Innovative Modes of Continual Assessment: Perspectives of undergraduate students

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ABSTRACT

With the current emphasis on creative and critical reflective thinking in Singapore, it is imperative that academic staff at tertiary institutions research on more innovative modes of assessment to grade their students. To better reflect what undergraduate students can really do to demonstrate their learning growth, higher-order assessment activities that test cognitive processing skills of organization and integration and task-based problem-solving and decision making skills need to be implemented. Grammar, for instance, has made an amazing comeback in the Singapore context. In the assessing of grammar, students need to be challenged to be able to fix as well as to explain grammatical problems. To do that, they need to fully internalize the concepts. But what do the tertiary students really think of these innovatively new assessment modes? Do these types of assessment modes meaningfully extend their learning? What evidence supports the effectiveness of these new assessment modes? Thus, our research questions centre on the kinds of assessment modes students prefer and whether such preferences are dependent on their cognitive learning styles and attitudes. A battery of questionnaire surveys was specifically designed to elicit such information. The results revealed that both groups of undergraduate students, irrespective of university type, showed an overall positive attitude towards the use of test or essay as a viable assessment mode in their modules. Finding 2 showed that each type of assessment mode did serve a particular role in enhancing learning. Finding 3 indicated that academic performance on the test was positively and significantly correlated with the students' favourable attitudes towards the use of test as mode of assessment, where $\underline{r}\,(92) = -.367$, $p<.01$. We are gratified that our hypothesis that the grades of students who are positive about these assessment modes should ostensibly improve has been supported by the survey results. Furthermore, it was found that their academic performance did not have any significant correlation with their perceptual learning styles, a fact which is positive as it shows that the various assessment modes in our study were not biased towards any particular group of students.

Introduction

Today, it is accepted that assessment is an important and legitimate concern for all stakeholders, including those who learn, those who teach, those who are responsible for the development and quality assurance of courses, and of course,

the parents who provide the money for the education of their children. Assessment is therefore seen as the cash nexus of learning. Brown and Knight (1994) argued that assessment should be the heart of the student experience. Assessment defines learning outcomes in terms of what students regard as important, how they focus their energy and time and how they come to see themselves as students. In short, according to teachers' observations in schools in Singapore, the students nowadays may seem to be increasingly "test-smart", strategizing their learning and obtaining cues from what is assessed rather than what is taught. Past year examination papers may be used to guide their studies. In other words, if we want to change student learning and to emphasize self-directed or collaborative learning, then there may be a need to obtain student feedback on assessment modes employed and then change methods of assessment accordingly.

Research has provided much evidence to show how student learning is influenced by assessment methods. Newble and Jaeger (1983) demonstrated in their study that the amount of time spent by medical students in their wards increased when the pass/fail clinical assessment based on ward reports was changed to clinical practical examination. Another research by Watkins and Hattie (1985) showed that the type of assessment influences styles of learning. Multiple-choice questions and other forms of tests promoted recall types of learning while projects and open-ended assessments developed independent learning. According to Biggs (1987) and Harper and Kember (1989), the use of deeper approaches of learning and independent learning declined during many undergraduate courses. Findings revealed that some students rejected deeper approaches to study as they felt that course assessments involved too much recall type of learning such that deeper approaches were not worth learning (Ramsden, 1988). However, it has been argued that use of problem-based approaches and appropriate forms of assessment can promote learning at a deeper level (Thomas & Bain, 1984; Newble & Clarke, 1987; Vernon & Blake, 1994). Entwistle (1987, 1992) and Ramsden (1992) have also written a number of articles on the effect of assessment on learning.

Perry (1970) believes that learning is much more than accumulation of facts and cognitive restructuring as advocated by cognitive psychologists like Norman (1980). It also involves restructuring of one's commitments and priorities which lead to changes in one's feelings and attitudes towards others and towards self. According to Ramsden (1992), teaching and assessment methods that promote active and long-term engagement with learning tasks foster deep learning approaches. There is personal commitment to content mastery and stresses on meaningfulness and relevance of learning to students who will have to exercise responsible choice in the method and content of study

It is now an accepted principle that using multi-faceted assessment modes in education is more accurate than just relying on a single measure for evaluating the students' mastery of content and development of performance competencies. Research that supports the efficacy of this assessment approach tends to deal largely with issues related to validity and test bias. Research by Yunker and Stinson (2001) found that the feedback from multi-faceted forms of assessment could be maximized so as to enhance the teaching-learning process in the training of counselors.

