The need for assessment leadership in building a community of assessment literate science teachers

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Outline of this presentation

• Theoretical/practical bases of AfL
• The PISA framework for scientific literacy
• Teachers’ AfL competency
• Principal’s AfL leadership and management
• Workshop
Rationale

- The positive roles of AfL in learning and teaching (Black and Wiliam, 1998; Hattie, 2008)
- Little information about teachers’ emerging AfL competencies
- No detailed standards to determine needs/stages of professional learning within a very diverse teacher cohort
- Teachers need enabling and supporting mechanism
- Principal’s expectations/philosophy
- The role of principal’s assessment competence in supporting teachers
The Evidence

• Key findings (Black and Wiliam, 1999):
  • ‘that initiatives designed to enhance effectiveness of the way assessment is used in the classroom to promote learning can raise pupil achievement’ (p3.)
  • ‘frequent assessment feedback helps low-achieving students and student with learning disabilities’.

• Hattie’s research (2008)
  – 800+ meta-analysis
  – 50,000 studies, and
  – 200+ million students
Effect Size

- measures both the *improvement* in achievement for a group of students AND the *variation* of student performances expressed on a standardised scale.

\[
\text{Average standard deviation} = \text{Average of the post-test scores} - \text{Average of the pre-test scores}
\]
Barometers of Influence

\[ d = 0.0 - 0.15 \]
What students could achieve without schooling

\[ d = 0.15 - 0.4 \]
Typical effects of teachers on students that can be accomplished in a year of teaching

\[ d > 0.4 \]
Zone of desired effects

Below \( d = 0.0 \) Decrease achievement
Interpretation

An intervention with an effect size of $d=1.0$
- can advance the learning of students by 2 to 3 years; or
- can improve learning by 50%
- or in the case of experiments, those students who receive the intervention could exceed by 84% the performance of those who do not receive the treatment (Hattie, 2008).
## Disasters (Hattie, 2008)

### Barometers of Influence

- **d = 0.0 – 0.15**: What students could achieve without schooling.
- **d = 0.15 – 0.4**: Typical effects of teachers on students that can be accomplished in a year of teaching.
- **d > 0.4**: Zone of desired effects.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor/Influence</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>Homework</td>
<td>.29</td>
</tr>
<tr>
<td>121</td>
<td>Teacher education</td>
<td>.12</td>
</tr>
<tr>
<td>122</td>
<td>Ability grouping</td>
<td>.12</td>
</tr>
<tr>
<td>123</td>
<td>Gender</td>
<td>.12</td>
</tr>
<tr>
<td>124</td>
<td>Diet</td>
<td>.12</td>
</tr>
<tr>
<td>125</td>
<td>Teacher subject matter knowledge</td>
<td>.09</td>
</tr>
<tr>
<td>133</td>
<td>Open vs. Traditional</td>
<td>.01</td>
</tr>
<tr>
<td>134</td>
<td>Summer vacation</td>
<td>-.09</td>
</tr>
<tr>
<td>136</td>
<td>Retention</td>
<td>-.16</td>
</tr>
</tbody>
</table>

Disasters (Hattie, 2008)
## Average (Hattie, 2008)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor/Influence</th>
<th>Effect Size</th>
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</thead>
<tbody>
<tr>
<td>70</td>
<td>Time on Task</td>
<td>.38</td>
</tr>
<tr>
<td>71</td>
<td>Computer assisted instruction</td>
<td>.37</td>
</tr>
<tr>
<td>75</td>
<td>Attitude to Mathematics/Science</td>
<td>.36</td>
</tr>
<tr>
<td>90</td>
<td>Exercise/Relaxation programs</td>
<td>.28</td>
</tr>
<tr>
<td>99</td>
<td>Summer school</td>
<td>.23</td>
</tr>
<tr>
<td>106</td>
<td>Class size</td>
<td>.21</td>
</tr>
<tr>
<td>107</td>
<td>Charter Schools</td>
<td>.20</td>
</tr>
<tr>
<td>108</td>
<td>Aptitude/treatment interactions</td>
<td>.19</td>
</tr>
</tbody>
</table>

### Barometers of Influence

- **d = 0.0 – 0.15**: What students could achieve without schooling.
- **d = 0.15 – 0.4**: Typical effects of teachers on students that can be accomplished in a year of teaching.
- **d > 0.4**: Zone of desired effects.

