

Giving Students a voice - A Preliminary Study of the Validity of a Ultra Brief Outcome measure for Students: The Learning Rating Scale LRS

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Abstract

Concurrently with increased globalization policy makers and politicians put pressure on schools to improve the quality of education - "to deliver the goods" - in order to ensure better education for more students. In spite of several research findings, which demonstrate a robust connection between (1) a positive alliance between teacher and students, and (2) whether the teachers' way of teaching (3) facilitate the learning processes of the students, and (4) high expectation of the students, are of crucial importance for the learning process, paradoxically no outcome-measures have been developed as a specific tool for the teacher to use on a day-to-day basis. Feedback from the students to the teacher is according to several studies the single most important factor for whether learning takes place or not. This article describes the development and validation of an ultra brief, easy-to-use measurement instrument, the Learning Rating Scale (LRS), which measures the degree to which learning processes are facilitated in the classroom. The instrument's psychometric properties are examined and reported. Informed by practical experience with the LRS, its feasibility in class room settings is also considered and implications for further use of the instrument are presented.

Keywords: Learning, teacher-student alliance, analog rating scale, measurement instrument, validation.

Introduction

The role and importance of teaching method in promoting learning has for many years dominated discourse on student learning. Likewise research focus has primarily been placed on teaching methods with the aim of identifying the best possible method of promoting learning. Recent research, however, demonstrates that a positive alliance between teacher and student correlates with academic achievement (Crosnoe, Johnson, & Elder, 2004) as well as social behavior at school (Hamre & Pianta, 2005). As such, students who experience a positive teacher-student relationship, as compared to those who do not, achieve better grades, show higher levels of classroom motivation and participation, and display higher levels of comfort, enjoyment, and acceptance by their peers (Crosnoe, et al., 2004; Hamre & Pianta, 2005, Hughes & Kwok, 2006). Moreover, the documented impact of positive student-teacher alliances persists across different cultures and gender (Hughes & Kwok, 2006).

Research studies also document that positive expectations towards the students have a marked impact on intellectual performance among students (Rosenthal & Jacobson, 1977; Rosenthal, 2003; McKinsey & Company, 2007).

Finally, the teachers' approach to teaching, the teacher's expectations to the students, as well as the social context are of crucial importance of whether the learning process of the students is "triggered" or not and where the main outcome arrives from (Bandura, 1997; Deci & Ryan, 2000; Deci, Ryan, & Koestner, 1999).

Hence other factors than "merely" the way of instruction or method of teaching appear to be of crucial importance for facilitating the learning process. By analyzing several studies Hattie (2007) has found that the most powerful influences on learning and achievement is feedback, in the sense that the teacher receives feedback from the perspective of the students, and the student from the teacher. In accordance to Hattie the most powerful feature was the creation of situations in the classroom for the teachers to receive feedback about their teaching and the ripple effect back to the students (2009).

However there is to our knowledge no specific tool for teachers to use on a day to day basis emphasizing immediate feedback and feasibility in the class room. Such an instrument would be relevant for researchers, school leaders and teachers – to be used easily and efficiently on a day-to-day basis. The Learning Rating Scale (LRS) aims to address this gap by providing an easy to use and quick in-the-class room way of measuring extent to which student learning takes place in the class room.

The Learning Rating Scale (LRS) has been developed in order to measure the connections between the psychological factors that promote learning. The development of the LRS – in format inspired by the work of Duncan and Miller (2003) - is based on research findings showing that a positive learning alliance between teacher and students is strongly influenced by (1) the personal well being of the student in the class room (Crosnoe, et al., 2004; Hamre & Pianta, 2001; Hughes & Kwok, 2006; Rathunde, 2003; Rathunde & Csikszentmihalyi, 2005), (2) the teaching style, especially (3) whether the student can use the way the teacher teaches in her or his personal learning development (Bandura, 1997; Deci & Ryan, 2000; Deci, et al., 1999; Stern, 1985), and (4) positive expectations towards the student, have powerful influence on the learning process (Rosenthal, 2003).

