# The development of a brief measure of learner autonomy in university students

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Abstract

A great deal of attention is paid to the requirement for university students to become autonomous learners. A review of the literature revealed a lack of relatively short psychometrically sound measures of autonomous learning despite its purported importance. This study aimed to develop a brief psychometrically sound measure of autonomous learning to facilitate empirical research in this area. Items for the scale were selected from reviewing the literature and face validity was confirmed by experienced academics. In the first study, first year psychology students ($N$ =214) completed the measure. Principal components analysis produced a 12 item measure with 2 subscales that appeared to be psychometrically sound. The factor structure was reproduced with a more diverse group of undergraduates ($N$ =172) in a second study. The internal reliability and the concurrent validity of the scale were both found to be satisfactory suggesting that this measure may prove useful to educational researchers.

**Keywords:** autonomous learning, measurement scale, independent learning, study skills

## Introduction

It is frequently suggested that study at university requires students to become autonomous learners (Bryde and Milburn 1990; Chemers, Hu, and Garcia 2001; Stephenson and Laycock 1993). However, there does not appear to be a single consensual definition of what is meant by autonomous learning and indeed many articles appear to discuss autonomous learning without defining exactly what they mean by it. In the early literature it is often referred to as self-directed learning (Long 1989).

Autonomous learning is variously described as the learner's ability to acquire knowledge or skills of value independently by processes that he/she determines (Chene 1983), or as being a psychological characteristic of individuals who are able to independently direct their learning (Knowles 1980; Merriam and Caffarella 1999; Ponton 1999). It has been hypothesized that autonomous learning involves the application of personal initiative in engaging with learning and finding resources and opportunities for learning, persistence in learning, and resourcefulness (Ponton, Carr, and Confessore 2000). This latter definition stresses the psychological characteristics of autonomous learners and follows from Long's (1998) analysis that this psychological conceptualization is essential and sufficient to explain what he termed self-directed learning and is more frequently now labeled autonomous learning or independent learning.

As well as a history of competing definitions there was an apparent lack of any relatively short, psychometrically sound measure of autonomous learning. Most research has been undertaken on the processes associated with the facilitation of autonomous learning rather than on the characteristics of autonomous learners and this may explain the dearth of measures (Merriam and Caffarella 1999). The small amount of research on the characteristics of autonomous learners has tended to measure characteristics associated with autonomous

learning such as motivation to learn and perceived competence (Fazey and Fazey 2001) rather than directly measure autonomous learning.

Historically, the most widely used measure is Guglielmino's (1977) Self-directed Learning Readiness Scale but problems have been reported with the construct validity of this scale and the recommendation is to discontinue using it (Candy 1991; Field 1989, 1991; Straka and Hinz 1996). A full discussion on the short-comings of this measure is contained in Fisher, King, and Tague (2001). A more recently developed measure is the Self-directed Learning Readiness Scale for Nursing Education (Fisher et al. 2001). This is a fairly long scale developed with a specific group of students in mind. It was felt that a shorter generic scale designed specifically to measure what is currently understood as autonomous learning in university students would be beneficial for research in this area. Frequently researchers want to assess several variables hence the benefit of shorter measures so we do not overburden our research participants. The aim was to develop a short psychometrically sound measure with one group of students and validate it with a second more diverse student group (Kline 2000).

## Method Study 1

### *Participants*

The participants were 214 first year psychology students (170 women and 44 men, mean age = 19.11 years, *SD* =3.33), 197 were white British, 17 were British Asians and two were Greek. They volunteered to complete the questionnaire during small group induction sessions on their first day at university. The questionnaire was developed as part of a larger study exploring characteristics of students that might influence autonomous learning.

### *Development of the Measure*

The literature on autonomous learning was extensively surveyed with a particular focus on how autonomous learning was conceptualized as described in the introduction. Statements were then generated independently by the authors to reflect what was felt to be the core components of autonomous learning as reflected in the existing literature. With the removal of items that obviously duplicated each other, this produced a list of 16 items. The list was further refined after consultation with a group of four experienced academics with expertise in autonomous learning who judged that there was still duplication in the list. Three additional statements were generated by one member but the consensual view was that these statements were paraphrases of existing statements. This procedure ensured a satisfactory level of face validity for the scale in an expert sample. The scale is presented as 14 statements against which participants are asked to rate each statement as it relates to them using a five point Likert scale with *Very like me* at one end and *Not at all like me* at the other.

