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Relationship between Student Self-assessment and Constructivist Learner Scale CLS Score: A Case for Student Involvement in Assessment Process

Dr. Nasir Mahmood  
IER, University of the Punjab  
<mahsirm@ier.pu.edu.pk>

**Abstract:** The study focused on finding the difference of inclination towards self-assessment behavior between students with higher constructivist learning approach and lower constructivist approach. A self-assessment questionnaire was used to collect data from students of science in grade five over a period of almost two months during learning about "solution". The score Constructivist Learning Scale (CLS) was used to group them and high and low pro-constructivist learners. It was found that in quantitative terms the students of high CLS group were better able to make self-assessment as compared to the students of low CLS group but the same cannot be said in terms of qualitative relevance and depth of wording and ideas used by the students in the second part of the each question.

**Key words:** Self-assessment, constructivism, learning science

TE1-K

**Introduction:**

There is growing awareness of the benefits of including students in the assessment process which can make it more relative and authentic (Pellegrino et. al, 2003; pp.236-240, Ormord, 2003;p. 578) but its use is limited to elderly students most of the time (van Kraayenoord & Paris, 1997; pp.523-537). Consequently most of the research for developing self-assessment tools and related skills in students is limited to students in higher grades. But recently some authors have recognized the importance of the subject for elementary school students and showed that if approached with appropriate tools and training it can work equally well with younger students as well (Ormord, 2003;p. 578). In addition to the need for the cultivation of self-assessment ability this study takes one step further by investigating the relationship between the degree of pro-constructivist inclination of students towards learning (by utilizing students score on CLS) and proficiency in assessing themselves effectively.

**Objectives:**

The study used CLS (Nasir, 2004) as a tool to group students in higher and lower groups on the basis of their pro-constructivist inclination and then compares qualitative and qualitative difference among them in their ability of self-assessment.

**Method:**

The study involved 115 (38+39+38) students of grade 5, divided into three classes, from one of the attached elementary schools of Tokyo Gakugei University. The data was collected during the lessons on "solution" and the students were asked to fill in a self-assessment sheet at the end of each lesson session. For the purpose of comparison of self-assessment sheets it was made sure to synchronize the content for all three classes by equating lessons in which same content was taken up. The students CLS score was recorded at the beginning of the unit (solution) using Constructivist Learner Scale (CLS)

**Data Analysis:** Thirty students each (ten students from every class) of high and low CLS score were included in the analysis. Students' self-explanation of what they learned new, what they want to learn more and how far collaboration with other students and teacher helped in their learning was used to support quantitative results for both high and low CLS groups.

**Description of the self-assessment sheet:** It comprised of six questions and each question had two parts. The first part of each question was closed ended and required the students to select one of the two options (yes/no). In case of selecting 'yes', students were asked to write explanation in words. The questions were meant to investigate students' self-realization of what they have learned and which factors contribute importantly in their learning process. The constructivist traits addressed in the questions were students' previous knowledge, interest, effectiveness of collaboration with other students and interaction with teacher

**Results:**

The students of high CLS score averaged 76.5 (range of 86-71) while the average for students in low CLS score group were 38.1 (range of 37-65). The CLS comprised of 18 questions on a five-point scale thus making possible a range of 18-90 score.

The results showed that the students with high CLS are better at self-assessment than the students with low CLS score. Additional details are presented question-wise below:

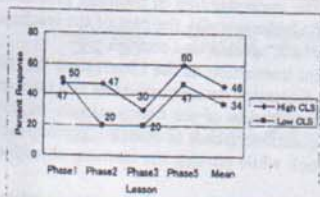


Figure 1: Question 1-Comparison of percentage of High and Low CLS on Self-assessment

development among the students with more pro-constructivist learning approach (high CLS score).

The difference in the quality of previous knowledge also differed between the groups. When students were asked about what they have observed while dissolving salt in water and did they know anything they observed during today's lesson beforehand. The differences can be attributed to the observation skills and depth of observed properties The students with high CLS have more critical approach of looking at the same phenomenon.

1. Figure 1 shows that although both groups started with same number of students reporting prior knowledge about the apparent characteristics of solution when salt was dissolved in it but the visible difference between the prior knowledge between high CLS score and low CLS score group in the later phases indicates better learning

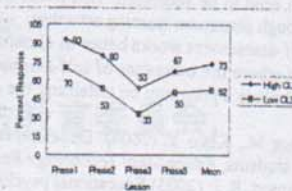


Figure 2: Question 2-Comparison of percentage of High and Low CLS on Self-assessment

3. The result concerning the students' self-consciousness of the adequacy of collaborating with other students (question 4) and learning from sharing with group fellows (question 5) illustrate that the students with higher CLS score put more weight to the collaboration with other students as contributive factor in their learning as compared to students with low CLS score. Almost half of the students with high CLS score found discussion with group fellows as valuable source in learning through out the analyzed lessons as compared to 1/3<sup>rd</sup> of the students with low CLS score.

