Assessment and Learning Partnerships

Short Course for School Leaders

Components of the Online Professional Development Course

for School Leaders

Unit 1

The purpose of this short course is to help school leaders understand the online professional development program that teachers are undertaking through the Professional Learning Team (PLT) structure.

The online professional development course comprises two related components:
1. Working in a PLT
2. Understanding the use of assessment data

This unit outlines the core content covered in the relevant teacher modules.

Context

Broadly, the aim of the online professional development course for school leaders is to help them support teachers to collaboratively use data to plan teaching interventions within a developmental construct to improve student learning outcomes.

A teacher working within a developmental construct (one who uses developmental frameworks or progressions) needs to understand that a student's learning will typically follow a series of progressive steps of increasing complexity in the skill being developed. Collaborative use of data involves PLTs critically interrogating the evidence of what student do, say, make or write to ascertain where they are developing in the relevant developmental progression. In planning teaching interventions the teacher needs to know where a student is at on the developmental progression so interventions can be planned accordingly.

For teachers to adopt these approaches they require more than the imparting of new information. It also depends upon teachers themselves seeing the value of what they are doing and changing their theories of practice.

Engaging with developmental constructs and evidence-based teaching, which involves the systematic use of data, applies not only to identifying the developmental level of

individual students. It also applies to the teacher and to the PLT. To truly work within a developmental construct, the teacher, and the PLT, (and school leaders) also have to be able to understand and locate their development on a relevant developmental framework or progression, be it in terms of PLT operations, challenging evidence, knowledge of subject matter, and the like, and to be able to take developmentally appropriate steps to improve their own skills in the light of that information.

If the effectiveness of what we will now call the project approach is to be established it has to be demonstrated. This requires ongoing assessment. This is integral to the approach. In the first instance the teacher needs to know how and if student learning outcomes are improving.

The result of student testing alone, however, does not tell the teacher enough. It tells how the student is achieving and whether improvement has been made. It does not definitively establish a connection between the project approach used by teachers and by the PLT, and student achievement. It is also necessary to find evidence of a connection between how the PLT is operating within a developmental construct, how members of the PLT are collaboratively using data to plan teaching interventions, and the effect on student learning outcomes. This requires input from professional development to identify the way forward as well as systematic research.

Working in an ALP Professional Learning Team

Why PLTs?

Teacher professional development has normally had improving student learning outcomes as its focus. Simply acquainting teachers with new knowledge and practices, however, has had little impact. Timperley et al (2007, p.xxxv) found 'little evidence to support the claim that providing teachers with time and resources is effective in promoting professional learning in ways that have positive outcomes for students' (

Many teachers need to acquire new skills to engage with new knowledge and practices that will enable them to consistently and differentially respond to changing student needs. However, this does not just happen; it requires a carefully thought through and supported process and structure which grounds, motivates and sustains ongoing teacher engagement with their theories of practice, with deepening of their professional knowledge, and with acquisition of skills.

Timperley et al (2007) and Hattie (2003) identified characteristics of professional development that could be linked to improvements in student learning. Most, if not all, of these are consistent with ALP goals, organization and processes:

- There is recognition that teacher continuous learning is central to improving student learning outcomes.

- There is an understanding that where this is not happening teacher theories of practice must be engaged if any change is to occur.
- There is a framework to support continuous teacher improvement built around professional practice.
- There is an alternative and integrated theory that explains and underpins the proposed new teaching practices and behaviours.
- External expertise provides alternative viewpoints, ways of linking theory to practice, and support to help the teacher(s) avoid reverting to the status quo.
- There is an emphasis on establishing new routines which are practiced.
- There is a focus on results.
- Student assessment data is used as a catalyst for initial and ongoing engagement of teams of teachers in the inquiry.
- Evidence is collected to assess student understandings and skills against developmental constructs in order to determine where the student is at in their learning, and therefore to focus teaching.
- There is an emphasis on developmental, not deficit, approaches to learning.
- There is an emphasis on teachers building their body of knowledge to support students bridge the gap between what they can do and what they are learning to do.
- Goals and success criteria are clear.
- Learning tasks are engaging and appropriately challenging for each student.
- Evidence is collected to investigate the impact of subsequent, explicit teaching on student learning, and for the purpose of confirming or refining teaching practice.
- Teachers take collective responsibility for student learning.
- Teachers work together to plan their teaching in the light of evidence about student achievement.
- Student achievement is identified and evaluated at regular points in time.
- The impact of teaching on diverse student learners is systematically analysed.
- Teachers discuss and act collectively to build pedagogical content knowledge around needs identified.
- Teachers share evidence of progress towards a common goal.
- Accountability is shared.
- Teacher roles and planning are interdependent.
- Teacher professional practice is deprivatised.
- Teachers take responsibility for promoting the learning of *all* students.
- School leadership plays an active and central role in providing goals or targets for student learning; monitoring and collecting evidence on progress; using this information to stimulate teacher reflection; putting in place organizational arrangements to support new professional learning and practices especially time and physical resources; participating with, motivating and encouraging teachers; and celebrating achievement.
- There is recognition that change will not be immediate, that it will need an extended timeframe.

- Teachers are empowered to use their new learning to address teaching and learning needs within structured frameworks, e.g. PLTs or communities of practice.

What, then, does an ALP PLT look like? How does it operate, and what is the role of the school leader?

Many schools have PLTs teams but their nature varies considerably. Some PLTs are administrative groups, year level teams or subject departments called by another name but carrying out traditional functions. Others have a generalised professional learning responsibility in their school. The following description of an ALP PLT (henceforward called PLT) is of one that focuses on student learning outcomes. While administrative matters and professional learning are important, the focus of the PLT on student learning outcomes is critical in this project.

The structure and function of professional learning team procedures outlined in this project, focus on helping teachers maximise student learning gains. It is important that the PLT is given a start on the right path by school leaders. It is important that school leaders understand the work and role of members of the PLT, and tangibly support its operation and development.

The PLT typically consists of six members including a team leader, and has a specific focus and set of responsibilities entirely related to improving student educational outcomes. The PLT is developmentally oriented. It focuses on student learning outcomes as determined by evidence about what students do, say, make and write. Members of the PLT collaboratively, and systematically use evidence from testing combined with evidence from other student work to identify the zone of proximal development (ZPD) for individual students, and to identify groupings of students operating at the same level. Members of the PLT challenge the evidence assembled to ensure that they get an accurate reading of a student's ZPD, on which subsequent teaching interventions will be built. The PLT accepts and takes joint responsibility for all students covered by the PLT. The PLT identifies and documents, in PLT logs, learning goals and strategies targeted at students' ZPD, and identifies resources needed to implement those strategies. The PLT sets timelines to evaluate student progress and the effectiveness of strategies and resources used, retaining those that are effective in a teaching resource bank and discarding those that are not. Information from PLT processes feed directly into school planning and budgeting. As the PLT establishes clear learning goals for each student and monitors these, the PLT knows when goals are achieved.