Extensive research reveals the efficacy of involving students in making decisions about their own learning and assessment. This learning principle that emphasises on student involvement and ownership for effective education was first proposed by John Dewey, the pioneer for the Progressive Movement at the beginning of the twentieth century. His key idea is that effective learning occurs when the student is actively involved in his own education and learning is greatly maximized by social interactions as well as a variety of experiences (Dewey, 1938). His ideas were supported and substantiated by a number of eminent cognitive theorists like Piaget (1965), Ausubel (1977), Bloom (1956), Bruner (1964) and social-cognitive psychologists such as Vygotsky (1962). Today, the Constructivist Movement in education focuses on cognition and meaningful learning. It proposes that significant learning occurs only when the student finds the subject matter and/or the learning activities meaningful and the teaching-learning process interactive and experiential.

Furthermore, Jerome Bruner, father of discovery learning, was a firm believer that assessment itself could become part of the instructional process and could be employed to enhance the learning process (Bruner, 1960, 1964). By using Bruner's approach in the classroom, students can be given opportunity to be active participants in the learning process as well as the evaluative process of their education.

In recent years, Howard Gardner's (1983) theory of multiple intelligences recognizes the multiple ways of "knowing". This calls for multiple ways of assessing that "knowing". The students will then have a good variety of assessment procedures to assess their knowledge, skills and competencies. According to Weber (1999), when students participate in this type of teaching-learning process, they are better able to probe more deeply into issues and provide feedback on assessment that aids their learning.

Instruction in our local universities is tailored to meet specific learning outcomes. Similarly, various assessment modes employed are matched to the types of learning outcomes being evaluated. The general types of assessment used include the following: test which is used to assess command of the knowledge base; written assignment (essay format) which assesses students' abilities to analyse, synthesize and organize information, and to provide evidence to substantiate their answers; and performance tasks such as oral presentations, group projects and demonstrations which are used to assess communication and collaborative learning.

Ever since Falchikov (1986, 1988) and Boud (1988) reported on the benefits of peer assessment in enhancing student learning, peer assessment has been increasingly utilized in assessment particularly of oral presentations. Supporters of peer assessment argue that peer participation in the assessment process can develop students' autonomy, maturity and critical thinking skills. However, in a comprehensive review of peer assessment in higher education, Topping (1998) concludes that even though the practice has been widely adopted, evidence for such enhancement of student learning remains limited because peer assessment is not always well understood. Students express reservations about peer assessment, primarily concerning conflicts of loyalty (Falchikov, 1994). So we

really need more research to find out what the undergraduate students think of such assessment practice.

For the last few years, lecturers have been challenged to make assessment an empowering process for students whereby the learners are encouraged to critically reflect and to make decisions about their own learning, including how they are assessed. Empowerment in the assessment context encourages the learners to take direct action, both as individuals and in groups, to assess their own work and their peers' work, to evaluate the assessment modes employed and to propose assessment practices that enhance their learning process. This paper outlines the current thinking and practice and reports on what students think of current assessment practices in relation to their learning styles. It addresses three fundamental questions relating to authenticity in assessment:

1. What are the undergraduate students' attitudes towards the use of group oral presentation and peer assessment?
2. Is there a relationship between their reported attitudes and a) perceptual learning style preferences and b) academic performance?
3. How can their views be used to improve instructional and assessment designs to better facilitate self-directed and collaborative learning?

The Context

The modules assessed in this study are first year B.A. or B.Sc. modules at the National University of Singapore and at the Nanyang Technological University. The modules are assessed by either a test or a written assignment (essay) of 2000 words, and a peer-assessed group oral presentation either of a grammar lesson plan by NUS students or a problem-based learning project by NTU students. The test and the essay require students to understand the content and to learn how to organize their knowledge and research findings so as to support their arguments. Peer assessment, however, requires students to apply marking criteria to their peers' work demonstrated during the oral presentation. It is hoped that through such a process, students will become more aware of the quality of their own work which is subjected to the same scrutiny.

The instructors attempted to increase the validity of the peer marking by giving the students a simple marking scheme that was accompanied by detailed rubrics, describing the criteria for presentation and content, which they had to use to judge the oral presentations. However, it is a cause of concern that the validity may have been threatened due to the inexperience of the markers who did not have enough opportunities to practise using the marking criteria. Reliability could also be threatened as the students were aware of the identity of the presenters despite the fact that they were asked to grade the presenters fairly.

Method

Participants

Data collected from first year BA students in a multi-disciplinary undergraduate programme in National University of Singapore (n = 42 or 44.7%) were compared with data collected from first year BA and BSc students in a single discipline undergraduate programme at Nanyang Technological University (n=52 or 55.3%) in Singapore. The data were used to investigate potential demographic, learning styles and perception of assessment mode differences of students enrolled in the local university degree programmes. There were a total of 19 male and 75 female participants, representing the various multi-racial groups (Chinese = 71, Indians = 4, Malays = 16, Eurasians = 3) in Singapore. Out of the total of 94 participants, the majority of them (or n= 73) had their post-secondary education in the junior colleges.

