessment</b></p> <p><i>Review of Educational Research</i> Vol. 78, No. 1, pp. 153 - 189</p>	<p><b>Shute, V. (2008) Focus on formative feedback.</b></p> <p>This paper also reviews the evidence from numerous studies on feedback including a number of meta-analyses conducted by other researchers. The writer uses the results of the review to propose a set of research-based principles related to the use of feedback. The following is a very short summary of some of these principles along with the research on which they are based.</p> <p><b>Main Findings:</b></p> <p><b>Formative feedback to enhance learning - things to do</b></p> <ul style="list-style-type: none"> <li>• <b>Focus feedback on the task, not the learner</b></li> <li>• <b>Provide elaborated feedback</b> – feedback has been shown to be significantly more effective when it provides details of how to improve rather than just an indication of the level of correctness.</li> <li>• <b>Present elaborated feedback in manageable units</b> - feedback that is too complex seems to be ignored by many learners.</li> <li>• <b>Be specific and clear</b> – Feedback that is not specific can actually impede learning by producing uncertainty in learners as to how to respond to the feedback.</li> <li>• <b>Reduce uncertainty between performance and goals</b> - feedback is most effective when it helps a learner understand exactly where they stand in relation to a specific goal.</li> <li>• <b>Promote a ‘learning’ orientation</b> - Learners have been shown to have either a ‘learning’ orientation ( a desire to increase one’s competence and a belief that intelligence is malleable) or a ‘performance’ orientation (a desire to demonstrate one’s competence to others accompanied by a belief that ability is innate) towards a particular task. A learning orientation is characterized by persistence, strategy and a desire for challenge and is associated with more positive outcomes. A performance orientation is characterized by a tendency to seek less challenging tasks where success is assured. Feedback which emphasizes effort and the fact that mistakes are an important part of the learning process can encourage a learning orientation.</li> </ul>

	<p><b>Things to avoid</b></p> <ul style="list-style-type: none"> <li>• <b>Do not give normative comparisons</b> – Learners who do not perform well tend to attribute poor performance to lack of ability when given feedback which compares them with peers. This lowers their expectations and motivation. McColskey and Leary (1985) found that feedback referenced to the learner’s own past performance resulted in higher expectations regarding future performance and increased attribution to effort when compared with feedback referenced to the performance of peers.</li> <li>• <b>Be cautious about providing overall grades</b> - comment only feedback has been shown to be more effective than grades alone ( which produce no learning gains) and grades with comments.</li> <li>• <b>Do not give feedback which discourages the learner or threatens the learner’s self-esteem.</b></li> <li>• <b>Use ‘praise’ sparingly</b> – directing attention to the ‘self’ can distract attention from the task and the consequent learning.</li> <li>• <b>Do not interrupt the learner with feedback if the learner is actively engaged.</b></li> </ul> <p><b>Feedback guidelines in relation go learner characteristics</b></p> <ul style="list-style-type: none"> <li>• <b>For high-achieving learner consider using delayed feedback</b> – high-achieving learners appear to benefit from more delayed feedback.</li> <li>• <b>For low-achieving learners, use immediate feedback.</b></li> <li>• <b>For low achieving learners use more directive feedback</b> ( tell the learner what needs fixing)</li> <li>• <b>For high achieving learners use more facilitative feedback</b> (comments and suggestions to help guide the learners in their own revision and conceptualization).</li> <li>• <b>For all learners provide specific, goal-directed feedback</b> - Fisher &amp; Ford (1998) showed that close match between a learner’s goals and they expectation that they can meet the goal increases motivation.</li> </ul>
<p><b>ESL / Assessment</b></p> <p><i>Educational Measurement: Issues and Practice, Fall 2008, pp. 17 - 31</i></p>	<p><b>Abedi, J. (2008) Classification system for English language learners: Issues and Recommendations</b></p> <p>This paper examines the situation in US schools with regard to entry and exit from ESL support programs. The validity of current practices is investigated and a model to improve the validity of classification is proposed and tested.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>• Commonly used English proficiency tests used to classification / placement of ESL learners vary widely with respect to purpose, theoretical foundation, test design, validity etc.</li> <li>• Post NCLB, consortiums worked to create English proficiency tests aligned with state standards. These generally exhibit higher validity than tests previously used.</li> <li>• Standardized achievement tests are also often used for classification If ESL learners, but these can be problematic as none are specifically designed to assess the content knowledge of these students and often contain unnecessary linguistic complexity.</li> <li>• Research indicates that there is no specific indication of which tests or which cutoff scores would indicate an acceptable level of English proficiency.</li> <li>• Surveys filled out by parents with questions on nationality and languages spoken at home are also used for classification, but these can be unreliable as parents do not always give completely accurate answers for various reasons.</li> <li>• Performance differences in one piece of research between learners classified as ESL and those classified as non-ESL on English Language Proficiency tests only explained between 3% and 9% of the variation in classification - not large enough to suggest a strong association between test scores and ESL / non-ESL classification.</li> <li>• Performance differences between learners classified as ESL and those classified as non-ESL on Standardized Norm-Referenced</li> </ul>