This PLT is formally recognised as a major part of the school planning and decision-making structure and has documented responsibilities. It has support from school leadership and operates in a climate of mutual trust that encourages members to take risks with their learning. The value of the PLT is acknowledged by the fact that it formally meets in school time for one hour minimum once per fortnight, and PLT members are allocated an equivalent amount of time to prepare for each meeting. School leadership, which is represented on this PLT, see themselves as learners. They articulate a vision that is focused on student-learning outcomes, and actively monitor its implementation. They tangibly

support the implementation of new teaching and learning practices linked to improvements in student learning outcomes and ensure achievements are celebrated.

PLT members and the PLT as a whole monitor their development and take developmentally appropriate steps to build their own knowledge and skills. They consciously work to improve team functioning and effectiveness. PLT members are aware of their own theories of practice and willingly negotiate new practice when there is clear evidence as to how and why they should do so.

The role of the school leader in supporting the PLT is explained in detail in the final unit of this short course.

The key goals of collaboration, working within a developmental construct, and use of data to plan teaching interventions are key to the operation of a PLT.

The emphasis on a collaborative (collective) or a team approach has multiple benefits. In the first instance, though there is recognition that the goal is to improve individual teacher practice and, therefore, student educational outcomes, the focus is on the team, not the individual. This allows the individual teacher some space and time to adjust.

Simultaneously, membership of a team in which the members are accountable to each other, and in which the team is accountable to school leadership and others for decisions, actions and results, means that individuals ought not be able to easily 'do their own thing'. Nor can they expect their assumptions about teaching and learning to go unchallenged. Indeed, they should expect to produce evidence to substantiate their claims. The formation of teams means that teachers can be involved in building a new, shared culture to support the work of all. An additional advantage of teachers working in teams is that if the work of such teams can be formalised, structures and processes made routine, supported, monitored and effort concentrated, then they can be sustained. This would mean that retaining and building on teacher, PLT and school learnings and practice can become the norm rather than re-inventing practice with each new teacher. This has significant implications for systemic change and improvement.

Developmental constructs

The importance of developmental constructs (frameworks or progressions) is that when they are used with evidence they can provide a basis for identifying students' ZPD, in other words, where a student is ready to learn. This is a key element in the work of a PLT and requires further explanation.

Developmental constructs are formulations of the steps or stages of increasing competence. It is important that teachers (and school leaders) use these stages to think developmentally about their teaching in order to support student learning.

For school leaders not familiar with developmental constructs, there are three main types of developmental constructs that can underpin developmental learning. These are developmental frameworks, theoretical progressions and empirical progressions.

(a) Developmental and organizational frameworks:
These are general in nature and can be applied to many situations. They use the concept of 'stages of development' to develop progressions of increasing competence. An example of an organisational taxonomy is Krathwohl's affective domain.

Let's look first at a simplified version of this in Figure 1, below.

(Rejecting)	A learner who is not willing to receive or listen to new information.
Receiving	A learner who is willing to receive or listen to new information and ideas, but has not made decisions about the worth of the information.
Responding	A learner who is actively participating in and interacting with the new information or procedures without agreeing or endorsing them. This could also be described as compliance.
Valuing	A learner who is able to see the worth of new information and procedures.
Organising	A learner who is incorporating the new information and procedures into their existing schema. New information and procedures can be implemented with understanding in a regular and effective manner.
Characterising	A learner has become an advocate of the new information or procedures.

Figure 1. Krathwohl's affective domain. Krathwohl et al (1964).

It is clear that this developmental framework describes a series of attitudinal stages that people move through when acquiring new ideas or behaviours. A lower level, 'rejecting' has been added to Krathwohl's affective domain to cater for those individuals who are set in their ways and not willing to listen to new information.

Now look at Figure 2 where Krathwohl's affective domain has been used to construct a progression for identifying teacher levels with respect to developmental assessment.

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Rejecting	Avoids discussion of merits of the approach, highlights flaws, contrasts with personally favoured approaches, criticizes proponents and cites other approaches as superior; ridicules, disagrees, argues against developmental assessment; highlights flaws, criticizes, avoids involvement.
Receiving	Listens passively; shows awareness of the importance of learning about the approach; shows sensitivity to student and teacher needs and learning problems; accepts differences in school culture and approach; attends to activities designed for learning about developmental assessment.
Responding	Complies with assessment requirements for development; participates in discussions about developmental assessment, completes assigned tasks; is compliant to rules and procedures.
Valuing	Demonstrates a link between the assessment and learning process; appreciates applications of developmental assessment; demonstrates a commitment to assessment practice improvement; sees value in assessment data; volunteers new ideas and activities; shows interest in learning about the approach; tries to help others, is compliant to rules and procedures; appreciates the role of professional education on assessment in teaching professionalism and looks for opportunities to learn more about the topics.
Organising	Adopts procedures as a personal preference; recognizes the need for balance between freedom and responsibility in the uses of assessment data and strategies; recognizes the role of systematic planning in solving assessment interpretation issues; accepts responsibility for own assessment decisions and behavior; adjusts behavior to accommodate the requirements of the situation; understand and accepts own strengths and limitations on developmental assessment; formulates a professional development plan in harmony with abilities, interests and self-beliefs about developmental learning and assessment; demonstrates self-reliance in working independently.
Characterising	Displays consistent consciousness of developmental approaches to assessment; uses an objective approach in problem solving using assessment data and evidence; models assessment habits and attempts to influence others to adopt developmental assessment approaches; prepares convincing and sound arguments in favour of developmental assessment practices.

Figure 2. Krathwohl and developmental assessment.

When thinking about this taxonomy consider an initiative that you have introduced at school. Were teacher attitudes uniform or were they different? The likelihood is that there were a range of differences. What the taxonomy enables us to do is to identify the attitudes held, identify groups holding similar attitudes, and to plan accordingly in relation to each group's needs. The response is differential not 'one size fits all'.

Other examples of widely used developmental frameworks are Bloom's Taxonomy and Dreyfus' Model of Skill Acquisition. These are illustrated in Figures 3 & 4.

1.0 Remember	Retrieving relevant knowledge from long-term memory.
2.0 Understand	Determining the meaning of instructional messages, including oral, written, and graphic communication.
3.0 Apply	Carrying out or using a procedure in a given situation.
4.0 Analyse	Breaking material into its constituent parts and detecting how the parts relate to one another and to an overall structure or purpose.
5.0 Evaluate	Making judgments based on criteria and standards.
6.0 Create	Putting elements together to form a novel, coherent whole or make an original product.