### Effects

- **Negative**: Below d = 0.0. Decrease achievement.
- **Medium**: 0.0. Neutral achievement.
- **High**: Above 0.0. Increase achievement.
### Winners (Hattie, 2008)

**Barometers of Influence**

- **d = 0.0 - 0.15**
  - What students could achieve without schooling

- **d = 0.15 - 0.4**
  - Typical effects of teachers on students that can be accomplished in a year of teaching

- **d > 0.4**
  - Zone of desired effects

**d = 1**
- can advance learning by 2 to 3 years
- can improve learning by 50%
- can increase performance by 84%

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor/Influence</th>
<th>Effect Size</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Self-reported grades</td>
<td>1.44</td>
</tr>
<tr>
<td>2</td>
<td>Piagetian program</td>
<td>1.28</td>
</tr>
<tr>
<td>3</td>
<td>Providing formative evaluation</td>
<td>0.90</td>
</tr>
<tr>
<td>4</td>
<td>Micro teaching</td>
<td>0.88</td>
</tr>
<tr>
<td>5</td>
<td>Acceleration</td>
<td>0.88</td>
</tr>
<tr>
<td>6</td>
<td>Classroom behavioral</td>
<td>0.80</td>
</tr>
<tr>
<td>7</td>
<td>Intervention for students with learning needs</td>
<td>0.77</td>
</tr>
<tr>
<td>8</td>
<td>Teacher clarity</td>
<td>0.75</td>
</tr>
<tr>
<td>9</td>
<td>Reciprocal teaching</td>
<td>0.74</td>
</tr>
<tr>
<td>10</td>
<td>Feedback</td>
<td>0.73</td>
</tr>
</tbody>
</table>

*Winners*
Others (Hattie, 2008)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Factor/Influence</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Teacher-student relationships</td>
<td>.72</td>
</tr>
<tr>
<td>14</td>
<td>Prior achievement</td>
<td>.67</td>
</tr>
<tr>
<td>18</td>
<td>Self-verbalization and self-questioning</td>
<td>.64</td>
</tr>
<tr>
<td>19</td>
<td>Professional development</td>
<td>.62</td>
</tr>
<tr>
<td>21</td>
<td>Not labeling students</td>
<td>.61</td>
</tr>
<tr>
<td>22</td>
<td>Teaching strategies</td>
<td>.60</td>
</tr>
<tr>
<td>25</td>
<td>Direct instruction</td>
<td>.59</td>
</tr>
</tbody>
</table>
The Challenge

Griffin (2007)


Zone of Proximal Development (Vygotsky 1978/1986)

1. Training design
2. Modalities
3. Teacher learning
4. Resource allocation
5. Policy articulation

1. Self-assessment
2. Peer-assessment
3. School Heads’ direct assessment

Teacher Performance Evaluation

Professional Development
Framework for PISA 2015 Scientific Literacy

**Contexts**
- Personal
- Local/national
- Global

**Competencies**
- Explain phenomena scientifically
- Evaluate and design scientific enquiry
- Interpret data and evidence scientifically

**Knowledge**
- Content
- Procedural
- Epistemic

**Attitudes**
- Interest in science
- Valuing scientific approaches to enquiry
- Environmental awareness

How an individual does this is influenced by
Figure 1: Teacher inquiry and knowledge-building cycle to promote valued student outcomes

What knowledge and skills do our students need?

What has been the impact of our changed actions?

Engage students in new learning experiences

Deepen professional knowledge and refine skills

What knowledge and skills do we as teachers need?

(Timperley et al., 2008)
Teacher’s AfL competency

• Based from Alonzo, Davison & Lee (2013)
• Established 6 factors of teacher’s AfL competencies
• Criteria and standards framed like rubrics
• For teacher’s self-assessment
Factor analysis: EFA/CFA/ESEM

• Factor 1: Teacher as an assessor
• Factor 2: Teacher as a pedagogy expert
• Factor 3: Teacher as a student partner
• Factor 4: Teacher as a motivator
• Factor 5: Teacher as a teacher learner
• Factor 6: Teacher as a stakeholder partner
• Factor G: Teacher as an AfL expert
Results of Latent Profile Analysis

• Establish a latent profile of teachers’ AfL competencies/skills
  – Identifying a number of teacher groups based on their use of the assessment for learning (AfL) concept.
  – Identifying patterns of teachers’ use of the assessment for learning (AfL) concept
LPA: The 5-class model of teachers