LRS Learning Rating Scale

Name _____ Age _____ Date _____ No. _____

Class _____ School _____

How do you think you are doing in school at the moment? Please put a mark on the lines to let us know.

In class

I don't learn much in school 😞 |-----| 😊 I learn a lot in school

Socially

I don't get along well in school 😞 |-----| 😊 I get along well in school

Method

I don't like the way teacher teaches 😞 |-----| 😊 I like the way teacher teaches

Expectation

Not much is expected of me in school 😞 |-----| 😊 Much is expected of me in school

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Figure 1. LRS – The Learning Rating Scale.

These theoretical ideas are in the LRS transformed into a four-item visual analogue instrument, consisting of four 10-cm visual analog rating scales with instructions to place a hash mark on a line with negative responses depicted on the left and positive responses indicated on the right (see figure 1). First a *learning gain scale* gauges the experienced learning gain in the lesson on a continuum from “I don’t learn a lot in school” to “I learn a lot in school”. Second is a *social scale*, that rates the lesson on a continuum from “I don’t get along well in school” to “I get along well in school”. Third is a *method match scale* requiring the student to rate the lesson on a continuum from “I don’t like the way teacher teaches” to “I like the way teacher teaches”. Finally a fourth *expectation scale* gauges the student experience of expectations on a continuum from “Not much is expected of me in school” to “Much is expected of me in school”.

The objectives behind the rating scale are to enable the teacher to measure whether the intrinsic learning process is taking place in the class room and in effect to support evidence-informed teaching. The intension is not to use the LRS in connection with every lesson but to use the LRS when the teacher wants to know, whether the instruction works or not.

Method

Research design

The LRS was used among other research instruments in a nation-wide evaluation of experiments with teacher assistants in Danish public schools (Rambøll, 2011). The evaluation, commissioned by the Agency for Quality Assurance and Evaluation under the Danish Ministry of

Education, was carried out in the school year 2010-11. The evaluation involved an interrupted time series design where the LRS was administered before, during and towards the end of the teacher assistant experiment.

The LRS was administered at 24 randomly selected schools. First, an information package containing an introduction to the LRS, a guide to the administration of the instrument and 60 pre-printed copies of the LRS was sent to the schools. Second, a series of follow-up phone calls were made with school administrators at all of the participating schools to accommodate questions relating to the subsequent administration of the LRS. Third, the LRS forms were administered by the teachers in their respective classrooms. The teachers administered the LRS at the end of the class. Teachers were asked to read a brief introductory text about the LRS and how to fill out the four items on the LRS. Fourth and final, the completed LRS forms were returned to Rambøll Management Consulting by the school administrator.

The LRS was subsequently scored by simply summing the marks made by the student measured by one decimal place on each of the four lines. Each of the four lines was scored from 0-10 points, awarding one point per centimeter. As a result, the overall *learning alliance score* ranges from 0-40 points.

Sampling Procedures

A random sample of 24 public schools carrying out experiments with teaching assistants took part in the time series study evaluation. Neither schools nor participants were compensated for their participation. The LRS was administered at all of these schools in classes where the teaching assistants had been consistently present throughout the school year. As such, the class rooms and in effect the pupils were not randomly selected for participation. The results of the validation study only pertain to pupils with the specified participant characteristics presented in the following section.

Participant characteristics

The population in the validation study consists of 901 pupils from 24 public schools in Denmark. Participants were unevenly dispersed across class levels with the majority of pupils in 2nd-5th grade, as shown in Table 1. The participants ranged in age (M = 9.3 years, age-range 5-16 years) and males constituted a majority of the population (47 % female, 53 % male).

Table 1. Class level

Class level	Frequency	Percent
0	43	4.8
1	63	7.0
2	158	17.5
3	274	30.4
4	122	13.5
5	121	13.4
6	61	6.8
7	41	4.6
8	15	1.7
9	3	.3
Total	901	100.0

Validation strategy

A measurement tool is considered to be valid if it measures what it purports to measure (Allen and Yen, 1979). Validity can be assessed in several ways, depending on the measurement tool and its intended use. In our effort to validate the LRS, we awarded particular attention to both content and construct validity. Let's consider these in turn.