Figure 3. Bloom's Taxonomy, from Anderson et al (2001)

Novice	Rigid adherence to taught rules or plans; no store of contingency plans for when circumstances vary from the expected.
Advanced Beginner	Minor adjustments to rules or plans can be carried out in some situations under supervision.
Competent	Perceives actions at least partially in terms of longer-term goals; conscious, deliberate planning and use of standardised and routinised procedures; makes reasoned decisions about new situations without being sure of appropriateness of decision.
Proficient	Sees situations holistically and identifies goals or salient aspects intuitively; perceives deviations from the normal pattern and possesses perspectives on a situation; decision making is less laboured.
Expert	No longer relies on rules, guidelines or maxims; operates from a deep understanding of the total situation; analytical approaches are only used in novel situations or when a problem occurs; vision of what is possible.

Figure 4. Dreyfus' model of skill acquisition.

(b) Theoretical Progressions

Theoretical progressions, like the Victorian Essential Learning Standards (VELS), describe the predicted development of learning in a particular area. They can be constructed using a combination of theories and the personal experiences of those producing them. The advantage of this type of developmental construct is that they are more specific than a developmental framework, but do not require the large amounts of data necessary to construct an empirical progression. The disadvantage is that they can be influenced by the existing practices of those constructing the

theoretical progression and may not reflect the actual order of acquisition of skills or knowledge by students.

(c) Empirical Progressions

Empirical progressions are derived from data showing the skills and knowledge of large numbers of people. They use statistical methods to determine the normal order of acquisition of skills, knowledge or attitudes. Examples of empirical progressions include the NAPLAN scales. Empirical progressions represent a typical rather than an absolute pathway for students and therefore can be a useful frame of reference for teachers. They can be used in the process of planning learning goals for students. It allows teachers to select goals that are developmentally appropriate and, therefore, maximise the rate of learning of their students.

The Assessment Research Centre (ARC) has produced three sets of empirical progressions derived from the data collected from the assessment of thousands of Victorian students. The first set, which includes Reading and Numeracy, is for students working in VELS from 2.0 upwards. The second set is for students with additional needs. The purpose of these progressions is to help teachers make decisions about learning goals for students. Links to these are included in the unit readings. The third set of empirical progressions is based on an analysis of a range of tests that are used in the LAP project. This progression of reading development (PRD) was empirically derived from analysis of items in old AIM tests, the Torch Test, the Dart and the PAT(R) tests. The PRD is used by Catholic schools operating within the program.

Student performances are linked to developmental progressions to identify student ZPD and to plan and monitor the teaching interventions.

One other very important element of working in a developmental construct that needs to be mentioned is that it is in direct opposition to a deficit approach to assessment and teaching which focuses on describing and then attempting to remediate what a student cannot do. Instead it works from where the student is at, what they can do and locates their learning in a developmental context.

A PLT provides the structure that best fits what research identifies needs to be done, and how it needs to be done, to improve student learning outcomes.

Understanding and Using Assessment Data

Much of the time, assessment is taken as the measurement of an end point of learning. It starts with the measurement of a student's ability or skill and ends with the reporting of a grade or score. However, our position is that assessment is for teaching. It is the starting point for learning and the beginning of change. Within a five-step approach to developmental assessment proposed by Griffin (2007), learning, teaching and assessment become the origin of educational interventions, resource implementation and policy development. This can be seen in Figure 5.
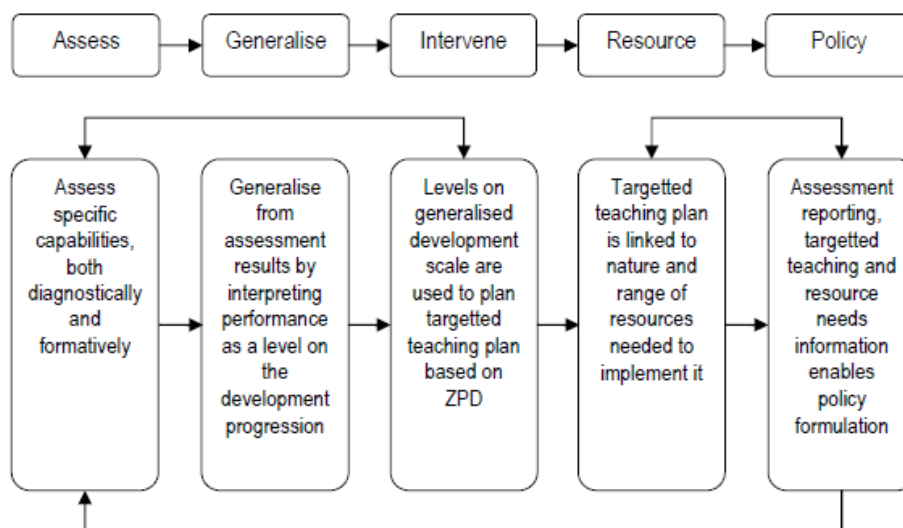

Figure 5. Five steps from assessment to policy, Griffin (2007)

The work of the PLT is data-driven, differentiated assessment and teaching. Griffin's five step approach to developmental assessment depends upon the PLT member's understanding of assessment, the nature of evidence, how assessment can be used, when it is reliable and valid, what conclusions can reasonably be drawn from it, and what hypotheses are formulated to use as the starting point for deep discussions about student learning and teaching.

The first step is to assess a student's specific capabilities. To do this two things are needed, a developmental progression and evidence. The developmental progression relates to what is being taught, learned and assessed, and evidence consists of observable actions, what the student can do, say, make or write that demonstrates a level of understanding.

The developmental progression describes what skills, knowledge or behaviours are to be taught. There are a number of ways in which these can be developed and/or followed. For

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example, a taxonomy framework such as Bloom's Taxonomy could be used to interpret and plan student work in terms of knowledge development.