- Achievement tests only explained between 3.5% and 12% of the variation in classification.
- A valid classification system should be based on a theory of language acquisition and should clearly identify the level of academic language proficiency required to allow full participation in an English-only curriculum.
- The paper proposes the use of multiple criteria in what they term an augmented-classification system:



- A study showed that using this model improved the strength of association between ESL classification and the criteria used for classification (from 24.8% of variance explained to 41.1% of variance explained).

**Assessment / Professional Learning Communities / Leadership**  
*Journal of Staff Development*  
Vol 29, No. 4,

**Pijanowski, L. (2008) Striking a Balance: Georgia District Adds Assessments and Transforms Classroom Practice**  
Lissa Pijanowski, associate superintendent in the Forsyth County Schools in Georgia, reports on her district’s impressive student-achievement gains, which she attributes to “focused, collegial conversations” about interim assessment results.  
**Main Arguments:**

- the key was organizing three levels of reflection on interim assessment results, with teacher leaders involved at every stage of the process:

<p>pp. 43 - 46</p>	<ul style="list-style-type: none"> <li>• <i>Level 1: Individual teachers</i> – Classroom teachers look at their interim assessment item analyses and ask themselves these questions:             <ul style="list-style-type: none"> <li>- Which items did my students miss most frequently?</li> <li>- What standards was each of these items assessing?</li> <li>- How did my students' results compare to school performance on each item?</li> <li>- Why did most of my students choose the incorrect responses they did?</li> <li>- What will I do now to reteach the most problematic missed standards?</li> <li>- Which individual students need additional help based on these results?</li> </ul> </li> </ul> <p>Teacher understanding of their own performance data must precede conversations within a professional learning community.</p> <ul style="list-style-type: none"> <li>• <i>Level 2: Grade-level or content teams</i> – Having done their individual reflections, teachers meet in same-grade or same-subject teams and ask these questions:             <ul style="list-style-type: none"> <li>- What are our team strengths based on these results?</li> <li>- What are our team challenges?</li> <li>- What factors in our curriculum and instruction do we feel influenced these results?</li> <li>- How can we collaboratively modify instruction and reteach standards that our students had the most difficulty learning?</li> <li>- How will we know if our students have mastered each standard?</li> <li>- What remediation and intervention will be most effective for individual students with low performance?</li> <li>- Is there additional professional development and learning support that we need as a team to help us achieve our goals for student learning?</li> </ul> </li> </ul> <p>Teachers analyzed their results even more intensely and took actions they may not have otherwise considered in isolation.</p> <ul style="list-style-type: none"> <li>• <i>Level 3: Schoolwide dialogue</i> – Finally, school leaders got the whole staff together to focus on interim assessment results and other schoolwide data, answering these questions:             <ul style="list-style-type: none"> <li>- Do the results show we are making progress toward meeting our school improvement goals?</li> <li>- How did we perform on the reading/English language arts and math target areas we identified for improvement this year?</li> <li>- How did our subgroups and at-risk students perform?</li> <li>- Are there strategies and actions in our school improvement plan that need to be modified based on these results?</li> <li>- Are our remediation and intervention strategies closing the achievement gap?</li> </ul> </li> </ul>