Content validity (also known as logical validity) is an advanced form of the oft-cited face validity and constitutes an important and very often useful first step in developing new and valid measurement tools. Content validity involves the "careful definition of the domain of behaviors to be measured by a test and the logical design of items to cover all the important areas of this domain" (Allen and Yen, 1979). In our effort to develop a valid measure of student learning, content validity was enhanced by informing the structure and content of the LRS by existing evidence on factors promoting student learning.

First, the development of our measurement was informed by existing knowledge, theories and studies on student learning. The first item *learning* measures to which degree the intrinsic learning process is facilitated and is based on a vast body of literature from former theorists like Dewey, Piaget, Rogers, and Vygotsky, whose collective work emphasized that students actively construct their own learning. These early ideas are further elaborated by modern theories like Deci's self-determination theory (Deci, 1976, 1980; Deci & Ryan, 2000; Deci, et al., 1999) that emphasizes the importance of self-motivation or intrinsic motivation in opposition to extrinsic motivation so the learning process can be seen as a form of personal growth.

The second item *Social* relates to the importance that social climate has on student learning. Social climate involves the teacher-student relationship, the student-student relationship and as a whole the total social setting of the school. If the students experience social difficulties, their energy is taken away from the learning process (Crosnoe, et al., 2004; Hamre & Pianta, 2001, 2005; Hughes & Kwok, 2006; Rathunde, 2003; Rathunde & Csikszentmihalyi, 2005).

Item three, *Method*, focuses on the kind of instruction the students are "exposed" to in the classroom (Joyce, 2009), while the fourth item *expectation* reflects the importance of positive expectations towards the students in relation to intellectual performance (Rosenthal & Jacobson, 1977; Rosenthal, 2003). See fig. 2.

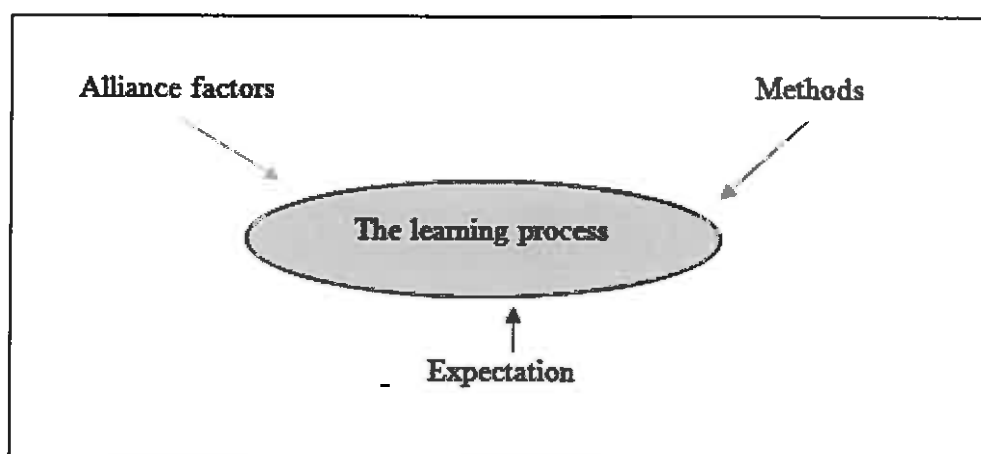


Fig. 2. The learning process is influenced by alliance factors, teaching methods, and expectation to the student

By developing our model informed by existing literature on student learning and systematically translating our model into a corresponding set of items, the content validity of the LRS was enhanced. In the end, however, we are well aware that content validity, being based on a set of systematic, yet subjective judgments, is more vulnerable to error than other types of validity. Hence the content validity of our measurement tool did not – in and of itself – constitute a sufficient justification for its use. With this in mind we also examined the construct validity of our model.