Before looking at the project assessment procedures which use an empirical developmental progression to assess student capabilities, it is important to consider the implications of Table 1, below, which is constructed from NAPLAN data for 2011 on Reading in Australia for Years 3, 5, 7, and 9.
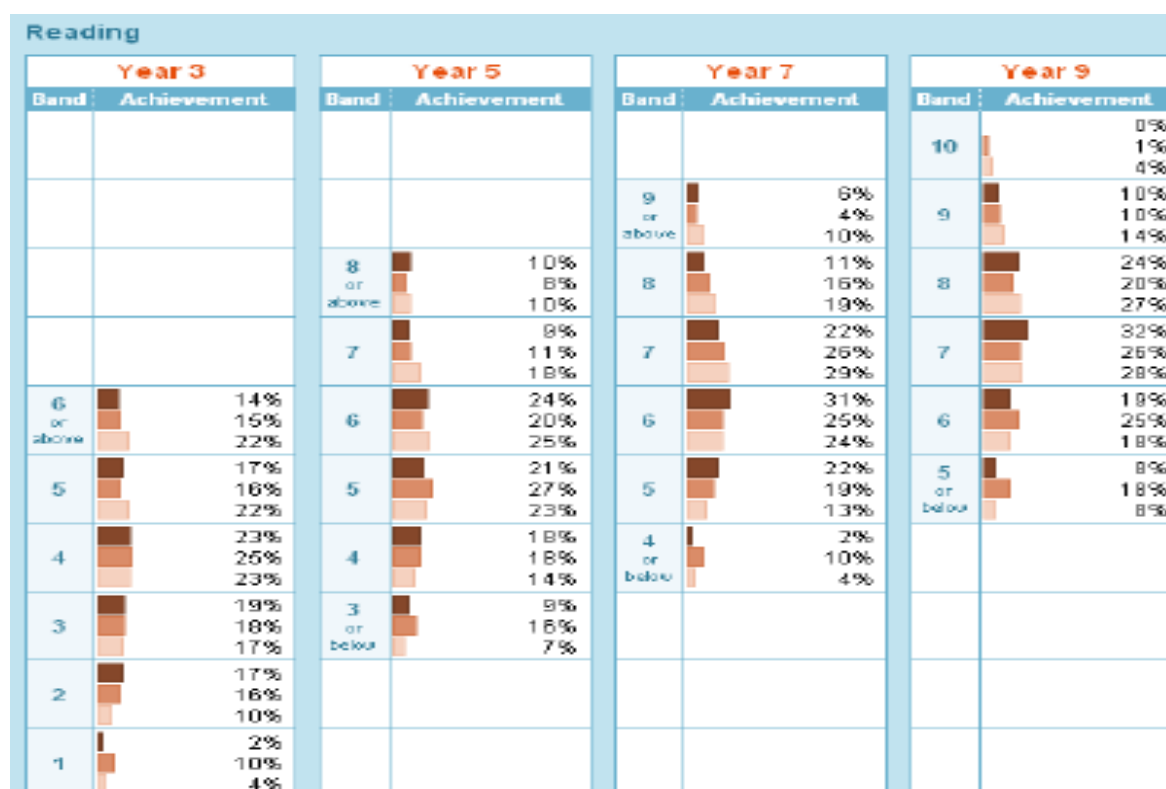

Figure 6. NAPLAN Reading Results - a de-identified school report
Source: My School (2011)

The bands for each of Years 3, 5, 7 and 9 feature data for a de-identified school (dark shading), like schools (moderate shading) and national (light shading). What is important about this table for this course is the range of reading outcomes evident in each of the four year levels tested. For each year level the data reflects that students are spread across at least six Reading Bands. In both national and Victorian literature on student performance reference is made to students being 'above', 'at' or 'below' standard for the related age group. What this data suggests is that to talk of a standard misses the point.

If teachers teach to the standard what many students can 'do, say, make and write' to demonstrate skills, knowledge and behaviours is ignored. This applies to both students who are 'above' the standard and those who are 'below'. If assessment is for teaching and the

starting point for learning then teaching has to *focus on where the student is at*, irrespective of an expected standard.   It is this point that has to be identified for each student. The ALP developmental learning framework that resulted from **an amalgamation of theory and practice** from three scholars, Vygotsky, Glaser and Rasch, supports this. The work of these three is described as follows.

Lev Vygotsky (1896-1934)

Lev Vygotsky was a Russian psychologist who wrote extensively on education. He described that the emphasis in education must be on identifying students' emerging skills, and scaffolding learning by providing appropriate and timely intervention. Vygotsky is well known for his seminal concept of the zone of proximal development (ZPD) and his theoretical stance that social interaction plays a fundamental role in the development of cognition. The ZPD is the difference between a student's actual developmental level and their potential developmental level when collaborating with a more able peer (Figure 7). He argued that this zone is the point at which intervention will have the greatest impact, at which the student is most ready to learn, and where teaching must be focused. ZPD identification can be used by teachers to scaffold students' learning by providing information about what the student can demonstrate, struggles to demonstrate, or cannot demonstrate. In interpretations of Vygotsky's work, the ZPD has been described as:

> "… a state of readiness in which a student will be able to make certain kinds of conceptual connections, but not others; anything too simple for the student will quickly become boring; anything too difficult will quickly become demoralising" (Burbules, 1993, p 122).
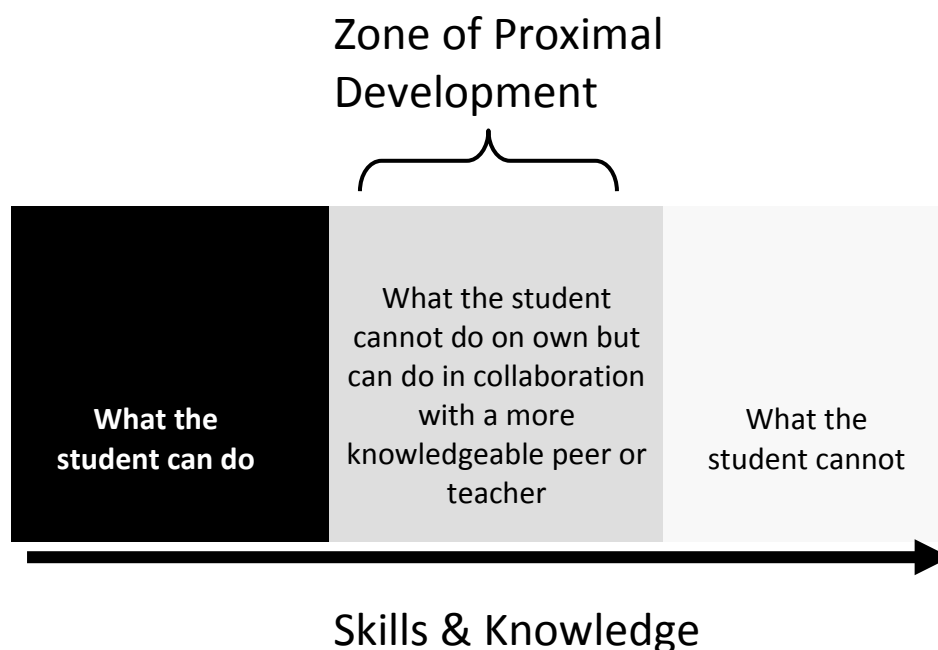
Zone of Proximal Development

What the student can do	What the student cannot do on own but can do in collaboration with a more knowledgeable peer or teacher	What the student cannot

Skills & Knowledge

Figure 7. Schematic Diagram of ZPD

Robert Glaser (1921-2012)

Glaser described a theoretical framework of assessment interpretation known as a 'criterion-referenced interpretation'. Underlying this concept is the notion of a continuum of knowledge acquisition ranging from no proficiency to high proficiency.

Criterion-referenced interpretation describes an individual's performance on an assessment in terms of the tasks performed or competence displayed. Criterion-referenced measurement was created to 'encourage the development of procedures whereby assessments of proficiency could be referred to stages along progressions of increasing competence' (Glaser, 1981).