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	<ul style="list-style-type: none"> <li>- Do we need to modify our professional learning plan to provide additional support?</li> <li>- What resources do we need to accomplish the curriculum and instructional changes we have identified?</li> </ul>
<p>Assessment / Curriculum Implementation / Standardized Testing</p> <p>Education Week July 30, 2007</p>	<p><b>Cech, S. (2007) 12-State Study Finds Falloff in Testing Gains After NCLB.</b></p> <p>The study reviewed here uses the results of both state and the federal NAEP.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>● Initial progress in reading and math after the introduction of NCLB has virtually come to a halt in recent years.</li> <li>● Achievement gaps in reading between black and Latino students and white students have not been closed.</li> <li>● Initial progress in closing gaps in achievement in math has halted.</li> </ul>
<p>Teaching Strategies / Educational Change / Assessment</p>	<p><b>Hayes, D., Mills, M., Christie, P. and Lingard, B. (2006) <i>Teachers and Schooling Making a Difference: Productive pedagogies, assessment and performance.</i> Crows Nest : Allen &amp; Unwin</b></p> <p>This is a book written using the results of the Queensland School Reform Longitudinal Study (2001), which launched the New Basic program in Queensland. The study began by observing classrooms attempting to determine the pedagogical and assessment practices which correlated with student achievement, then moved on to attempt to determine the school structural characteristics which supported those pedagogies. They distilled 20 elements of what they termed productive pedagogy and grouped them into four dimensions. Some of the major findings as reported in the book are:</p> <ul style="list-style-type: none"> <li>● Pedagogy and assessment do make a difference to student achievement, especially for disadvantages students</li> <li>● The intellectual quality of classroom activities correlated strongly with student academic achievement</li> <li>● Supportive classroom pedagogies also correlated strongly with student academic achievement</li> <li>● Connectedness to the world correlated with students academic achievement but not as strongly as intellectual quality or supportive classroom pedagogies</li> <li>● There was no correlation between valuing difference and academic achievement but this did correlate with significant positive social outcomes.</li> <li>● A crowded curriculum reduces the latitude for teaching for depth of understanding</li> <li>● What the study termed as productive pedagogies, assessments and performances were not widely found to be in practice in classrooms</li> <li>● There was a widespread absence in classrooms of expectations for students to understand other cultural knowledges.</li> <li>● There was a large disconnect between what teachers reported as their goals for their students' education on surveys and the practices that took place in their classrooms both in pedagogy and assessment</li> <li>● Students who received intellectually challenging tasks mediated by supportive classroom pedagogies are more likely to remain engaged in learning</li> <li>● The structural aspects which supported productive pedagogy and assessment were: valuing of teachers and their knowledge and ongoing learning, dispersed leadership across the school, a culture of linking teachers' ongoing learning to the enhancement of student learning, a culture or professional dialog and pedagogically focused leadership.</li> </ul> <p>The four dimensions and 20 elements of productive pedagogy were:</p> <p><b>Intellectual Quality</b> - problematic knowledge, higher-order thinking, depth of student understanding, substantive conversation,</p>

