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How and Why Students Learn: Development and Validation of the Learner Awareness Levels Questionnaire for Higher Education Students

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The development of the 21-item Learner Awareness Levels Questionnaire (LALQ) was carried out using data from three separate studies. The LALQ is a self-reporting questionnaire assessing how and why students learn. Study 1 refined the initial pool of items to 21 using exploratory factor analysis. In Study 2, the analysis showed evidence for a four-factor solution (Survival, Establishing Stability, Approval, and Love of Learning). Results of the structural equation modelling and confirmatory factor analysis in Study 3 provided further support for the results obtained from Study 2 and also indicated a higher order Learner Awareness factor. Internal consistency for the four factors was within an acceptable range. The results of Study 3 showed that the questionnaire appeared to be a reliable instrument to measure how and why students learned because the structural equation model fit the questionnaire data well and the confirmatory factor analysis had good fit indices within an acceptable range.

Many questionnaires developed to address student learning processes from cognitive psychology, especially in information processing theories (Moreno & DiVesta, 1991, Schmeck, Geisler-Brenstein, & Cercy, 1991), are intended to address universal and culturally unbiased mechanisms. However, such a framework seems inappropriate to address a context-dependent issue like student learning (Biggs, 1999), where it encompasses student strategy uses such as their approaches to learning, their motives to learn, and their perceptions of the task demands, as well as the awareness of why they learn (Bell, 1993). Further, Biggs (1999) notes that how (the approach) and why (the motive) students learn are also dependent on what they had experienced when learning.

A recent study by Choy et al. (2014) based on the constructivist theory (Feuerstein, Klein, & Tannenbaum, 1999; Vygotsky, 1986) found that students' learning falls into four levels—survival, establishment of stability, approval, and love of learning—and that these levels occurred in all students regardless of achievement levels and are context driven. These learning levels have been subsequently named learner awareness levels because students describe them as being related to their motive to learn and the strategies used, hence their overall experience. The data in this study revealed that students readily talked about their learning experiences in relation to the way they perceived the context of their own learning, hence their "learning awareness." These students explained their experiences in terms of their approaches to learning something and their motive to learn. Questionnaires which help students explore and discover their learning awareness levels can make their learning experiences more meaningful. A careful search of current research literature did not produce any examples of such questionnaires. Therefore, it was concluded that the development of such questionnaires will help both teachers and students gain insight into how and why students learn and provide valuable information for teachers when developing teaching materials and facilitating students. The questionnaire is designed to be adapted to multiple contexts as needed by teachers.

This article describes the development of the Learner Awareness Level Questionnaire, a self-report measure of students' awareness of how and why they learn so as to improve and further develop the learning process in university education. The factor structure of the items on the questionnaire is undertaken using independent samples from two studies where exploratory and confirmatory factor analyses were used. Internal consistency estimates were also computed. Finally, this paper will also address the issue of whether the information gathered using the questionnaire will provide useful information to teachers and educators working with university level students.

Learner Awareness

Learning occurs when individuals use a combination of affective, cognitive and behavior, or psychomotor learning (Choy, 2002; Hall, 2011). It is a process which results in the continued growth and change in individuals and determines how information is taken in and connected into something that is meaningful. Within the three aspects of learning are multiple levels of learning that progress from the basic surface learning to more complex deep learning (Biggs, 1999). Students often use these three aspects of learning without being fully aware of them. Whether students are able to develop surface or deep learning depends on the direct transmission of information by the teacher but more so by the approaches that they engage in during

the process (Biggs, 1999). Hence the activities carried out in the classroom and reasons why students learn will determine the type of learning that takes place. As students learn, they interact with the world and hence change their conception of things, which expands their awareness through the process (Biggs & Tang, 2007).