A criterion-referenced interpretation of measurement scores describes an individual's achievement as a position on a continuum of developing competence. When measuring a student's performance, their level of proficiency or competency is located to a behaviour criterion along an increasing continuum of achievement (Figure 8).

Skills and Knowledge

High Proficiency

Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -   ← Student's Assessment Performance
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
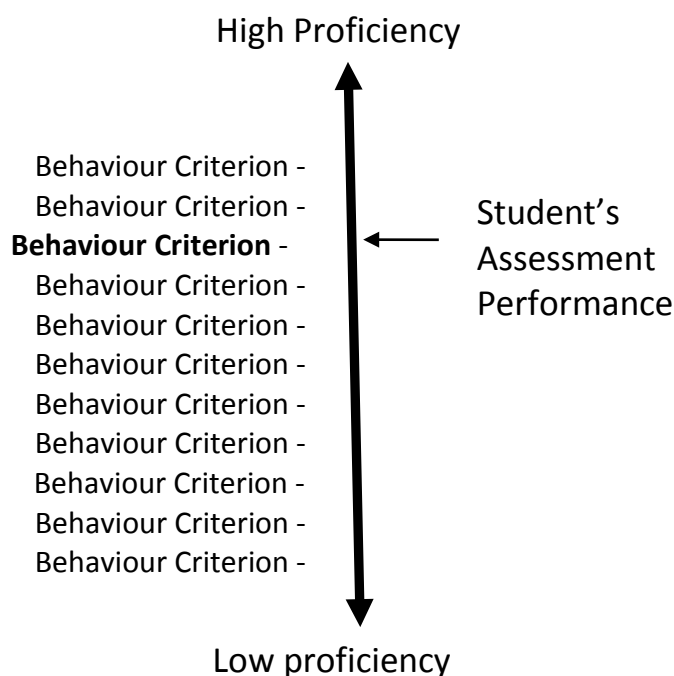Behaviour Criterion -
Behaviour Criterion -

Low proficiency

Figure 8. Criterion-referenced interpretation

In criterion-referenced interpretation, a student's results indicate their position on a continuum of developing competence – the level of proficiency in a progression of stages of increasing competence.

A variation of criterion-referenced interpretation is a standards-referenced interpretation. In this variation, an assessment score is regarded as a code and represents a levels or stages along a continuum of competence (Figure 9). In comparison to norm-referencing, standards-referencing removes any year or age level expectations of competence, instead describing what level of competence or development the student is at. Due to increasing emphasis on functionality and performance quality, there have been international educational shifts towards standards - and criterion-referenced assessment.
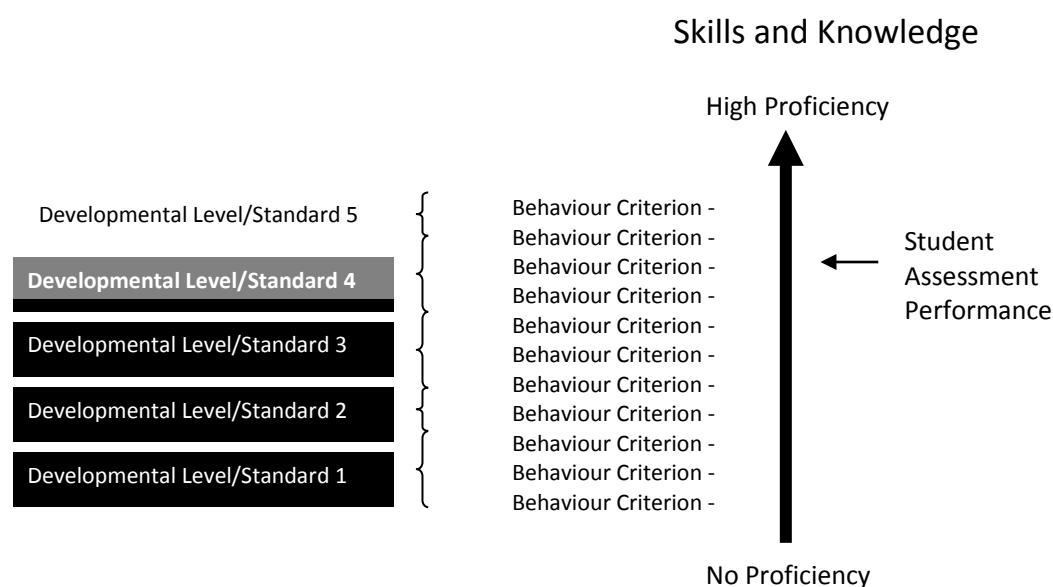
High Proficiency

Developmental Level/Standard 5

Developmental Level/Standard 4

Developmental Level/Standard 3

Developmental Level/Standard 2

Developmental Level/Standard 1

Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -
Behaviour Criterion -

Student
Assessment
Performance

No Proficiency

Figure 9. Schematic Diagram of Levels of Increasing Competency

Georg Rasch (1901–1980)

Using latent trait theory and mathematical modelling, Rasch was able to formally measure the location of students and test items together on a scale. This provided a mathematical model that could be used within a criterion-referenced framework. In the Rasch mathematical model, the probability of a correct response on a test item is a function of the distance between the person and item. According to Rasch (1980) odds of success are a function of the difference between the ability of the student and the difficulty of the task. When these are equal the odds of success are 50:50.

Using programs such as ConQuest (Wu, Adams, & Wilson, 1998), estimations of student ability and task difficulty can be obtained. Where a student and a test item are aligned, the probability of the student gaining a correct response on that item is 50:50. This modelling which also allows for the interpretation and empirical validation of levels of competency is illustrated in Figure 10.

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      3  |X
         |X   5.3 8.4
        XXX  2.3 3.5 10.4
        XXX  1.3 4.3
      2  XXXX 13.3 14.4
       XXXXX 9.4 12.3
        XXXX 11.3
      1  XXXXXX 14.3
      XXXXXXX 6.3 8.3 14.2
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        XXXX 8.1 12.1
    -3  XXXX 14.1
        XXX
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        XX  13.1
    -4  X
        X  7.1
        X
    -5  X
        |
    -6  |
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High ability — High difficulty