Instrumentation

Perceptual Learning Style Preference Questionnaire. Students provided demographic information and completed the Perceptual Learning Style Preference (PLSP) Questionnaire (Reid, 1984, 2000)*. The PSLP questionnaire, originally designed and normed for international ESL students in intensive English language programs in the U.S., had to be adapted because of the different fields of study of the students. However, the PLSP Questionnaire is a general educational assessment tool. It examined four perceptual (visual, auditory, tactile and kinesthetic) and two social (group and individual) learning-style preferences. The PLSP Questionnaire consisted of 30 statements on general learning-style preferences. Examples of items include the following:

Item 2. I prefer to learn by doing something in class.
Item 3. I get more work done when I work with others.
Item 6. I learn better by reading what the teacher writes on the chalkboard.
Item 8. When I do things in class, I learn better.
Item 13. When I study alone, I remember things better.

The respondents had to decide the extent to which they agreed with each statement by marking their choices on a five-point rating scale with Strongly Agree =5; Agree = 4, Neutral = 3, Disagree = 2 and Strongly Disagree =1. Each learning category had five items. When the numerical values have been added for each learning category, the answer must be multiplied by 2. Each of these six scales has a range of 0 to 50. A preference score that ranges from 38 to 50 is indicative of a strong preference towards that learning category or a major learning style preference. Scores ranging from 25 to 37 indicates a minor learning style preference. A score 24 or less is negligible and shows low preference towards the learning style preferences.

Self-Constructed Questionnaire. A short survey, consisting of five questions, on the use of various assessment methods and their effectiveness on student learning was administered to the participants. In Question 1, students were asked to

describe their feelings about the different assessment modes, using the 7-point Semantic Differential scale. This is a time-tested research strategy to confirm whether students really held attitudes which they claimed to hold and how strongly they held them. In the 7-point scale, the following pairs of adjectives were applied accordingly:

beneficial	*futile*
interesting	*boring*
innovative	*mundane*
essential	*unnecessary*
refreshing	*routine*
challenging	*frustrating*
highly recommended	*not recommended at all*

Question 2 required the students to rank their choices of assessment modes in order of their importance to the desired learning processes and outcomes. For example, the students were to rank their first three choices of a list of learning activities which they would recommend as best suited for each of the assessment strategy, ranging from reading, employing low level of cognitive processing of information to applying higher cognitive processing skills of concept organization and integration etc.

Questions 3 asked students to evaluate whether each of the assessment strategies should be retained as regular assessment mode in the module and to indicate their personal preferences and recommendation. Question 4 asked them for their preference of the assessment strategies and to give their reasons based on their dominant perceptual learning styles. Question 5 attempted to ascertain the extent of their learning in the module.

Grammar Editing Test and Oral Presentation

The Grammar Editing Test consisted of a three-page text on the topic "Spinning for a Casino in Singapore". The students were required to identify the 10 errors in the numbered sentences, write their correction in the numbered space provided on the right side of the text, to state the type of error and to give a brief explanation for the corrections: noun, pronoun, subject-verb agreement, word or verb form, tense, preposition, article, or parallelism. In addition to the written test, the students were also required to give an oral presentation to articulate their explanations.

Problem-Based Learning Essay and Oral Presentation

The problem-based learning (PBL) assignment aims to challenge and engage the students to learn independently. The assignment consisted of an ill-structured case-study (two pages) that simulated the kind of real world classroom problem that teachers were likely to face in neighbourhood schools. The problem anchored around the topic of learning how to learn, namely, the unit on learning theories. The students, individually and collectively in groups of five per group, were

assigned major responsibility for their own learning and instruction. The students were required to study the case scenario, generate their own learning issues or objectives based on the group's understanding and analysis of the problems, discover the best resources for acquiring the needed information, peer-coach the team members on the new information gathered, draw a concept map, analyse and evaluate it for its reliability and usefulness in relation to the problems and finally, apply and integrate the information learned to present the issues and solve the problems. It is hoped that through the PBL assignment, the students would develop self-directed study skills and problem-solving skills according to the following three broad and reiterative phases: gathering information under "What do we already know?"; engaging with the problem under "What do we need to know (to solve the problem)?"; and discussing, evaluating and organizing tentative hypotheses under "What should we do and why?". Their PBL investigation would culminate in an individually written 2000 word-essay, a group-created project/portfolio and a group oral presentation that addresses the driving questions. The criteria for grading the written PBL assignment included the following: formulation of very specific questions that are clearly related to the scenario and will lead to useful solutions and applications; comprehensive scope of research, accurate explanation of theories and concepts and clear linkages between theories, research and questions. For both the Grammar Editing and the PBL Oral presentations, the criteria for grading are as follows: accuracy, clarity and fluency in presentation, confidence in delivery, creative engagement of the audience and cohesion in team work.