Bell (1993) defines student awareness of learning as an increased comprehension of the subject content and the ability to use the material learned. However, this definition does not address the affective aspect of learning in terms of the feelings and attitudes that students have when learning the content material. Further to this, research by Frensch and Runger (2003) found that most learning occurs implicitly, that is without awareness of the learner. However, Frensch and Runger and other similar studies (Chung & Jiang, 1998; Reber, 1993) on implicit learning failed to define what actually takes place during the learning process. There are many issues that remain unexplored such as: the process of measuring implicit learning, the way learning occurs if learners are actually unaware of it, and the role of the three aspects of learning (cognitive, affective, and behavioral) during implicit learning. Frensch and Runger (2003) note that learners are often able to show that they have acquired the knowledge but are unable to verbalize what they have learned. Hence, there must be a certain awareness that learning has occurred although learners are not able to verbalize what they had learned. Aczel (2006) further notes in his studies that there is no evidence of unconscious cognition taking place when learning as it requires the awareness and conscious participation of the learner. Marton and Booth (1997) further stress that many studies on learning had been ineffective in providing relevant information as they took the perspective that learning was something that occurred outside the student and under the control of teachers. The learning process needs to be studied from the perspective of the student as it is an individual construct of what has been learned. Hence, learning is an active process through which students "construct" their own meaning of what they have learned and experienced (Jordan, Carlile & Stack, 2008). Biggs (1999) suggests that students will begin to want to learn when they personally feel a need to know, that is having an interest in, and curiosity about, what is to be learned. They will also adopt learning approaches that are self-directed as well as independent. Entwistle (2000) further argues that there must be "meetings of awareness" where teachers shape knowledge in a way that helps students understand it. This requires teachers to have an empathetic knowledge of what the students already know and how they learn.

Entwistle (2000) suggests that the end result of a process of broadening the awareness of the nature of learning may involve students having a fully developed conception of learning, being aware of the different contexts to which the learning can be used, and being able to adapt it to various tasks. Therefore, the effect of context on learning cannot be dismissed as learning takes its meaning in part on the specific social setting. Students tend to interpret what is required of them in a particular learning situation based on past events (Burnett, Pillay & Dart, 2003). What students believe about learning must also overlap with what they hope to achieve (Beaty, Gibbs, & Morgan, 1997). Hence these students will bring with them a set of aims and attitudes which expresses their individual relationship with a course of study. From this context success and failure are judged in terms of the extent to which students fulfil their own aims. Entwistle and Peterson (2004) further suggested that interest in what they are learning will likely lead to a deep approach while negative feelings towards what they are learning will likely lead to a surface approach. Deep approach here refers to attempts by students to understand and derive meaning from what they are learning which requires having interest, curiosity, and a love of what they are learning, while a surface approach refers to attempts by students to remember lists of disjointed facts without understanding the point the author is attempting to make, and they are likely to study to pass examinations and feel undue pressure about the learning process.

The development of deep thinking in students, essential for critical and analytical thinking, is necessary for meaningful learning to occur. Hence, students need to be active participants in their learning process as all aspects of their lives affect their learning (Raiker, 2009). Research has also found that students are often resistant to an approach that requires them to do more learning independently than a teacher-centered approach where they have less control of the content as well as the context of what is to be learned (Boyle, 2011). Therefore, the learner awareness questionnaire used for frequent administration by the teacher could provide a means for students to access an insight into the development of their learning.

Methods

The development and verification of the questionnaire was carried out following the methods used by Goh and Matthews (2010) for developing and verifying the Postgraduate Learning and Teaching Questionnaire. This method was used because it provided a systematic approach to analyzing and comparing the data.

Development of the Learner Awareness Questionnaire

Three key criteria guided the initial development of the questionnaire. Firstly, the questionnaire needed to

be short enough so that production of it would be economical and allow for frequent administration. The instrument was also expected to provide quick, useful information for students on how and why they learn and for teachers to use this information to facilitate learning in their classrooms. Secondly, the items needed to be representative of the important aspects of learning and show an accurate measurement of how and why students learn. Thirdly, a high degree of reliability that showed relevance to students' learning had to be established (Cohen, Manion & Morrison, 2000; Mason, 1996).

The preliminary measure of the learner awareness questionnaire consisted of 36 items. The items in the preliminary version were generated after reviewing the results from the phenomenological study on students' learning awareness by Choy et al. (2014) and existing literature on student learning (Biggs, 1999; Biggs & Tang, 2007; Entwistle, 2000). The items generated were divided into three sections and addressed students' awareness of how and why they learned and how they think about learning. As there was no existing equivalent measure of learner awareness, all the items on the preliminary questionnaire were generated based on results from the study by Choy et al. (2014) and existing literature on learning.

A 5-point Likert scale was used for each item, with a 5 indicating "Strongly agree," 4 indicating "Agree," 3 indicating "Neutral," 2 indicating "Disagree," and 1 indicating "Strongly Disagree." It was decided to have the neutral response choice in the questionnaire because the inclusion of this option allowed it to have better psychometric coherence when the items were considered as a whole, and it would have little effect on the overall reliability and validity (Dassa, Lambert, Blais, Potvin, & Gauthier, 1997). In addition, the study was focused on assessing the convictions of students in terms of their firm opinions about how and why they learn. The neutral response represented a conviction and was different from a "no opinion" and a "don't know" response (Dassa et al, 1997).