Students — Test Items

Low Ability — Low Difficulty

} Level 6
} Level 5
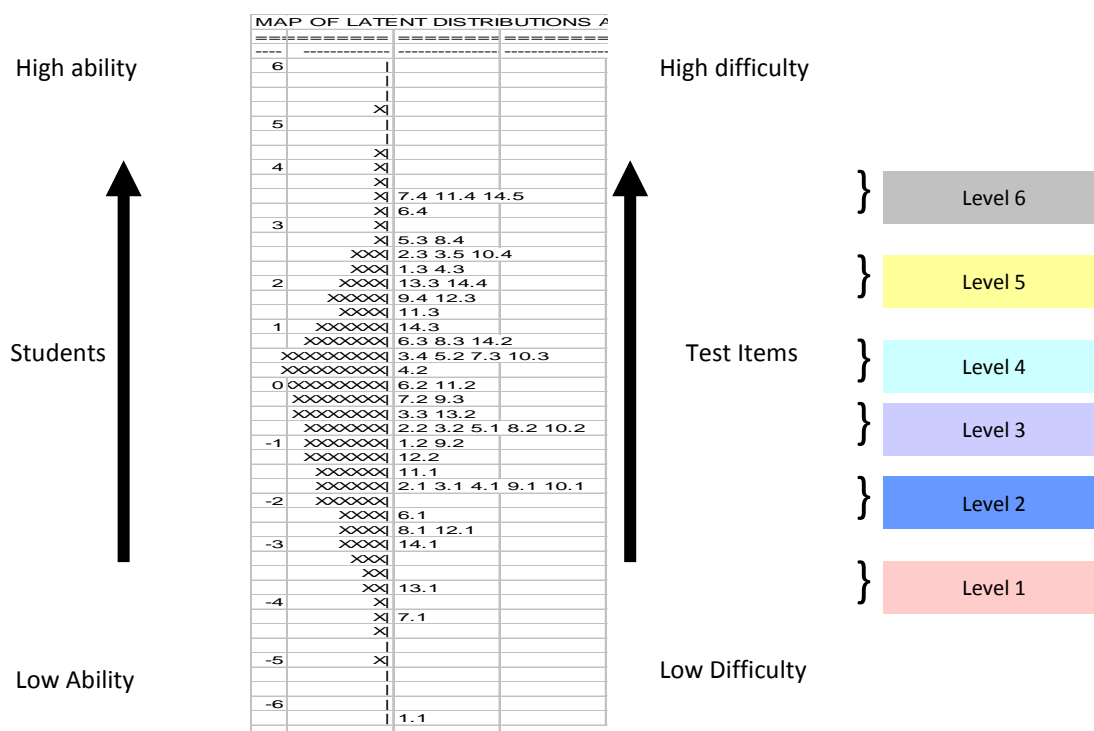} Level 4
} Level 3
} Level 2
} Level 1

Figure 10. Diagram of Task Difficulty, Student Ability and Stages

Each X on the left indicates the position of students, whereas each number on the right indicates the position of a test item. Groups of test items with similar difficulty and meanings can be interpreted as qualitatively different levels or standards of competence or development.

Combining the three theories

The combination of these three theories means that assessment results can be interpreted in terms of Glaser's levels of increasing competence and, when interpreted in a Rasch-like manner, provide an indicator of the point of intervention where learning could be 'scaffolded'. We can link the relative positions of a student and an item on the developmental continuum to an interpretation of what a student could learn where the odds of success are 50:50. That is, the tasks that a student could be expected to successfully perform on 50% of occasions.   This is illustrated for two groups of students on the variable maps depicted in Figures 10 and 11 in which each x represents a student who sat the test.
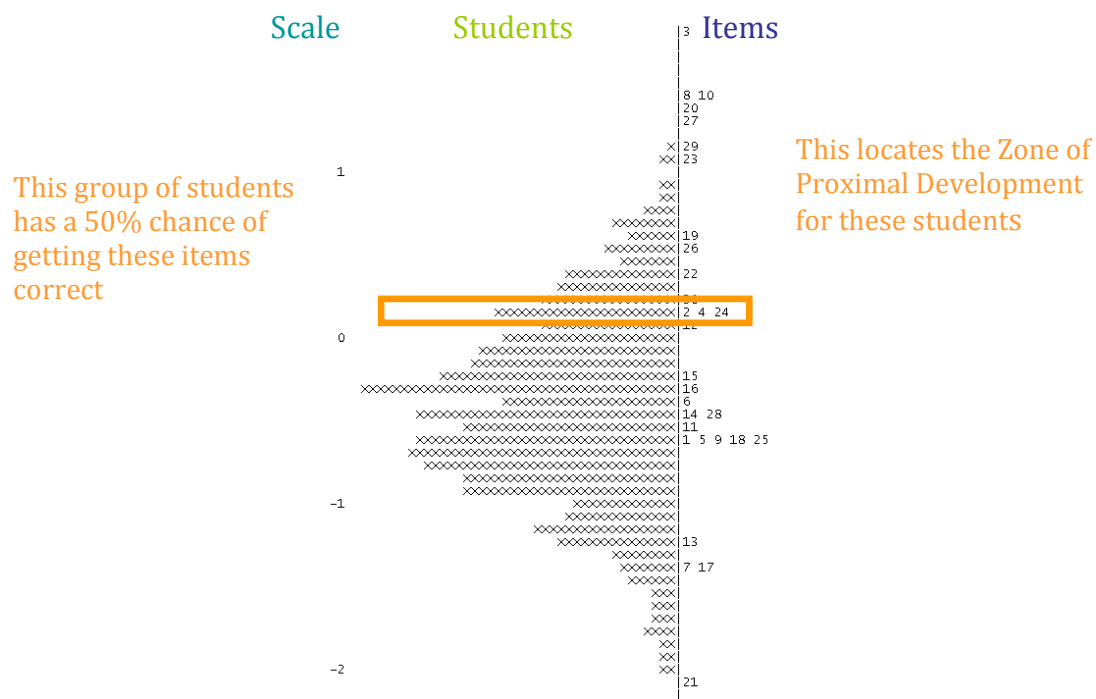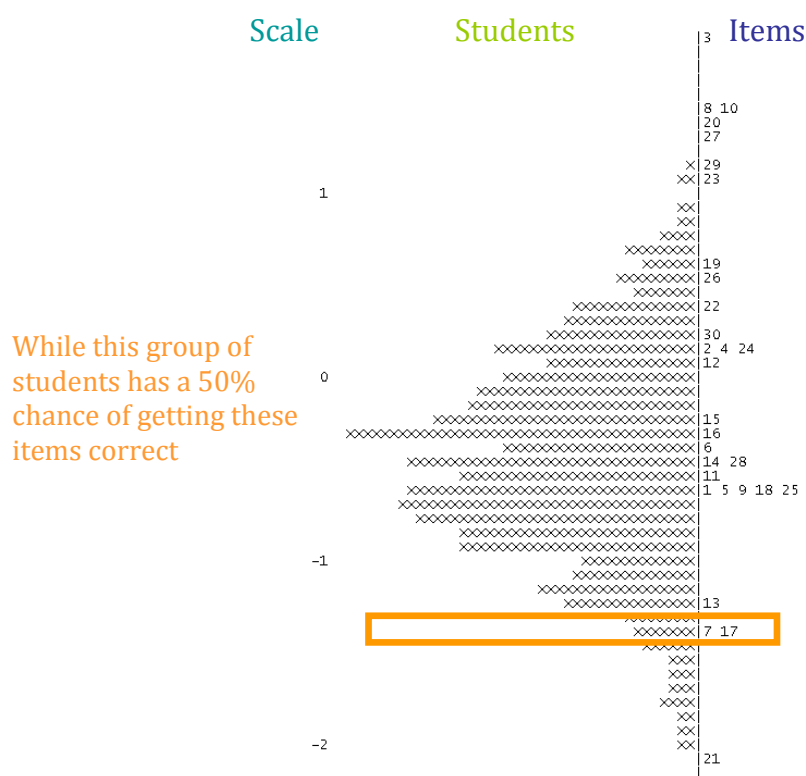
Figure 11.