One commonality found was the exceptionally high rating of collaboration in phase 2 of the lessons shown in figure 4.

The higher percentage of discussion in phase 2 was due inter-group disagreement on the existence of quantitative limit in dissolving. Thus reaffirming the need of class activities that can instigate difference of opinion can lead toward better collaboration and in turn can facilitate constructivist learning.

Another irregularity is evident in Figure 5, phase 3 when the percentage suddenly sinks to exceptionally lower. This phase involved an observatory activity in which students were involved in studying the change in weight of solution on dissolving a certain quantity of solvent.

When it comes to analysis of students detailed statements explaining their choice of 'yes' on first part of self-assessment questions, there is no clear pattern. The students' statements range from single worded shallow response to well elaborated deep statements for the students from both high CLS and low CLS group.

4. The overall trend in both high CLS and low CLS group is discouraging in terms of individual communication between students and teachers, which is less than 20% in both cases. In contradiction to the rest of the questions, the students of low CLS seem to have better communication with teacher compared to students of high CLS. A review of the statements in the self-assessment sheets lead to the conclusion that students did not refer to the group talk between them and teacher equivalent to their one-one talk to teacher.

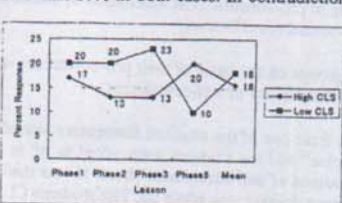


Figure 6: Question 6-Comparison of percentage of High and Low CLS on Self-assessment

asked by the students were limited to the use of some experimental apparatus, writing notes or seeking instruction. It is very rare to have any questions/discussion about the finding or conceptual problem

#### Discussion:

In quantitative terms the students of high CLS group were better able to make self-assessment as compared to the students of low CLS group but the same cannot be said in terms of qualitative relevance and depth of wording and ideas used by the students in the second part of the each question.

This implies that the ability of self-assessment needs proper nurturing and awareness of the intent for both students and teachers. The students need to be trained in what is expected out of self-assessment and what meanings are associated with the terms used in the assessment sheet. For example, how to look at collaboration when explaining learning resulting due to group work/discussion or what is meant to explain the context of having talk with teacher. The understanding of meaning associated with these words in constructivist perspective will add to the depth and clarity of self-assessment. On the part of the teachers, they also need to be trained in development of self-assessment sheets to make them relevant, specific and concise.

Another important implication for the teachers is to ensure the broader teacher-student interaction as the observation for this research showed a very low direct interaction between teacher and students. The class discussion between students and teachers get limited to the participants of willing if teacher do not create situation for the participation of the comparatively passive students. In addition to the broader participation the depth (quality of views shared or questions asked) of students' participation also need to be addressed. This needs training in the thinking ability and critical outlook while pursuing the learning objectives through classroom learning activities.

Self-assessment works better in classrooms where children are not afraid of risk-taking and exposing their misconceptions, and where the outcomes of self-assessment are rewarding (e.g., academically, intrinsically, etc.), rather than in classrooms that place a premium on obtaining the correct answers

#### References

- Nasir M., Kono Y. (2004). Development and validation of Constructivist learner Scale (CLS) for elementary school science students, *Educational Technology Research*, 27(1-2), pp.1-7
- Ormrod, E. J. (2003) Educational psychology: developing learners (4<sup>th</sup> ed.), New Jersey: Merrill Prentice Hall.
- Pellegrino, J. W., Chudowsky, N. & Glaswer, R. (2003). *Knowing what students know: the science and design of educational assessment (second print)*. Washington: National Academy Press.
- van Kraayenoord, C. E. and Paris, S. G. (1997). Australian students' self-appraisal of their work sample and academic progress. *Elementary School Journal*, 97, 523-537

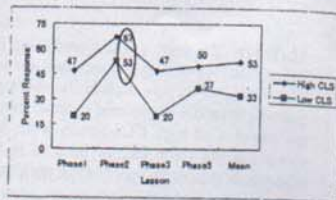


Figure 4: Question 4-Comparison of percentage of High and Low CLS on Self-assessment

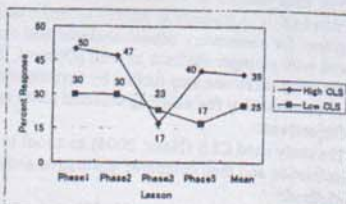


Figure 5: Question 5-Comparison of percentage of High and Low CLS on Self-assessment