Data Collection

Prior to data collection for the study, a pilot study was carried out to assess the validity and reliability of the instruments collected. The instruments were found to be suitable for Singapore use. The researchers, who are both lecturers in their respective universities, approached their respective classes and sought permission from the students to administer the instruments to them. They were given the choice if they did not wish to be included in the study. The students were informed of the purpose of the survey, namely to assess the use and effectiveness of various assessment strategies on their learning. To ensure that the answers of the students best reflected their feelings, the students were assured that their responses would be kept strictly confidential and would in no way affect their course grade. The survey questionnaire was administered to the students in their respective universities in October 2005. No time limit was imposed on the students to complete the questionnaire. The researcher requested the students to return the questionnaire to the teacher upon completion. The students took about forty minutes to complete the questionnaire. The final achievement results of the students in their English and Psychology courses at National University of Singapore and Nanyang Technological University respectively were used as the dependent variable.

Data Analysis

Descriptive statistics, namely frequency distribution and percentages were computed to analyze the background statistics of the students such as sex, race and place of university study; the proportion of participants in each of the learning style categories and their preference for the various assessment modes that enhanced their learning. The mean is used as a method of describing the distribution while the standard deviation is an estimate of dispersion for reporting the students' evaluation of their feelings and attitudes towards the use of tests or essay on the Semantic Differential Scale. To test the various hypotheses, the data collected were analyzed by using the t-test and correlation statistical procedures.

The t-test is used to determine whether two means are significantly different at a selected probability level. Due to exploratory nature of the study in combination with the need for sufficient power to moderate effect sizes, a liberal apha level of .05 was selected for each of the analyses. The strategy of the t-test is to compare the actual mean difference (X_1-X_2) with the expected by chance.

The Pearson product-moment correlation analysis provides an estimate of just how related two variables were, namely, the relationship between the reported attitudes of students towards the various assessment modes and their a) perceptual learning style preferences and b) academic performance. The correlation coefficient, denoted by r, measures the strength and the direction of a linear relationship between the two variables.

Results

Feelings and attitudes towards the use of traditional and innovative assessment modes such as group oral presentation and peer assessment.

In the survey, the attitude of the two groups of National University of Singapore (NUS) and Nanyang Technological University (NTU) undergraduates towards the various assessment modes was first determined based on their reported feelings on seven bipolar dimensions. The verification of their reported attitude was then made by analyzing their responses towards the various assessment modes in terms of the degree of their perceived importance in achieving the desired learning outcomes and their recommendations to either reject or to retain the assessment modes in the module.

Question 1 of the survey questionnaire asked students to describe their feelings towards the use of test and oral presentation as assessment modes in their undergraduate modules, using the 7-point Semantic Differential Scale which consisted of seven opposing pairs of adjectives (Taylor, Dagot, & Gardner, 1969, p. 2). A score of 7 indicates very strong positive feeling; a score of 4 indicates an ambivalent feeling of neither positive nor negative feeling, and a score of 1 indicates very strong negative feeling towards the use of a particular assessment mode.

From the results contained in Table 1, it can be seen that both groups of undergraduate students, irrespective of university type, showed an overall positive attitude towards the use of test or essay as a viable assessment mode in their

modules. The mean Semantic Differential scores ranged from a high mean score of 5.24 (beneficial) to a low mean score of 3.40 (neither refreshing nor routine) for feelings towards the use of test. The students felt that the test or essay as an assessment mode was beneficial, essential, fairly challenging and recommended its use even though they did not perceive test or essay as interesting, innovative or refreshing.

Table 2 shows that on the whole, the undergraduates were slightly more in favor of oral presentation as an assessment mode as could be seen by the higher Semantic Differential mean scores ranging from a high mean score of 5.34 (beneficial) to a low mean score of 4.35 (neither refreshing nor routine). However, it is interesting to note that contrary to their reported positive feelings in favor of

Table 1
Reported feelings towards the use of test on a Semantic Differential Scale (N = 94)

		Feelings Towards Use of Test or Essay						
University		**Beneficial**	**Interesting**	**Innovative**	**Essential**	**Refreshing**	**Challenging**	**Highly Recommended**
NTU	Mean	5.10	3.58	3.40	5.23	3.23	4.31	4.73
(*n*=52)	SD	1.17	1.28	1.05	1.36	1.30	1.16	1.23
NUS	Mean	5.43	4.40	4.02	5.00	3.62	4.19	4.74
(*n*=42)	SD	.91	1.06	1.00	1.18	1.18	1.06	1.08
	t	-1.50	-3.34	-2.90	.86	-1.49	.50	1.03
	p	NS	.001***	.05*	NS	NS	NS	NS
Total	Mean	5.24	3.95	3.68	5.13	3.40	4.26	4.73
	N	94	94	94	94	94	94	94
	SD	1.07	1.25	1.07	1.28	1.26	1.11	1.16

Note: * t(92) = -2.90, p<.05. *** t(92) = -3.34, p<.001.