Figure 12.

In Figure 13, where a number of skills are common, they can be generalised into a level. For example the items identified in the blue box could have all been exploring a student's ability to identify the purpose of a text and to make predictions. These students, who have approximately a 50:50 chance of getting these items correct, share a common level.
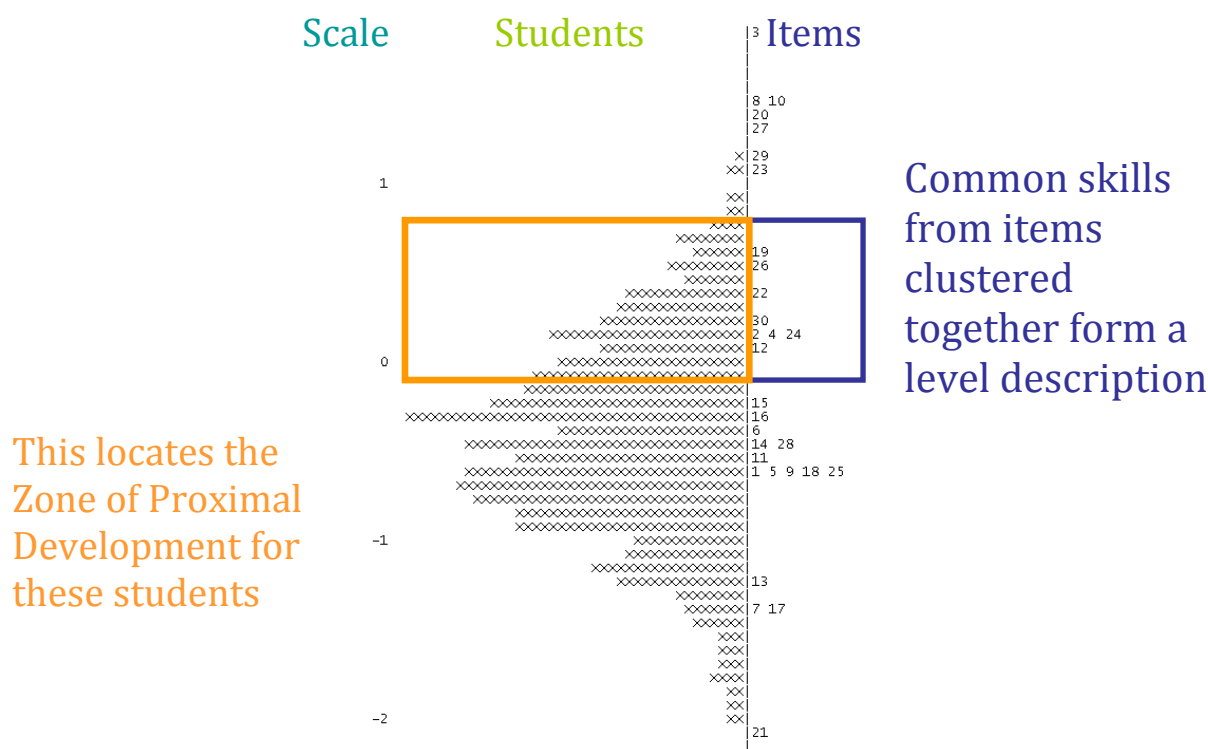

Figure 13.

The challenge for educators then is to identify students' emerging skills and provide the right support at the right time at the right level. Teachers need to be able to identify the ZPD or the 'the state of readiness' in the domain of learning being mastered. This has implications for teaching and learning practice. Traditionally, teachers are not trained to use test score data to identify the ZPD for students across particular disciplines. Identifying the ZPD is difficult without developmental continuums, and impossible to identify if working in a deficit model.

Combining the theories of Glaser, Rasch and Vygotsky allows teachers' assessment practices to move away from the interpretation of a test score as a piece of summative information from the past. Interpretation of the test score becomes the starting point for instruction indicating where a student's ZPD is located and where they are 'ready to learn'.

There are a number of ways in which this can be done. The first is through the use of tests and instruments that have been designed with these processes built in, and which give a reading on student ZPD. The ARC has designed a series of tests in Reading, Numeracy and

Problem Solving. These are known as the Assessment Research Centre Online Testing System (ARCOTS). The ARC has also designed a developmental instrument for Students with Special Needs (SWANS), which performs a similar function. The second way of getting a reading on student ZPD, especially for areas not covered by ARCOTS, is through the use of Guttman charts where teachers and PLTs can process data to identify student ZPD and common ZPD groups in a learning domain.

ARCOTS and SWANS

ARCOTS and SWANS tests and instruments have been specifically designed to locate the ZPD of students and provide feedback in the form of a student's location on a developmental progression. The ALP or LAP tests are a key element of both professional development and research. Students take a test in reading, numeracy or problem solving at two points in time each year, initially to establish a performance baseline for each student and thereafter to gauge progress. Once the data is available, which is at 4.00pm on the day of testing, it should become the focus of PLT discussions. Initially this is about whether the evidence from the tests confirms teacher knowledge of student performance and placement on the developmental progression, and if not what other evidence is needed to establish student ZPD accurately. Subsequently, it provides the basis for planning teaching interventions targeted at student ZPD. The management of ARCOTS testing, and the use of ARCOTS data, is addressed in detail in the online course.

Guttman Charts

The combination of the theories of Glaser, Rasch and Vygotsky enable the identification of student ZPD. The information that this provides is very important but such data can be overwhelming if it is not organised in a way to help PLTs manage their teaching effectively. A Guttman Chart analysis provides an effective tool to *group* students based on the skills they can demonstrate, and identify what needs to be taught next for each group of students. Guttman charts are particularly useful when related online testing methodologies are not available in the domain the PLT and teachers are working in. In the ALP professional development course, tecahers are taught how to create and interpret Guttman charts.

In 1944, Louis Guttman published the steps to produce a *scalogram,* a simple method to gain a picture of qualitative data from questionnaires or tests without the need for an understanding of statistics or time-consuming mathematical analyses. Griffin has built on Guttman's scalogram using the work of Glaser, Rasch and Vygotsky to create a 'Guttman Chart' for teachers which allows them to get a picture of their class's current learning and their future learning needs from assessment data and requires nothing more than some basic spreadsheet skills.