Construct validity expresses the degree to which a measurement tool measures the theoretical construct that it was designed to measure. Establishing construct validity involves three successive steps:

- Based on current theory regarding the trait being measured, the developer makes predictions about how the scores should behave in various situations.
- These predictions are then tested.
- If the predictions are supported by the data, construct validity is enhanced.

In our validation of the LRS, we made two central predictions about how the scores would behave:

First, we expected that the learning, social, method and expectation dimensions of the LRS individually constitute relevant factors for the learning alliance between a teacher and a pupil. As such, we examined the following:

- A. If the four dimensions measure the same underlying dimension then we would expect them to hold a moderate to strong positive correlation with each other. In contrast, if there are any variables that fail to correlate with any other variables, they should be excluded from the model. We examined this prediction by looking at the inter-correlation between the four variables.
- B. If each of the four dimensions is independently relevant then the dimensions will not correlate too highly, as it becomes impossible to determine the unique contribution of the individual dimensions to the overall learning alliance score. The too high or perfect correlation would be indicated by multicollinearity between the dimensions. We examined this prediction by looking at the determinant of the correlation-matrix.

Second, we predicted that the *learning* and *social* dimensions of the LRS would present the strongest relationship with the overall learning alliance score. We tested this prediction by carrying out a multiple regression analysis with the four dimensions as explanatory variables (i.e. independent variables) of the overall learning alliance score (dependent variable).

The results of the construct validity tests are presented in what follows.

Results

Statistics and data analysis¹

The first step in our validation analyses was to examine the correlation between the four dimensions of the LRS. Table 2 presents a correlation matrix. The purpose of the correlation matrix is to display the strength and direction of the relations between the four dimensions in the LRS. As the table indicates, there are moderate positive relations between the learning, social and method dimensions of the LRS (correlation coefficients ranging from $r = .428$ to $r = .504$, $p < .001$). In comparison, the expectation dimension has slightly weaker positive relations with all the other

¹ All the statistical analyses were carried out in SPSS 17.

dimensions (correlation coefficients ranging from $r = .330$ to $r = .377$, $p < .001$). Moreover, there appears to be no multicollinearity between the dimensions, indicating that each of the dimensions contribute individually (determinant of 0.449 is greater than the necessary value of 0.00001).

Table 2. Correlation matrix

Dimension	Learning	Social	Method	Expectation
Learning		.445	.504	.377
Social			.428	.330
Method				.345
Expectation				

All correlations are significant at $p < 0.001$, Determinant = .449.

The second step in our validation analysis involved carrying out a multiple regression analysis to determine the relative contribution to the overall learning alliance score by each of the four dimensions. The purpose of multiple regression analysis is to examine how the value of the dependent variable (e.g. the overall learning alliance score) changes when any one of the independent variables (e.g. social) is varied, while the other independent variables are held fixed (e.g. learning, method, and expectation). We carried out a hierarchical multiple regression analysis by stepwise entering each of the dimensions in the following order: learning, social, method and experience. Table 3 presents the model summary for each of the four steps in our analysis. The value of R Square indicates how much variability in the overall learning alliance score is accounted for by the dimensions. As the table indicates the *learning* dimension accounts for 58.1 % of the variation in the overall learning alliance score when holding the other dimensions constant. Moreover, the *learning* and *social* dimension of our model collectively accounts for 77.7 % of the variation of the overall learning alliance score, which means that the addition of the social dimension accounts for an additional 19.7 %. Finally, if we add either the *method* or the *expectation* dimension to our model the model accounts for an additional 11% of the variation.

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1. Learning	.762	.581	.580	4.3569	.581	1244.970	1	899	.000
2. Learning/social	.882	.777	.777	3.1773	.197	792.511	1	898	.000
3. Learning/social/Method	.943	.890	.890	2.2334	.113	920.464	1	897	.000
4. All dimensions	1.000	1.000	1.000	.0000	.110	8.872E16	1	896	.000

Dependent variable is overall learning alliance score

In summary, the results of our analyses appear to provide positive support for our model while at the same time suggesting further revisions and research needs. Three of the four dimensions, *learning*, *social* and *method*, display positive and moderately strong relations, indicating that they are measuring the same underlying construct. The *expectation* dimension, though, indicates generally low correlation with the other dimensions, suggesting that it might be excluded from the model. The

two dimensions *learning* and *social* present the strongest relationship and serve as the best predictors of the overall learning score.