Table 2
Reported feelings towards the use of oral presentation and peer assessment on a Semantic Differential Scale (N = 94)

		Feelings Towards Use of Oral Presentation						
University		**Beneficial**	**Interesting**	**Innovative**	**Essential**	**Refreshing**	**Challenging**	**Highly Recommended**
NTU	Mean	5.46	4.81	4.60	4.90	4.54	4.73	5.23
(*n*=52)	SD	1.09	1.25	1.36	1.24	1.16	1.06	1.00
NUS	Mean	5.19	4.93	4.57	4.71	4.17	4.83	.48
(*n*=42)	SD	.99	1.04	1.34	1.25	.69	1.18	1.04
	t	1.24	-.50	.08	.73	1.82	-.44	22.47
	p	NS	NS	NS	NS	NS	NS	.000***
Total	Mean	5.34	4.86	4.59	4.82	4.37	4.78	3.11
	N	94	94	94	94	94	94	94
	SD	1.05	1.16	1.34	1.24	.99	1.11	2.58

Note: *** t(92) = 22.47, p<.001.

the use of oral presentation that was assessed by peers, the undergraduates, however, seem to differ greatly in their opinion and did not recommend it as an assessment mode (mean Semantic Differential score =3.11, *SD*= 2.58). Interestingly, the NTU students were much more positive about oral presentation than NUS students. This could possibly be due to the fact that the NTU oral presentation was based on an interesting problem-based project while that in NUS was based on the identification of mundane grammar problems.

Perceived important contributions of various assessment modes to learning outcomes

Question 2 of the questionnaire asked the participants to identify and to rank the various assessment modes in order of importance in contributing to the desired learning outcomes of higher education. The results are presented in Table 3.

Table 3
Importance of the various assessment modes in contributing to desired learning outcomes by rank order, frequency and percentage of respondents (N = 94)

	Assessment Mode				
Learning Activities	Rank	Test (*n* = 42)	Written Essay (*n* = 52)	Oral Presentation (*N* = 94)	PBL Project (*n* = 52)
Reading and sourcing for information	1	2 (4.8%)	18 (34.6%)	11 (11.7%)	14 (26.9%)
	2	2 (4.8%)	10 (19.2%)	9 (9.6%)	10 (19.2%)
	3	5 (11.9%)	7 (13.5%)	19 (20.2%)	11 (21.1%)
n(%)		9 (21.5%)	35 (67.3%)	39 (41.5%)	35 (67.2%)
Employing low level of cognitive processing of information	1	23 (54.8%)	3 (5.8%)	14 (14.9%)	1 (1.9%)
	2	9 (21.4%)	3 (5.8%)	13 (13.8%)	0
	3	2 (4.8%)	6 (11.5%)	10 (10.6%)	7 (13.4%)
n(%)		34 (81%)	12 (23.1%)	37 (39.3%)	8 (15.3%)
Understanding and explaining concepts/issues/solutions	1	6 (14.3%)	14 (26.9%)	30 (31.9%)	12 (23.1%)
	2	15 (35.7%)	17 (32.7%)	21 (22.3%)	12 (23.1%)
	3	4 (9.5%)	8 (15.4%)	5 (5.3%)	7 (13.4%)
n(%)		25 (59.5%)	39 (75%)	56 (59.5%)	31 (59.6%)
Identifying, correcting misconceptions and defending viewpoints	1	3 (7.1%)	5 (9.6%)	9 (9.6%)	7 (13.4%)
	2	6 (14.3%	6 (11.5%)	14 (14.9%)	7 (13.4%)
	3	14 (33.3%)	12 (23.1%)	12 (12.8%)	7 (13.4%)
n(%)		23 (54.7%)	23 (44.2%)	35 (37.3%)	21 (40.2%)
Asking questions and seeking clarification from lecturer and peers	1	6 (14.3%)	3 (5.8%)	7 (7.4%)	4 (7.6%)
	2	7 (16.7%)	5 (9.6%)	12 (12.8%)	8 (15.4%)
	3	9 (21.4%)	3 (5.8%)	18 (19.1%)	6 (11.5%)
n(%)		22 (52.4%)	11 (21.2%)	37 (39.3%)	18 (34.5%)
Applying higher cognitive processing skills of concept organization and integration	1	0	8 (15.4%)	7 (7.4%)	7 (13.4%)
	2	1 (2.4%)	11 (21.2%)	12 (12.8%)	7 (13.4%)
	3	3 (7.1%)	11 (21.2%)	18 (19.1%)	7 (13.4%)
n(%)		4 (9.5%)	30 (57.8%)	37 (39.3%)	21 (40.2%)
Negotiating and refining ideas from peers	1	11 (26.2%)	1 (1.9%)	4 (4.3%)	7 (13.4%)
	2	5 (11.9%)	0	9 (9.6%)	7 (13.4%)
	3	6 (14.3%)	4 (7.7%)	35 (37.2%)	6 (11.5%)
n(%)		22 (52.4%)	5 (9.6%)	48 (51.1%)	20 (38.3%)