**Results**

The 14 items of the Learner Autonomy Scale were subjected to exploratory factor analysis (principal components) in SPSS16.0. In the initial run, two items failed to load substantially on any factor, using the Cohen (1988) criterion of a factor loading less than .40. These two items were dropped from the scale. A solution was sought with the remaining 12 items after assessing suitability of the data set for factor analysis. Inspection of the correlation matrix revealed many coefficients equal to or greater than .3 as recommended by Tabachnik and Fidell (2001). The sample size was adequate with a Kaiser-Meyer-Oklin value of .83 (Kaiser 1970, 1974) and the Bartlett's Test of Sphericity (Bartlett 1954) was statistically significant as required. The initial analysis revealed three components with eigenvalues greater than 1, explaining 35.1%, 16.4% and 9.2 % of the variance respectively. However,

the Scree Test (Catell 1966) suggested two components. This was confirmed by a Parallel Analysis using a Monte Carlo Principal Components Analysis for Parallel analysis.

-insert Table 1 about here-

As shown in Table 1, only two of the observed eigenvalues were greater than the corresponding criterion values generated from with 100 randomly generated data samples of the same size. Simple structure was sought on the remaining 12 items using varimax rotation as the correlation between the factors was low varimax and oblim rotation produced the same structure (Jennrich and Sampson 1966). The emergent factor loadings and scale reliability estimates are shown in Table 2. A clear two-factor solution converged in three iterations. The factors accounted for 29.29% and 22.21%of the variance respectively. While the factors themselves were correlated ($r$ = .26), the mean interitem correlations for each factor are substantially larger than the correlations between each factor providing initial support for the discriminant validity of  a two-factor solution (Clark and Watson 1995). The Cronbach's alphas are satisfactory for the scale and the 2 subscales as shown in Table 2.

-insert Table 2 about here-

Factor 1 consists of seven items which we have labelled *Independence of Learning* as it reflects elements of responsibility for learning, openness to experience, intrinsic motivation, with an element of self-confidence in tackling new activities, all core components of autonomous learning. Factor 2 relates more to learning and study practices reflecting issues of time management, procrastination, and attitude to lone working. Consequently, we have labelled it *Study Habits*.

**Introduction to study 2**

To further test the validity of the measure we collected data from a different sample of university students to see whether the factor structure would replicate and to measure the concurrent validity of the scales using some other related measure (Kline 2000). From the research literature the Self -directed Learning Readiness Scale (Fisher, King, and Tague 2001) was located. This scale was developed to measure how prepared nurses were for self-directed learning but the nursing related items had been removed and the authors suggested that the scale could be used to measure general readiness to undertake independent learning. The definition of self-directed learning associated with the scale relates to the amount of responsibility the learner is prepared to take for their own learning and this obviously relates to the requirements of autonomous learning. However, self-directed learning is conceptualised as a method of instruction much used within nursing, where students on their own have to undertake problem-based learning packages, complete reflective diaries, clinical logs and the like. In this way it is more context specific than autonomous learning focussed as it is on readiness to undertake individual independent learning projects but the underlying demands on the learner should be similar. Scores on the Self-directed Learning Readiness Scale should correlate with scores on the brief measure of learner autonomy in university students being developed here. The decision was to use the Self-directed Learning Readiness Scale as it appeared to be the most suitable measure available to test the concurrent validity of the new scale.

## Method

### *Participants and procedure*

The participants were 172 undergraduate university students (143 women and 29 men, mean age = 21.47 years, *SD* = 5.62), 162 were white British and 10 were British Asians. They came from a variety of social science, law and business courses. Some students were approached

on campus and in the library and asked whether they would complete the paper based questionnaire. Other students received an email message advertising the study and asking them to volunteer. For this group the data were collected anonymously through an online survey through an electronic web link supplied in the email. It was made clear in the advert that pressing the submit button on the questionnaire was taken as giving informed consent to their participation. For the students completing the paper questionnaire, they were told that the data collection was anonymous but returning the completed questionnaire to the researcher was taken as providing informed consent. Ethical approval for the study was obtained from the University Research Ethics Committee.

***Measures***

*Self -directed Learning Readiness Scale (SDLRS),* (Fisher, King, and Tague 2001) consists of 40 items with three subscales assessing Self-management, *I manage my time well* [item 1], Desire for Learning, *I enjoy a challenge* [item 17], and Self-control, *I am responsible for my own actions/decisions* [item 23]. Items are rated on a five point Likert scale from 1 (*very unlike me)* to 5 (*very like me*) with higher scores indicating higher levels of readiness for independent learning. The alpha coefficients for the complete scale is .92, the Self-management subscale is .85, the Desire for Learning subscale is .85, and the Self-control subscale is .83. No other reliability data on the scale is currently available.