The 36-item questionnaire was given to five persons that were academic staff of a university but not taking part in the research. This group of people were requested to comment on the questionnaire for any linguistic ambiguities, and items that had inadequacies were modified. This new instrument was then named the Learner Awareness Levels Questionnaire (LALQ).

Testing the Instrument

Study 1 – Exploratory factor analysis. The 36 item LALQ was administered to 172 undergraduate students (89 females and 83 males) enrolled in a diploma program. The students came from a number of faculties and were all full-time students. The questionnaire was done as a paper and pencil exercise with the consent of each participant. The data was then encoded and entered into SPSS (Version 16) for initial analysis.

Before conducting the Exploratory Factor Analysis (EFA), two indicators were tested for sample appropriateness for such an analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy index was 0.74, and Bartlett's Test of Sphericity was significant $\chi 2 = 1877.14$, $p < 0.0001$, indicating that the sample and correlation matrix were within an acceptable range for the analysis.

The EFA was then used to assess fit, detect possible factor structure, and eliminate non-fitting items. Questionnaire soundness was examined using principal components factor analysis with varimax rotation. The scree plot test and the acceptance of eigenvalues greater than one, together with a comparison of a parallel analysis of an equivalent set of eigenvalues obtained from a random data set of the same size, were used to identify the number of factors likely to be extracted. Only eigenvalues that exceeded the corresponding values from the random data set were retained. Initial analysis with a factor loading of 0.40 was used as the cut off point for variable acceptance. Twelve factors emerged with eigenvalues greater than one, accounting for 65.9 per cent of the variance in the respondents' scores. Rotation converged after 23 iterations. The first four factors accounted for 37.5 per cent of variance in the respondents. The eigenvalues of these four factors, when compared using the parallel analysis of an equivalent random data set, were higher. Based on the results of the analysis, it was decided that a criterion loading of higher than 0.45 would be used to select items for further analysis. This yielded 21 items with loadings ranging from 0.45 to 0.79. Therefore, 21 of the original 36 items were selected for further testing.

Study 2 – Second exploratory factor analysis. Another group of 331 students (178 female and 153 male), all enrolled in a diploma program, participated in the study. The age ranges of the sample were as follows: 311 between 16-20, 17 between 21-23, and three between 24-26. These students were all full-time students from a number of faculties. The questionnaire was done as a paper and pencil exercise with the full consent of each participant. The data was then coded and entered into SPSS (Version 16) for analysis.

The KMO measure of sampling adequacy (0.80) and the Bartlett's test of Sphericity ($\chi 2 = 2009.22$, $p < 0.0001$) met the required standards for exploratory factor analyses. EFA's principal-axis factoring with varimax rotation of the 21 items yielded four factors with loadings ranging from 0.42 to 0.86. Eigenvalues greater than one accounted for 51.5 per cent of the variances in the students' scores. The scree test, however, suggested that only three or four factors could be extracted; therefore, these possibilities were

examined. Only items with factor loading above 0.40 were used. In the three-factor solution, the items did not show clear indications that they fell into any of the four awareness levels: survival, establishing stability, approval, and love of learning. In the four-factor solution (Table 1), items related to the four awareness levels clearly loaded into each of the factors. Reliabilities (α) for each of the factors were 0.78 for "Survival," 0.75 for "Establishing Stability," 0.60 for "Approval," and 0.77 for "Loving to Learn." The Cronbach alpha for the "Approval" scale was only 0.60, but its mean inter item correlation of 0.27 fell within the optimal range of 0.2 to 0.4 (Briggs & Cheek, 1986, DeVellis, 2012). The four-factor solution both seemed economical and provided a better interpretation of students' awareness of how and why they learn. The four-factor solution was accepted, and the factors were subsequently labelled as:

- Factor 1 – Survival (nine items). The statements required the students to reflect on their basic universal human need to adapt and survive everyday situations, which Tay and Diener (2011) attributes to individuals attempting to establish well-being. These items are about their fear of authority and fulfilling a need that they have toward learning.
- Factor 2 – Establishing Stability (four items). Students had to reflect on their safety needs (Maslow, 1954), which they perceive needed to be established in their lives. The items were about striving to achieve and having no choice, which are reflective of actions that they can take at this level. The item, "I will just memorize my notes rather than analyze them in order to pass my examinations" was included because it was an approach students will use to ensure success in examinations, hence achieving stability in their lives.
- Factor 3 – Approval (four items). The statements required students to reflect on their need to belong and the need to please others through their actions. The items were reflective of the actions they would carry out to meet the approval of others.
- Factor 4 – Loving to Learn (four items). Students were required to reflect on their "love of learning," adapted from a term Seligman (2002, 2004, & 2011) used to describe an individual's motivation to acquire new skills and build on existing knowledge.