The results show that an overwhelming majority of the 42 NUS students, or 81% of the participants (n = 34) who had test as an assessment mode in their module, indicated that test employed only low level of cognitive processing of information. Only half of them or five out of every 10 undergraduates felt that the test aided in understanding and explaining concepts (n = 25 or 59.5%), identifying, correcting misconceptions/irrational thinking /errors and defending viewpoints (n =23 or 54.7%), asking and seeking clarifications or negotiating and refining ideas from peers (n = 22, or 52.4%).

On the other hand, 75% of the NTU students who had written essay as their assessment mode, found that written assignment aided in understanding of concepts (n = 39) while more than half of them felt that written essay helped them to read up more (n = 35 or 67.3%) and aided in the application of higher cognitive processing skills of concept organization and integration (n = 30 or 57.8%).

An analysis of the whole sample showed that students ranked oral presentation as an assessment mode in terms of usefulness in aiding understanding of concepts, issues and solutions and in developing negotiating skills and refining ideas from peers (n = 48 or 51.1%).

Problem-based learning as an assessment mode was found to be useful in locating sources of information (n = 35 or 67.2%), understanding concepts (n = 31 or 59.6%), in identifying and correcting misconceptions (n = 21 or 40.2%) and for the application of higher cognitive processing skills of concept organization and integration (n = 21 or 40.2%).

In summary, it appears that each type of assessment mode does serve a particular role in enhancing learning.

Question 3 of the questionnaire asked whether the existing assessment strategies should remain as regular assessment mode in the module. The respondents had to indicate their choices by rating the various assessment modes on a four-point scale, with 4 = Strongly Agree, 3 = Agree, 2 = Disagree and 1 = Strongly Disagree. Graphically, the following pie charts in Figure 1 reveal that slightly more than half of the respondents strongly agreed that test, problem-based project work and essay should remain as regular assessment modes in the module. However, it is interesting to note that only slightly more than a quarter strongly agreed that oral presentation should remain as regular assessment mode in the module.

Table 4 shows that the mean rating score confirms the above results. It is surprising that the undergraduate students are still strongly in favour of the traditional mode of assessment, namely test and essay, as well as multiple modes of assessment, including innovative assessment approaches such as the problem-based project work and oral presentation that uses peer assessment.

Figure 1
Pie charts showing the extent of student acceptance of the use of various assessment modes

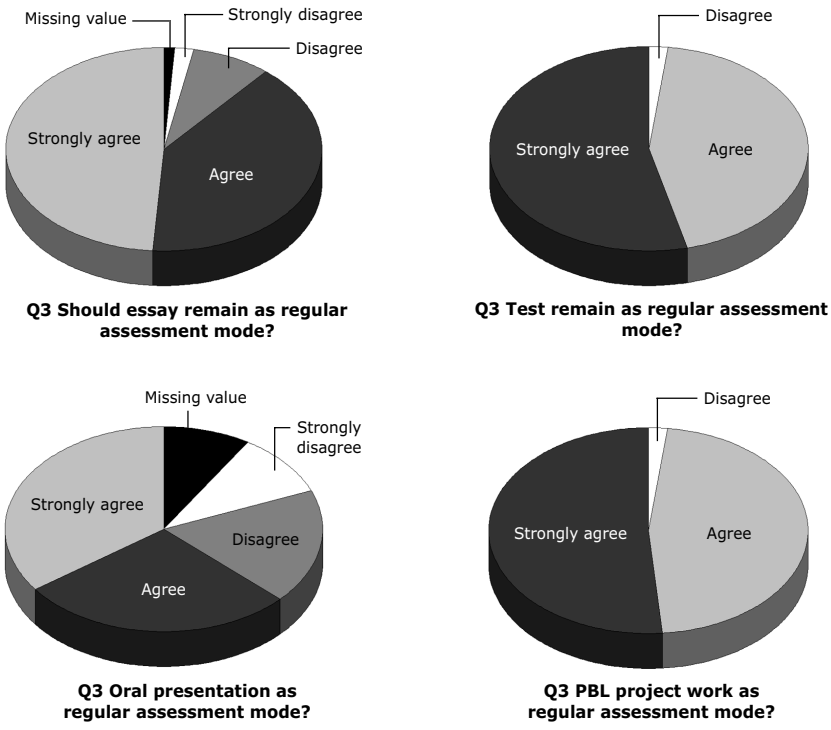

Table 4
Mean rating scores of agreement towards the use of various assessment mode in the module (N=94)