	<p>metalanguage  <b>Connectedness</b> – connectedness to the world beyond the classroom, knowledge integration, background knowledge, problem-based curriculum  <b>Supportive Classroom Environment</b> – student direction, explicit quality performance criteria, social support, academic engagement, student self-regulation  <b>Working with and Valuing Difference</b> – cultural knowledges, active citizenship, narrative, group identities in learning communities, representation</p>
<p>Assessment</p> <p><i>Learning and Instruction</i> 16, 416 – 432.</p>	<p><b>Hovardis, T., &amp; Korfiatis, K. (2006) Word associations as a tool for assessing conceptual change in science education.</b></p> <p>By analyzing pre-tests and post-tests of a word association task researchers described the conceptual change in science class. The change described was a social representation (the change in the shared conceptual structure of the students in the class) rather than an individual description.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>● For all stimulus terms, new associations relating to the field of ecology were introduced after the course ( in population ecology)</li> <li>● Associations to field other than ecology were reduced after the course. ( 10 words associations were recorded for each stimulus term)</li> <li>● Before the course, the ‘core’ of students’ conceptual structures included mainly non-scientific terms. Increased frequencies (number of students mentioning) and higher ranks (mentioned earlier) for ecological associations were demonstrated.</li> <li>● The newly introduced associations comprised coherent groups describing causality mechanisms in population dynamics, indicating the coherence of the conceptual structures.</li> <li>● The increased frequency and rank of ecological associations could comprise and index of the improved availability of the corresponding ecological conceptual structure.</li> <li>● The core gives the meaning to the conceptual structure and is unaffected by situational variation.</li> <li>● Results indicated that the enhanced homogeneity of the social representation was accompanied by increased heterogeneity in individual representations. ( Low and High use student groups)</li> </ul>
<p><b>Using Data</b></p> <p><i>CRESPAR Technical Report 67. John Hopkins University, Baltimore,</i>  <a href="http://www.csos.jhu.edu/crespar/techReports/Report67.pdf">http://www.csos.jhu.edu/crespar/techReports/Report67.pdf</a></p>	<p><b>Wayman, J., Stringfield, S. &amp; Yakimowski, M. (2004) Software enabling school improvement through analysis of student data.</b></p> <p>This is a report which outlines criteria which schools should consider when selecting software for storage and analysis of student data and then evaluates the various software packages on the market in light of these criteria.</p> <p><b>Main Findings:</b>  <b>Important issues on software implementation</b></p> <p>The authors recommend that schools or districts considering implementing a software package for data storage and use consider the following:</p> <ol style="list-style-type: none"> <li>1. <i>Assessment of data needs</i> – This should include:             <ul style="list-style-type: none"> <li>● Data inventory and preparation - an inventory of all data currently stored and where it is located</li> <li>● Data ‘cleaning’ - assess the quality and accuracy of the current data and estimate what it would take to ‘clean’ it.</li> <li>● Software needs - assess the types of data, presentation and analyses that will be most helpful in making the kind of decisions you want to make based on data.</li> <li>● Outside help - evaluate what services you can perform in-house and what you require outside help with.</li> </ul> </li> <li>2. <i>Time to implementation</i> – rapid, successful implementation is important to sustain interest and improve education sooner rather than</li> </ol>

- later. Schools should aim to ‘get data up and running’ quickly even if the initial system does not do everything that is desired
3. *Cost* – Cost evaluations should include ‘opportunity costs’ such as the time lost by internal people in designing systems and inputting data if it is decided that the system should be developed internally.
  4. *Choosing a vendor* – there is currently no ‘best product’. Different companies have focused on different aspects when producing software, so schools should carefully choose a product that meets their needs and a vendor that provides the kind of extra services they require.
  5. *Schools Interoperability Framework* - a framework exists for ensuring that software packages are able to communicate with each other. Schools can check if the product they are interested in fits the standards outlined in the Schools Interoperability Framework ([www.sifinfo.org](http://www.sifinfo.org)) A full list of compliant applications can be found at: [www.opengroup.org/sif/cert/cert\\_prodlst.tpl](http://www.opengroup.org/sif/cert/cert_prodlst.tpl)

**What should good software for student data analysis look like?**

The authors have compiled the following criteria for evaluating software:

1. *User friendliness*
  - Software is intuitive and easy to use
  - Software requires little training
  - Presentation is familiar to user
  - Access speed is fast and efficient
2. *User features*
  - Comprehensive query tools available for every level of user
  - Flexible drill-down capability from any form of data aggregation
  - Data can be accessed from anywhere
3. *Information access*
  - Multiple ways to access information
  - Varied methods of representing information ( eg. tables, graphs)
  - Wide range of data available for analysis
  - Interface provides immediate access to relevant information
  - Pre-formatted reports are clear, varied, relevant and comprehensive
  - Longitudinal presentation of data available at every user level
4. *Creating and sustaining quality data*
  - Provides capacity to enable clean data
  - Company accepts responsibility to facilitate data process with schools
  - System allows for expansion past initial implementation
  - System provides proper security for data transmission
  - Integration of different areas of information is seamless to the user
  - Software accepts many common data formats
5. *Additional features*
  - *Online student work samples available*
  - *Software exports into common programs*
  - *Users can access electronic discussion groups*

Assessment Articles

- *Easy access to learning standards information*
- *Software offers capacity to link individual teacher data to student data*

**Software reviews**

A table containing a summary of the reviews is included as an appendix after these summaries.