Study 3 – Structural equation model formation and model testing. The purpose for Study 3 was to determine whether the 21-item LALQ was suitable for diagnostic purposes with an independent sample through the use of structure modelling (SEM) and confirmatory factor analysis (CFA). As in Study 2, the Cronbach alpha was also determined for this study.

A sample of 356 participants took part in the third study with 180 female and 176 male and all of them were enrolled in a diploma program. These were all full time students from different faculties. The age ranges of these students were as follows: 336 were between 16-20, 17 between 21-23, and three were between 24-26.

In Study 2 the 21-item LALQ was found to have four scales: Survival (nine items, $\alpha = 0.78$), Establishing Stability (four items, $\alpha = 0.75$), Approval (four items, $\alpha = 0.60$ with mean inter item correlation of 0.24), and Loving to Learn (four items, $\alpha = 0.77$). The same 21-item LALQ was administered in Study 3 as a paper and pencil exercise.

Model Fit

Data from the 21-item questionnaire were examined using AMOS (Version 20) to test the dimensionality and goodness of fit of the model. Two models were developed and tested for their fit to the data. They were a four-factor baseline model and a four factor hierarchal model. The two models that were tested using CFA and AMOS are shown in Figure 1. The four latent variables are survival, establishing stability, approval, and loving to learn.

Figure 1a represents the baseline model. This represents the most parsimonious and best fitting for the data of a particular group (Dimitrov, 2006) and is the independence (null) model (Kline, 2011), which assumes zero covariances among manifest variables. However, in reality, association between latent factors and manifest variables may occur. Figure 1b represents the hierarchical model. This model represents the hypothesis that a higher order (second-order) factor in this case "learner awareness" has a presumed direct causal effect on the four lower order (first-order) factors of survival, establishing stability, approval, and loving to learn (Kline, 2011). The second order factor is indirectly measured through the indicators of the first order factors.

The model fit for the two hypothesized models were evaluated using multiple fit indexes provided by AMOS. One of the evaluations used was to generate the CFA using the ratio of the chi-square, χ^2 to the degrees of freedom (χ^2/df). The lower the ratio, the better the model fit. Kline (2011) recommends a number less than three as a reasonable indicator of good fit, although ideally the ratio should be close to one; however, this rarely happens if the models are complex and use item level data (Byrne, 2001). Other goodness of fit indices used to assess the adequacy of model fit include the Goodness of Fit Index (GFI), Comparative Fit Index (CFI), and the Root Mean Square Error of

Table 1
Factor Analysis with Varimax Rotation for the Learner Awareness Questionnaire

Scales	Typical Items	Items	Factor 1	Factor 2	Factor 3	Factor 4
Survival	My family wants me to study so I think I have no choice but to listen to them	Q1	.750			
	To please my parents, I enrolled in this programme although I do not like it	Q2	.731			
	I study because my parents want me to.	Q3	.741			
	I am studying in this institution because I want to please my parents	Q4	.670			
	I have always thought that I had no choice about going to school	Q5	.583			
	I do my course work because I do not want to disappoint my parents	Q6	.507			
	I signed up for this programme because my friends signed up for it	Q7	.454			
	I give up easily especially when I feel the subjects are difficult	Q8	.446			
	I learn because I want a better future	Q9	.410			
Establishing Stability	I am studying now so that I can have a good job in the future	Q10		.794		
	Passing examinations is important to me for a secure future	Q11		.778		
	I make sure I go for my classes because what I learn can be applied to my future	Q12		.652		
	I will just memorise my notes rather than analyse them in order to pass my examinations.	Q13		.616		
Approval	I think my friends will be impressed if I do well in my studies	Q14			.692	
	I am confident I can do the work required in this programme and graduate on time	Q15			.659	
	I feel confident I can pass my examinations with good grades	Q16			.609	
	I think I will have more friends if I do well in my studies	Q17			.596	
Loving to Learn	I think learning is fun	Q18				.802
	I find learning interesting	Q19				.795
	I love learning all through my school year until now	Q20				.772
	I like to think of new ways to learn something	Q21				.608
Percentage Variance (after rotation)			14.84	26.42	37.72	46.30