<table>
<thead>
<tr>
<th>Class</th>
<th>Mean Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>3.7%</td>
</tr>
<tr>
<td>Class 2</td>
<td>18.5%</td>
</tr>
<tr>
<td>Class 3</td>
<td>32.4%</td>
</tr>
<tr>
<td>Class 4</td>
<td>36.0%</td>
</tr>
<tr>
<td>Class 5</td>
<td>9.3%</td>
</tr>
</tbody>
</table>
The 5-class model of teachers: Interpretations

- **Class 1: Novice teachers**
  - show very little skills and knowledge with the AfL

- **Class 2: Developing teachers**
  - show limited skills and knowledge with the AfL

- **Class 3: Proficient teachers**
  - use a range of the AfL-related activities

- **Class 4: Skilled teachers**
  - use consistently the AfL practice; reflect and evaluate their own AfL skills

- **Class 5: Expert/Lead teachers**
  - Provides professional support to their colleagues.
• Overall, there is a consistency in teachers’ use of different aspects of the AfL concept and practice across all groups.

• More consistency manifested by Classes 2, 3, and 4, compared to the Class 1 or 5.
There were relatively little differences in their use of assessment tasks to measure students’ learning (Factor 1).

The dimension of teachers as motivators can discriminate the novice and expert teachers.
Summary of findings

1. The levels (as opposed to profile patterns) are prominent differences among teachers; hence, the five groups can indicate different stages of using and understanding the AfL concept.

2. Teachers’ AfL competence develops with holistic acquisition of skills.

3. Teachers’ assessment data literacy (Factors 2-6) is an important factor for their AfL competence.
Implications for practice

• Teachers’ latent class can be used to identify their strengths and weaknesses in using the AfL concept and practice.
• Teachers who are in need to develop the AfL concept and practice can be identified, hence a needs-based enabling mechanism can be provided.
Implications for practice

• LPA shows that it is unlikely that a teacher is an expert in one area of the AfL practice and a novice on another area of the AfL practice. Hence, assessment literacy should be holistically designed.

• Professional development programs should emphasise assessment data literacy (Factors 2-6).
# High performance of teachers

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conducts assessment with consideration of student background and culture</td>
<td>4.36</td>
</tr>
<tr>
<td>Participates in professional development related to assessment</td>
<td>4.36</td>
</tr>
<tr>
<td>Demonstrates belief in the ability of every student to improve</td>
<td>4.14</td>
</tr>
<tr>
<td>Identifies appropriate teaching methods</td>
<td>3.94</td>
</tr>
<tr>
<td>Maintains confidentiality in dealing with assessment results (norm referencing, inappropriate disclosure of assessment results and ranking students)</td>
<td>3.93</td>
</tr>
<tr>
<td>Develops an environment of trust</td>
<td>3.93</td>
</tr>
<tr>
<td>Undertakes further education/ training</td>
<td>3.93</td>
</tr>
<tr>
<td>Tailors lessons to available resources</td>
<td>3.88</td>
</tr>
<tr>
<td>Uses assessment to build students’ interest to learn</td>
<td>3.86</td>
</tr>
<tr>
<td>Reinforces positive learning attitude of students</td>
<td>3.79</td>
</tr>
</tbody>
</table>
## Low performance of teachers

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gathers a range of evidence of student learning</td>
<td>2.36</td>
</tr>
<tr>
<td>Designs assessment tasks</td>
<td>2.45</td>
</tr>
<tr>
<td>Engages students in peer-assessment</td>
<td>2.45</td>
</tr>
<tr>
<td>Engages in self-assessment/ reflection</td>
<td>2.68</td>
</tr>
<tr>
<td>Involves students in the development of learning outcomes</td>
<td>2.87</td>
</tr>
<tr>
<td>Gives feedback related to criteria</td>
<td>2.87</td>
</tr>
<tr>
<td>Assists students in using feedback to feed forward</td>
<td>2.98</td>
</tr>
<tr>
<td>Collaborates with family to establish home activities to support student learning</td>
<td>2.98</td>
</tr>
<tr>
<td>Informs community of school’s assessment practices</td>
<td>3.12</td>
</tr>
<tr>
<td>Develops appropriate English language assessment strategies</td>
<td>3.33</td>
</tr>
<tr>
<td>Moderates feedback and results of self and peer assessment</td>
<td>3.33</td>
</tr>
<tr>
<td>Engages in peer-review of teaching performance</td>
<td>3.36</td>
</tr>
<tr>
<td>Identifies key assessment and teaching issues for review</td>
<td>3.36</td>
</tr>
<tr>
<td>Involves students in the development of success criteria/ rubrics</td>
<td>3.4</td>
</tr>
<tr>
<td>Explains the success criteria/ rubrics</td>
<td>3.4</td>
</tr>
<tr>
<td>Engages students in self-assessment</td>
<td>3.4</td>
</tr>
</tbody>
</table>
What **knowledge** and **skills** do we as leaders need to support our teachers?
Leader Inquiry and Knowledge Building Cycle