The authors maintain a website that contains updates of product reviews:

[www.cos.jhu.edu/systemics/database.htm](http://www.cos.jhu.edu/systemics/database.htm)

**APPENDIX - SUMMARY OF SOFTWARE REVIEWS FROM WAYMAN, STRINGFIELD & YAKIMOWSKI**

Software & company	Account from SchoolNet	Data Miner from Chancery	Data Point from NSSE	Ease-e from TetraData	EDsmart	eScholar	QSP from CRESST	Sagebrush Analytics, pwr'd by Swift-Knowledge	SAMS from Executive Intelligence	Scholar Suite from SCHOLARinc.	Socrates Data System from CRM	STARS from SchoolCity	Virtual Education from Edmin
Company Focus	Educational Technology	Student Info Systems	Educational Research	Educational Technology	Educational Research	Data Warehousing	Educational Research	Data Analysis & Reporting	Educational Technology	Mngemnt of Assessment Data	Educational Research	Educational Technology	Learning Mngemnt
Version	4	4.1	n/a	4.5	3.2	5	4.3	5.1	3.4	2	2.2	2.6	5.5
Pre-formatted reports	x	x		x	x	x	x	x	x		x	x	
Query tools for less advnced users	x		x	x	x		x	x	x			x	x
Stored queries		x	x	x	x	x	x	x		x	x		x
Online student work samples			x				x						x
User discussion brds or user mtngs	x			x	x	x	x		x		x		x
Accepts data formats in addition to ASC II	x	x		x	x	x		x	x		x	x	x

Assessment Articles

Variable set customized to fit school needs		x	x	x	x		x	x	x		x	x	x
Company will house data	x		x	x	x	x		x	x	x	x	x	x
School may house data	x	x		x	x	x	x	x			x	x	x
Company helps collect data	x	x	x	x	x	x		x	x		x	x	x
Reports SIS compliance	x	x		x	x	x			x	x			x
SIF-certified	x	x		x		x							
No. of districts in use	40	83	15	464	27	750	100	35	20	15	92	28	110