Assessment Mode	*n*	University Type	Mean Rating Score	SD
Test	42	NUS	3.19	.50
Essay	52	NTU	2.97	.72
Oral Presentation	94	Combined Group	3.13	.64
Problem-based Project Work	52	NTU	3.13	.48

Note: * Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1

Relationship between reported assessment attitudes of undergraduates and their perceptual learning style preferences and academic performance

Research Question 2 aims to establish the relationship between the reported attitudes of students towards the various assessment modes and their a) perceptual learning style preferences and b) academic performance. This requires an extensive correlation analysis. Table 5 shows the correlation between learning styles, reported attitude towards assessment approaches and performance scores on the test or essay and on the oral presentation peer assessment scores.

Table 5
Correlations among the perceptual learning style preferences, attitudes towards assessment modes and achievement measures of the undergraduate students (N=94)

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
Learning Style													
l. Visual	35.94	4.76	1										
2. Auditory	35.85	4.75	-.09	1									
3. Kinesthetic	38.22	5.53	-.03	.05	1								
4. Tactile	36.02	7.30	.04	.00	.67***	1							
5. Group	33.11	7.31	.01	.04	.37***	.24**	1						
6. Individual	34.12	6.62	.10	.01	.04	.15	-.51***	1					
Assessment Attitude													
7. Test	3.19	.50	.21	-.11	-.03	.14	-.00	-.07	1				
8. Essay	2.97	.72	.21*	-.08	-.16	-.11	.06	-.11	1.00***	1			
9. Oral Presentation	3.13	.64	-.18	-.00	.37***	.22*	.27**	-.09	.20	-.08	1		
10. Problem-Based Project Work	3.13	.48	.08	.23	.24	.16	.37**	-.12	0	.12	.30*	1	
Achievement Score													
11. Test/Essay Score	13.71	3.12	.06	-.06	.20	.18	.14	.05	.37*	-.05	.05	.07	1
12. Oral Presentation Score	15.33	1.49	.16	.09	-.15	-.18	-.09	.08	.11	.19	-.13	-.06	-.26**

Note: * Correlation is significant at the .05 level (2-tailed).
** Correlation is significant at the .01 level (2-tailed).
*** Correlation is significant at the .001 level (2-tailed).

Results show that favourable student attitudes towards oral presentation as an assessment mode are positively and significantly correlated with the kinesthetic learning style ($p<.001$), tactile ($p<.05$) and group ($p<.01$) learning style preferences. In addition, preference for group work has shown strong and significant correlations with tactile or kinesthetic dominant perceptual learning styles. Here we can confirm our initial expectation that students who like group oral presentations are those who have a more kinesthetic learning style. Similarly, attitudes towards problem-based project work have shown significant and positive correlation with group learning style preference, where $r\,(92) = .367$, $p < .01$. This is expected as the problem-based project was set as group, and not individual, work.

Interestingly, academic performance on test or essay has shown significant negative correlations with performance on peer assessed oral presentation, where $r\,(92) = -.259$, $p<.01$. It appears that the participants who performed well on the test or written assignment might not perform well on the oral presentation component of the module assessment. It may be inferred that these students may belong to the auditory or visual-oriented learning style types or, more probably, the types of skills measured by traditional tests and essays are totally different from those measured by oral presentations.

As expected, academic performance on the test has shown positive and significant correlation with the students' favourable attitudes towards the use of test as mode of assessment, where $r\,(92) = -.367$, $p<.01$. However, it is interesting to note that academic performance has no correlation with any of the perceptual learning style preferences.

Conclusion

We shall conclude with a summary of the salient findings of our research which will have important implications for the enhancement of student learning in visionary institutions like NTU & NUS.

First of all, there is overwhelming evidence that our students are positive about the assessment modes we specially designed for them. And their positive attitudes have resulted in their good performance overall, as we hypothesized. Furthermore, the fact that they liked all our assessment modes, both traditional ones like tests and essays and more innovative ones like project-based projects and oral presentations, shows that we need not be obsessed with designing "innovative" assessment modes as such. Instead we can make the traditional modes more "innovative" in our questioning techniques and level of difficulty. For instance, in the grammar test we set for this study, we required the students not only to identify and correct errors, but to classify them in their grammatical categories. More than that, we required that they briefly explain why the error needed correction. So all in all, it really does not seem to matter whether the modes of assessment are traditional or more innovative so long as we test higher order cognitive skills at their appropriate level of difficulty.