Approximation (RMSEA). Kline (2011) and Hu and Bentler (1998) recommend that values greater that 0.900 would indicate a reasonable to excellent fit for both GFI and CFI indexes. The RMSEA value is useful because it is not associated with the latent variable and can be used to obtain parametric confidence level and perform hypothesis testing (Kelly & Lai, 2011). It was recommended that a cut off value of 0.06 will indicate a relatively good fit (Hu & Bentler, 1998).

A summary of the fit indices of the two models is presented in Table 2. The indices of the two hypothesized models showed reasonable fit. However, the

Table 2
Summary of the Indices of Fit for the Hypothesized Models

Model	n	χ^2	*df*	χ^2/df	*p-value*	RMSEA	GFI	CFI
Four factor baseline model	356	303	150	2.02	0.00	0.056	0.923	0.910
Four factor hierarchical model	356	244	150	1.62	0.00	0.043	0.937	0.943

hierarchical model had better fit indices than the baseline model. It had a lower χ^2/df ratio of 2.62 with a *p-ratio* of 0.00 and had better indices for the rest as well (RMSEA = 0.043, GFI = 0.937 and CFI = 0.943). Hence, a general learner awareness factor is presumed to underlie the more specific factors of survival, establishing stability, approval, and loving to learn.

Internal Consistency

In order to estimate internal consistency, the Cronbach's coefficient alpha (α) was determined for the Study 3 sample (n = 356). The internal consistency for the four LALQ factors were as follows: survival (9 items), α = 0.76, establishing stability (4 items), α = 0.73, approval (4 items), α = 0.53 and loving to learn (4 items). α = 0.78. Although the α for approval is relatively low, the mean inter-item correlation is 0.22 ,which is within the optimum range of 02 to 0.4 (Pallant, 2011).

Discussion and Conclusion

The studies in this paper were carried out to construct and validate the LALQ questionnaire for use with university students to assess how and why they learn. In Study 1 with a sample of 172 students, the EFA suggested to narrow the pool items from an initial 36 to 21 items. The EFA in Study 2 with a sample population of 331 students showed that the 21-item LALQ had four factors, namely Survival, Establishing Stability, Approval, and Loving to Learn. Two four-factor models were hypothesized to establish the CFA of the LALQ. The models tested were a four-factor baseline model and a four-factor hierarchical model. The fit indices used provided evidence to support that the two hypothesized models for the LALQ had good fit with the data and the four-factor hierarchical model had the best fit. The four-factor hierarchical model also showed that there was a second order 'learner awareness' had a direct causal effect on the four factors of survival, establishing stability, approval, and loving to learn that were in a lower order. All the 21 items on the LALQ loaded significantly on their factors. Each of the LALQ scale was found to be internally consistent and the values of the Cronbach alpha adequate (Pallant, 2011). The use of this questionnaire on students from other universities, both locally and internationally, would further validate the findings.

The students' responses to the items on the LALQ showed that they were more likely to learn because they wanted to establish stability in their lives by ensuring a good future career and a love of learning, which Seligman (2011) described as the drive to learn something new and continuously seek new learning. These students were less likely to learn because they feared consequences from authority figures. However, they also wanted approval from their families and friends when they did well in their studies. These perceptions of students about how and why they learn were supported by the statistical analysis obtained using confirmatory analyses and AMOS. The analyses, for this sample at least, supported the acceptance of a four-factor hierarchical model as the structural equation model that substantiated a learner awareness factor as a direct consequence. Important reasons why they learned were to secure a better future, to obtain approval from their families and peers, and to satisfy a love of learning. Biggs (1999) noted that students will want to learn if they can see it is important to them. They are also more likely to take an approach that will develop their critical and deep thinking, resulting in lifelong learning.

The LALQ that was validated in this study showed that it could possibly provide useful information about how and why students learn. Accessing the perceptions of students towards learning would provide useful information to teachers and education administrators alike, especially in curriculum design as well as planning learning experiences in and out of the classroom. Further testing needs to be carried out with other populations both locally and with foreign partners. The 21 items LALQ is designed for quick administration and analysis so that there is easy access to information that will be useful as well as current.

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