- What knowledge and skills do our teachers and students need?
- What knowledge and skills do we as leaders need?
- What has been the impact of our changed actions on teachers and students?
- Engage teachers and students in new learning experiences
- Deepen leadership knowledge and refine leadership skills

(Timperley, in press)
Issues

• Misalignment of principals’ expectations to teachers’ assessment practices
• Teachers’ need for enabling and supporting mechanism to further improve their assessment literacy
• Inconsistencies between performance evaluation criteria and classroom assessment practices
• The need for principals to advance their assessment leadership skills
The BIG Question

• Can we expect that all principals/school heads have a high level of assessment literacy?

  – The focus of high performing principals is ensuring student learning (Dinham, 2005)
  – The role of principals in helping teachers in their assessment practices (Stiggins & Duke, 2008)
  – Effective principals use a wide range of assessment data to help teachers (Day et al., 2009)
Why establish community of assessment literate teachers?
Theoretical Basis

The constructivist theory of learning

- AfL knowledge is generated through interaction of teachers.
- Understanding AfL principles is negotiated through interaction (Brooks & Brooks, 1999), which consequently expands knowledge through collaborative enterprise (Palloff & Pride, 2005).
- Through shared knowledge, AfL principles will be fully understood.
Theoretical Basis

The socio-cultural theory of learning

- As teachers coming from various contexts bring and share their unique learning, teaching and assessment experiences, their interaction allows them to construct meanings of reality (DeCorte, 1996: Nicol, 1997).

- The construction of reality is embedded with mutual trust and partnership, which is deemed to have a long term impact to and to be drivers of educational reforms.
Theoretical Basis

The community of inquiry

– The design, facilitation and direction of cognitive and social processes create meaningful experiences
– Enquiry is at the core of professional engagement which involves process of collaboration and construction
– Social interaction helps teachers to share knowledge, develop and evaluate meanings, and hence enrich their understanding (Garrison & Vaughan, 2007)
Principals: Assessment managers or leaders?

Assessment Management
- Administering assessment system
- Planning school assessment activities
- Ensuring adherence to standards

Assessment Leadership
- Empowering and mentoring teachers
- Ensures motivation of teachers
- Development of new assessment opportunities
Workshop

In a group, identify what assessment leadership and assessment management skills you need to have to support your teachers’ assessment practices and literacy.
1. Advance level of AfL Skills in the ff. areas:

- Development of learning outcomes
- Establishment of success criteria and standards
- Development of differentiated assessment
- Communicating assessment results
- Ensuring trustworthiness of assessment
- Adherence to ethical standards
- Utilisation of assessment data in lesson planning
- Differentiation of teaching
Advance level of AfL Skills \textit{cont’n}

– Engaging students in teaching and assessment
– Development of environment that values individual learner
– Directing students towards learning
– Utilisation of assessment tool to identify professional training needs
– Communication with parents/guardians
– Enhancement of community’s trust.
2. AfL mentoring skills

– Establish a collegial peer-evaluation of teaching
– Identify training needs of teachers based from the results of AfL skills inventory
– Communicate to teachers their training needs
– Provide professional training/guide/mentoring to teachers
– Develop a professional development plan with emphasis to assessment and content-knowledge skills
3. Engage with teachers and students in a conversation around assessment

– Consider teacher’s beliefs and values
– Draw strong commitment from teachers
– Promote discussion of assessment to teachers, students and other stakeholders
4. Develop an assessment culture that promotes high level of student achievement and learning

– Oversee that professional development is made available for teachers
– Identify and secure the resources needed
– Create a climate where assessment for learning is the focus of monitoring and supervision