Discussion

In this article we have presented the results of an initial validation study of the LRS, a newly developed measurement instrument that measures psychological factors promoting student learning. Overall the LRS performs well; though, our findings also suggest further refinement and practical experience is called for. Three of the four dimensions, *learning*, *social* and *method*, display positive and moderately strong relations, indicating that they are measuring the same underlying construct. The *expectation* dimension, though, indicates generally low correlation with the other dimensions, suggesting that it might be excluded from the model. The two dimensions *learning* and *social relation* present the strongest relationship and serve as the best predictors of the overall learning score.

The current effort is a first step in the development and validation of the LRS. As such, we feel that several new researches needs arise from our efforts. These relate to both the further validation of the instrument as well as the practical use of the instrument.

Further validation needs

In enhancing the validity of the LRS further work on the criterion-related validity of the instrument would be in place. This could involve the parallel administration of the LRS and validated instruments measuring student learning. Alternatively, the LRS could be administered in combination with systematic teacher appraisals of students' ability levels. The validation effort would moreover serve to establish cut-off scores or intervals for determining students with high and low learning gain. This would also further the practical use of the instrument among teachers.

Another area in need of further validation study is the expectation dimension of the LRS. The low correlations between this dimension and the other dimensions in the model could be the product of a theory error (the dimension is not relevant and hence should be included in the LRS) or an implementation error (the phrasing of the item is incorrect and hence should be revised). In clarifying the type of error in the expectation dimension, the LRS scores on the expectation dimension could cross validated with other validated measurement instrument of teacher-student expectation (for example the motivational questionnaire by Ryan and Deci, 2000). The aim of this effort would be to determine the type of error underlying the low performance of the dimension and in effect whether the dimension should be revised or eliminated from the LRS.

Finally, we find it important to examine the consequential validity of the LRS. Consequential validity has to do with the extent to which any negative consequences or implications arise from the practical application of the instrument and the degree to which these negative outcomes stem from flaws in the measurement instrument. The focus on utilization of the LRS in class room settings makes the examination of consequential validity particularly compelling. The practical approach to explore this type of validity would involve a more qualitative yet systematic analysis of the use and consequences of the LRS in various school settings.

Practical significance of findings

One strand worth pursuing in the practical development of the LRS would be the further use and practical implementation of the instrument in varied school settings. The instrument is not developed on the basis of specific teaching methods or approaches and the LRS is in its practical application method-neutral. As such, it can be applied in combination with a broad range of teaching methods and approaches. Likewise it would be interesting to pursue practical experiences with the LRS in both traditional settings with "one teacher, one subject, one room and one class" and more experimental settings with project-oriented learning environments. The systematic application of the

LRS in different settings could also involve the use of LRS in combination with various instructional strategies or methods, subjects and curriculums or even the administration of the LRS by different types of staff (e.g. the use of teaching assistants or teaching aids), with different types of students (e.g. socio-economic background, grade levels, learning styles etc.), or in relation to different ways of organizing the class room.

Another area of interest could be the use of the LRS in working with individual or groups of students on academic progression and performance. How do teachers use the LRS scores in dialogues with students and/or parents? How do teachers use the LRS in dialogues about student progress with other teachers? How if at all can the LRS be used in developing individual student plans for academic improvement? These are some of the questions that could be interesting to pursue in further research efforts.

Finally, we find it worthwhile to examine the potential application and use of the LRS in furthering teacher reflections on various teaching methods. How if at all can the use of the LRS promote more small scale, yet systematic, development and testing of various instructional strategies and methods? How can the LRS play a beneficial role in teachers developing their practice? This potential role of the LRS is particularly compelling in the context of promoting more small scale evidence-informed practices in the class room.

It is our hope that our discussion of the initial results and potential roles of the LRS will promote further interest and systematic application of the LRS among teachers and researchers.

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