<p><b>Leadership / Using Data</b></p> <p><i>American Journal of Education</i> Vol. 112, pp. 521 - 548</p>	<p><b>Young, V. (2006) Teachers' use of data: Loose coupling, agenda setting, and team norms.</b> The researcher investigated grade level teams in four schools to examine the influence of leadership practices and team norms on data use.</p> <p><b>Main Findings:</b></p> <p><b>Leadership practices</b></p> <ul style="list-style-type: none"> <li>• Agenda setting by school leaders including (1) articulating a rationale for data use; (2) establishing expectations for how teachers will use particular forms of data; (3) modeling data use; (4) planning and scaffolding teachers' learning about data use and; (5) structuring time to allow teachers to use data collaboratively, was associated with the establishment of grade level team norms conducive to productive data use and with productive use of data by teachers.</li> <li>• The use of data by leaders primarily for accountability purposes can easily become decoupled from teachers' use of data for instruction. The purpose of data and how teachers might use data can be unclear to them.</li> </ul> <p><b>Team norms</b></p> <ul style="list-style-type: none"> <li>• Four sets of norms were found to influence whether and how team members used data for instruction. These norms were plotted on continua from (a) team discord ---- team cohesion; (b) story swapping ---- joint work; (c) low leadership for teachers' data use --- - high leadership for teachers' data use and; (d) low collaboration on data use ---- high collaboration on data use.</li> </ul> <p><b>Roles for data-related functions ( Organizational capacity)</b></p> <ul style="list-style-type: none"> <li>• The main functions related to data use include: (1) dealing with data reporting; (2) interpreting data and teaching teachers about data; (3) furnishing instructional resources linked to issues arising from data analysis; (4) facilitating meetings so that teachers answer "so what"; (5) following up with teachers on responses to data analysis</li> <li>• Schools where these roles were not performed did not effectively use data for instruction</li> </ul>
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	<ul style="list-style-type: none"> <li>• The school where data was used most effectively for instruction evidenced all of the functions though some were not explicitly delineated as being the responsibility of a particular individual.</li> <li>• At the second school where data was used effectively for instruction, the roles were all explicitly delineated, but for this school the idea of using data for instruction was relatively new and the researchers suggest that the emphasis on assigning nonclassroom roles to particular individuals may be developmental.</li> </ul> <p>Overall the researchers conclude that schools must go beyond presenting compelling arguments and providing professional development. Schools must effect organizational change in leadership patterns, collegial norms and role definitions in order to create the capacity within the school for effective data use.</p>
<p><b>Leadership / Using Data</b></p> <p><i>American Journal of Education</i> Vol.112, pp. 496 - 520</p>	<p><b>Kerr, K., Marsh, J., Ikemoto, G., Darilek, H. &amp; Barney, H. (2006) Strategies to promote data use for instructional improvement: Actions, outcomes, and lessons from three urban districts.</b></p> <p>This study examined the strategies employed by three school districts to promote data use for instructional improvement.</p> <p><b>Main Findings:</b></p> <ul style="list-style-type: none"> <li>• Strategies used by the three districts included the development of interim assessments; the development of technology / systems for housing, analyzing and reporting data; the provision of professional development and / or technical assistance on how to interpret and use student test results; the revamping of school improvement planning processes; the encouragement of structured review of student work; the use of a classroom observation protocol called the Learning Walk to assess the quality of classroom instruction. Districts varied widely in the emphasis they gave to different strategies.</li> </ul> <p><b>Focal Initiatives</b></p> <ul style="list-style-type: none"> <li>• One district focused on examining assessment results by grade level to identify areas of needed improvement in math and English and to address a narrow range of strategies to address those needs. A detailed School Improvement Plan was written based on these analyses</li> <li>• School faculty in this district consistently described school improvement planning as useful, described the process of improvement planning as useful, and were positive about the impact of the improvement plan on their instruction. They did, however, find the process time-consuming and challenging.</li> <li>• A second district focused on creating comprehensive, standards-aligned interim assessments between standardized test intervals. These assessments were linked to a sophisticated data management system. Principals were enthusiastic about the validity and usefulness of the data created, but teachers’ opinions were mixed with only 59% of teachers finding them moderately of very useful for guiding instruction and 60% reporting that other classroom assessments provided more useful planning information.</li> </ul> <p><b>Factors affecting data use</b></p> <ul style="list-style-type: none"> <li>• A history of state accountability provided incentives for to use data</li> <li>• Lack of accessibility and timeliness of data limited use</li> <li>• Perceived validity of data greatly affected data buy-in and use</li> <li>• Perceived lack of flexibility to alter instruction limited data use</li> <li>• Staff capacity and support enabled data use</li> </ul> <p><b>Primary Conclusions</b></p> <ul style="list-style-type: none"> <li>• A major challenge for schools wanting teachers to use data is to provide data that is timely, valuable and in a user-friendly format - data from standardized tests were often perceived by teachers to be not timely or adequately aligned with daily instruction. Of all the types of data used teachers reported “systematic review of student work” to be the most useful for guiding instruction.</li> </ul>