A Guttman chart orders students according to ability, and assessment items (e.g. questions, observations, survey responses, etc.) according to difficulty. Using this method, students with *similar* skills can be identified and grouped together. The skills behind each assessment item can also be grouped to see the usual order of development of the skills assessed. Finally, groups of students can be matched to the group of skills they need to develop. In this way, the assessment data can be used to provide PLTs and teachers with a clear picture of what each group of students is ready to learn. With this information PLTs and teachers can select strategies and resources to meet the learning needs of each group.

Interpreting a Guttman Chart

Ones and zeros to readiness to learn

A student will generally have a pattern of ones for the items that are easy for them, zeros for the items that are hard for them. At some point along the row, between these two extremes, the pattern breaks down to a mixture of ones and zeros. The level in which the student's pattern breaks down is the point of readiness to learn (shown by the coloured boxes). The big ideas in this level should be the goal of targeted teaching for that student.

Everything right? Everything wrong?

Getting almost everything right or wrong on an assessment doesn't provide any information about the readiness to learn of that student. It is the breakdown in the ones and zeros that is important.

Irregular Student Patterns

An irregular row of ones and zeros indicates that the student has not engaged fully in the assessment. The pattern is a reflection of the student's attention to the task, rather than their skills. Therefore, it is not possible to identify the student's point of readiness to learn from the assessment and alternate means must be used.

Odd Zeros

An unusual zero amongst a lot of ones is most likely an indication of a lapse in concentration and not an indication that the student needs to be taught the skill again. We all occasionally made mistakes with something we can do accurately most of the time!

Odd Ones

An unexpected one after the pattern has broken down should also be disregarded. It is an indication of lucky guessing or an unusual event, not a skill that the student has mastered. This is much more likely if the assessment is a multiple choice test, where the probability of guessing correctly is relatively high.
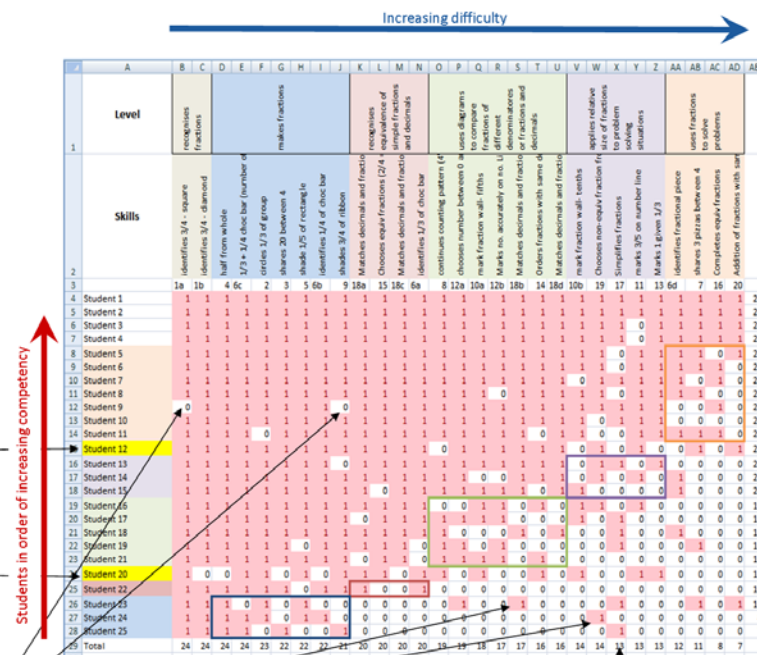
Width of the mixture of ones and zeros

The width of the zone containing a mixture of ones and zeros in an indication of the reliability of the assessment. A very wide zone means that there is a lot of 'noise' in the measure of the students' abilities. A narrow zone indicates that the assessment is a reliability of the students' abilities in the underlying construct. 'Noise' could be due to a number of reasons, including the following: that the students were not engaged in the task, that the assessment was not administered consistently, that the assessment is not of good quality or that the assessment measures more than one underlying construct.

Skill order to level descriptions

The order of skills shows the relative difficulty of the skills for these students, or the likely order of emergence of the skills. This provides a form of developmental progression on which the progress of students can be mapped. The smaller the number of students, the less robust this order will be.

These skills will group themselves into levels, with similar skills emerging together. The cut points between the levels can be found by looking at a combination of the skills and the student responses. If there is a step in the student responses it shows that this is the point at which students take the step to the next level of complexity of skills. Level descriptions can be written to capture the big idea or ideas connecting the skills within the level, generalising from the specifics of one assessment to the underlying construct.

Item Performance

Patterns are expected within the column for an item. It should start with mostly ones which is an indication that the question was easy for the more able students and finish with mostly zeros showing that it was difficult for the less able students. In between, the pattern will break down to a mixture of ones and zeros.

Irregular Item Patterns

If there is an irregular mixture of ones and zeros within a column, it shows the item is not an indicator of a student's ability in the underlying construct. This may be due to ambiguity in the item, inconsistent marking, or an item that is not matched to the underlying construct. (Eg: if a maths question is written in difficult language, the question may measure reading ability, not maths ability.) It could also be an indication that the item is too difficult for the students undertaking the assessment. Items which perform like this should be removed from the current analysis, and teachers can use this information to improve their assessment tasks in the future.

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Figure 14. Interpreting a Guttman Chart.

Figure 14, Interpreting a Guttman Chart, illustrates what a Guttman Chart looks like and how it can be used. PLTs learn how to construct and interpret these charts during the ALP course. In the chart, the zone in which a student moves from mostly correct responses (these appear as 1s on the chart) to mostly incorrect responses (which appear as 0s) is the zone where teaching will be most effective. The Guttman chart enables PLTs to locate this zone and match it to the big ideas underlying the relevant skills. The big idea then becomes the next teaching target for the student/group of students.

Any assessment can only check a limited number of skills that the students may have learned within a subject area. For each item that is included, there are many similar items which were not assessed. A Guttman analysis gives teachers the chance to generalise from the results on a specific assessment to see student progress on the broader ideas, or construct, which underpin the subject area. Therefore, student progress can be tracked against the construct and teaching interventions planned with the aim of developing the student in the underlying construct, not simply remedying deficiencies shown on the skills included in one specific assessment.

Creation of a Guttman Chart provides the PLT with a means of organising their data in a meaningful way to facilitate focused discussion and planning for teaching interventions.

Essential Reading:

Griffin, P. (2007). *The comfort of competence and the uncertainty of assessment.* Studies in Educational Evaluation. 33 : 87-99.
Available from: http://www.sciencedirect.com/science/article/pii/S0191491X07000089

Related Readings:
H. Timperley, A. W., H. Harrar & I. Fung (2007). *Teacher Professional Learning and Development: Best Evidence Synthesis Iteration*. Wellington, New Zealand: Ministry of Education
Available from: http://www.educationcounts.govt.nz/topics/BES

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