Interestingly, although the students are positive about all the modes, namely test, essay, project and peer-assessed oral presentation, they recommend that all except the last, oral presentation remain as a regular assessment mode. They claim that oral presentation to them is highly beneficial, interesting, essential and challenging and yet they seem to reject this relatively innovative mode of assessment. This is perhaps due to the fact that oral presentations, especially peer-assessed ones, are still relatively rare as an assessment tool in the overall education system in the Singapore context. Another plausible reason is that the challenges of oral presentation can be rather intimidating, particularly for those who are more reticent and self-effacing.

Finally, it is important to note that academic performance has no significant correlation with any of the perceptual learning style preferences of the students. Initially, we were rather alarmed as it meant that we had no indication of which learning style to recommend to the students for better performance. But, on second thoughts, this is good news in the sense that this must mean that every student, whatever his learning style, has an equal chance to do well in our university courses. Hence, we can conclude that both in NUS and NTU, our assessment modes are not biased towards any particular group of students.

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Appendix I

The Perceptual Learning Style Questionnaire in ***The process of composition*** **(pp. 328-330) by Joy Reid, 2000 (Third Edition), New York: Prentice Hall Regents.** Used with permission from the course designers Professors Joy Reid and Mary Ann Christison. The authors would like to thank both of them for their kindness. Professor Reid currently owns the copyright of the questionnaire.

Survey 1: Perceptual Learning Style Preference Questionnaire

Directions: This survey will show you how you prefer to learn English. Read each of the statements below. Then mark the appropriate box for each statement: that you Strongly Agree (**SA**), Agree (**A**), are Undecided (**U**), Disagree (**D**), or Strongly Disagree (**SD**). Mark only one box for each statement, the box that most accurately identifies your feelings about each statement as it concerns learning English. When you finish, use the scoring guide at the end of the survey to discover your learning style preferences.

Statements	SA	A	U	D	SD
1. When the teacher tells me the instructions, I understand better.					
2. I prefer to learn by doing something in class.					
3. I get more work done when I work with others.					
4. I learn more when I study with a group.					
5. In class, I learn best when I work with others.					
6. I learn better by reading what the teacher writes on the chalkboard.					
7. When someone tells me how to do something in class, I learn it better.					
8. When I do things in class, I learn better.					
9. I remember things I have heard in class better than things I have read.					
10. When I read instructions, I remember them better.					
11. I learn more when I can make a model of something.					
12. I understand better when I read instructions.					
13. When I study alone, I remember things better.					
14. I learn more when I make something for a class project.					
15. I enjoy learning in class by doing experiments.					
16. I learn better when I make drawings as I study.					
17. I learn better in class when the teacher gives a lecture.					
18. When I work alone, I learn better.					
19. I understand things better when I participat in role-playing.					
20. I learn better in class when I listen to someone.					

Statements	SA	A	U	D	SD
21. I enjoy working on an assignment with two or three classmates.					
22. When I build something, I remember what I have learned better.					
23. I prefer to study with others.					
24. I learn better by reading then by listening to someone.					
25. I enjoy making something for a class project.					
26. I learn best in class when I can participate in related activities.					
27. In class, I work better when I work alone.					
28. I prefer working on projects by myself.					
29. I learn more by reading textbooks than by listening to lectures.					
30. I prefer to work by myself.					

Learning Style Preferences Self-Scoring Sheet

Directions: There are 5 questions for each learning style category in this survey. The questions are grouped below according to each learning style. Assign each question you answered a numerical value as follows:

SA = 5 A = 4 U = 3 D = 2 SD = 1

Fill in the blanks below with the numerical value of each answer. For example, if you answered Strongly Agree (SA) for question 6 (a visual preference question), write a 5 (SA) on the blank next to question 6 below.

Example: Visual
6 – __5__

When you have completed all the numerical values for Visual, add the numbers. Multiply the answer by 2 and put the total in the appropriate blank.

Follow this process for each of the learning style categories. When you are finished, the score at the bottom of the page will help you determine your major learning style preference(s), your minor learning style preference(s), and those learning styles that are negligible. See the next page for information about each learning style preference.

If you need help, ask your teacher.

Visual
6 - _____
10 - _____
12 - _____
24 - _____
29 - _____
Total _____ x 2 = _____
(Score)

Tactile
11 - _____
14 - _____
16 - _____
22 - _____
25 - _____
Total _____ x 2 = _____
(Score)

Auditory

1 - _____
7 - _____
9 - _____
17 - _____
20 - _____
Total _____ x 2 = _____
(Score)

Group

3 - _____
4 - _____
5 - _____
21 - _____
23 - _____
Total _____ x 2 = _____
(Score)

Kinesthetic

2 - _____
8 - _____
15 - _____
19 - _____
26 - _____
Total _____ x 2 = _____
(Score)

Individual

13 - _____
18 - _____
27 - _____
28 - _____
30 - _____
Total _____ x 2 = _____
(Score)

Major Learning Style Preference Scores: 38–50
Minor Learning Style Preference Scores: 25–37
Negligible: 0–24