	<ul style="list-style-type: none"> <li>• A second challenge is to ensure that the goal of data use is aligned within a coherent overall policy framework and in particular to ensure that policies related to curriculum ensure the flexibility to address needs identified by data analysis - some districts had policies of standardized curricular content and pacing which were perceived by teachers to conflict with data use. Many teachers chose to follow curriculum guides rather than make use of information from data.</li> <li>• A third challenge is the building of capacity to deal with data analysis and identify appropriate interventions.</li> </ul>
<p><b>Leadership / Using data</b></p> <p><i>American Journal of Education Vol. 112, pp. 549 - 571</i></p>	<p><b>Wayman, J. &amp; Stringfield, S. (2006) Technology-supported involvement of entire faculties in examination of student data for instructional improvement.</b></p> <p>This research reports case studies (primarily using interviews and focus groups of administrators and teachers) of three schools attempting to involve entire faculties in the examination of student data supported by data systems.</p> <p><b>Main Findings:</b></p> <p><b>Factors that facilitate widespread use of data tools to inform practice</b></p> <ul style="list-style-type: none"> <li>• <i>District support</i></li> <li>• <i>Principal involvement</i> - interviewees at all levels highlighted the fact that principal leadership was a key factor</li> <li>• <i>Non-threatening triangulation of data</i> - data drawn from multiple sources, but used for non-threatening, diagnostic purposes</li> <li>• <i>Efficient data access</i> - faculty at every school noted increased efficiency from the use of data management software. Technology was key to facilitating data use.</li> <li>• <i>Time to examine data</i></li> </ul> <p><b>Changes in faculty practice as a result of data use</b></p> <ul style="list-style-type: none"> <li>• <i>Increased sense of teacher efficiency</i> - many teachers cited an increased sense of teacher professionalism and pride that their school was participating in data initiatives. Teachers noted increased efficiency supported by the use of data software and systems.</li> <li>• <i>Better response to student needs</i> – teachers reported that the data systems enabled them to get a more rounded view of student performance. The possibility of accessing detailed information relating to contradictions and consistencies helped avoid the misdiagnosis possible from a single data source. Many teachers reported they were better able to group students as a result of data.</li> <li>• <i>Reflecting on practice</i> – teachers often reported that data enabled them to examine their own practice. The data often enhanced differentiation of instruction. Teachers in all schools, however, reported some difficulty in connecting data to instruction due to a lack of preparation. One principal was leading teachers in a process of writing their own assessments to reinforce the connection and teachers felt this initiative was successful. Some teachers (often those who also reported that data had helped them improve practice) were dubious about whether there had been an overall improvement in practice. This was often related to concerns about the amount of time used assessing that took away from instructional time.</li> <li>• <i>Collaboration</i> – teachers reported that using data had helped them establish a ‘common language’, that data created more opportunity and need for collaboration and was a respected conversation starter. Some teachers noted that collaboration had become more academic and professional.</li> </ul>
<p><b>Leadership / Using data</b></p> <p><i>International Journal of Leadership in</i></p>	<p><b>Shen, J. &amp; Cooley, V. (2008) Critical issues in using data for decision-making.</b></p> <p>The authors identify eight critical issues in using data for decision-making based on their work with 16 principals, the state department of education, major state level professional associations, and universities in a midwest state of the USA.</p> <p><b>Main Findings / Arguments:</b></p> <p>The eight issues identified are:</p> <ol style="list-style-type: none"> <li>1. An overemphasis on achievement data based on standardized tests does not provide a clear student learning profile and has</li> </ol>

<p><i>Education Vol. 11, No. 3, pp. 319 - 329</i></p>	<p>limited implications for curriculum and instruction.</p> <ol style="list-style-type: none"> <li>2. The current emphasis on data tends to centre on data ‘of’ learning, rather than data ‘for’ learning, the data being used more for accountability purposes, rather than to improve teaching and learning. Data is currently used primarily for accountability purposes.</li> <li>3. Student achievement data not intersected with other streams of data will not facilitate student learning. Intersection involves four types of data: (a) demographic data; (b) perceptual data; (c) student achievement data (both formal and informal); (d) school process data. Of the 16 principals interviewed, only two used student and community background data and only 3 reported using school process data.</li> <li>4. Many districts do not possess the technological infrastructure to analyse data in a form for efficient and effective use by teachers, principals, central office administrators and others.</li> <li>5. District level and school level turf wars and the politics of data compromise school and district effectiveness. These turf wars are related to the purposes for which data is used.</li> <li>6. University teacher education and administrator preparation programmes fail to meet the needs of the teachers and administrators they serve.</li> <li>7. The function and role of data in the educational process must be clearly defined or the promise of data will likely be compromised - are decisions data-driven, data-based or data-informed? The authors claim they should be data-informed since while data provide a sound foundation for influencing education, the moral dimension of education must also be considered.</li> <li>8. Data-informed decision-making along will not renew the educational system, there has to be coherent changed in the system to make sure that stakeholders have the knowledge and skills in data-informed decision-making and structural arrangements in place to facilitate date-informed decision-making and harness the power of data-informed decision-making.</li> </ol>
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