*Autonomous Learning Scale* is now a 12-item measure with two subscales measuring Independence of Learning, *I tend to be motivated to work by assessment deadlines,* [item 10] and Study habits, *I frequently find excuses for not getting down to work,*[item 2]. Responses are recorded on a 5-point Likert scale from 1 *(very unlike me)* to 5 (*very like me*) with higher scores indicating greater levels of autonomy, more independence and more

positive attitudes to learning. Two items were negatively worded to help prevent response bias in participants.

**Results**

The 12 items of the Learner Autonomy Scale were subjected to principal components analysis in SPSS16.0 as described previously. This sample size was shown to be adequate with a Kaiser-Meyer-Oklin value of .83 (Kaiser 1970, 1974) and the Bartlett's Test of Sphericity (Bartlett 1954) was statistically significant as required and the correlation matrix revealed many coefficients equal to or greater than .3 as recommended by Tabachnik and Fidell (2001). As in the previous study, the initial analysis produced three components with eigenvalues greater than 1; however, the Scree Test (Catell 1966) suggested two components. This was confirmed by a Parallel Analysis using a Monte Carlo PCA for Parallel analysis. The observed eigenvalues and the corresponding criterion values generated in the parallel analysis are shown in Table 3.

-insert Table 3 about here-

Using varimax rotation the same two- factor solution as found in the first study converged in three iterations with this new sample and is shown in Table 4. The factors accounted for 25.55% and 24.04% of the variance respectively. Again the factors were correlated ($r$ = .26), with the mean interitem correlations for each factor being substantially larger than the correlations between each factor providing additional support for the discriminant validity of a two-factor solution (Clark and Watson 1995).

-insert Table 4 about here-

-insert Table 5 about here -

The means, standard deviations, ranges, and Cronbach's alphas for the variables measured are shown in Table 5. The alpha levels for all the scales were satisfactory being greater than the recommended .70, although the Cronbach's alphas for the new autonomous learning scale and the 2 subscales are lower than those reported in study 1. A Pearson product moment correlation was computed to examine the associations between the variables as a test of the concurrent validity of the new scale and the results are shown in Table 6. Kline (2000) suggests that correlations > 0.4 indicate satisfactory levels of concurrent validity. The hypothesis was that the overall scales are measuring very similar concepts and this is reflected in a satisfactorily high correlation between the total scores on the two scales as shown in Table 6. The subscales purport to measure slightly different aspects of autonomous learning but even here, with the exception of the study habits subscale and the SDLRS self-control subscale, all the other scales demonstrate satisfactory concurrent validity.

- Table 6 about here -

**Discussion**

There is a lack of relatively brief measures of autonomous learning. The most widely used scale historically; the Self-directed Learning Readiness Scale (Guglielmino 1977) has been shown to be psychometrically unsound. The more recently developed measure, the Self-directed Learning Readiness Scale for Nursing Education (Fisher et al. 2001) was designed to be context specific and is a relatively long measure with only limited psychometric data available to support its use. It is argued that a brief measure of autonomous learning will be beneficial to research in education. If the development of autonomous learners is one of the major aims of a university education (Bryde and Milburn 1990; Chemers et al. 2001;

Stephenson and Laycock 1993) then it is important that we develop tools to assist in its assessment.

The 12 item scale that has been developed is psychometrically sound demonstrating the same structure across two different samples of students. The items selected for the scale all have a high degree of face validity with experienced academics. The factor structure and the internal reliability of the scale have been confirmed using two different groups of university students. The concurrent validity of the scale was measured against the Self-directed Learning Readiness Scale for Nursing Education (Fisher et al. 2001) and found to be satisfactory. There was however little cultural diversity in the participant groups in both studies and the applicability of the measures across different cultural groups still needs to be examined. We made no attempt to measure test-retest reliability, arguing that if university education is aiming to promote learner autonomy we would expect to see changes in scores so what we are measuring is the student's current state of autonomous learning.

The operational definition that is implicit in the measure suggests that autonomous learners take responsibility for their own learning, are motivated to learn, gain enjoyment from their learning, are open-minded, manage their time well, plan effectively, meet deadlines, are happy to work on their own, display perseverance when encountering difficulties and are low in procrastination when it comes to their work. Experienced colleagues with an interest in autonomous learning have concurred with this conceptualization of autonomous learning, although it is open to debate. We would argue that the inclusion of such a specific definition of the autonomous learner will help to bring more clarity to exactly what is being developed and measured.

We have not yet had the opportunity to test the predictive power of the scale. As academics, we assume that autonomous learning is desirable and indeed employers re-iterate

that they value it highly in graduates (Confederation of British Industry 1994) suggesting that students who possess this ability will perform at a higher level. This still requires to be assessed with reference to the measure in a future study when the data becomes available.

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Table 1. Comparison of eigenvalues from factor analysis and the corresponding criterion values obtained from parallel analysis.

| Component | Eigenvalue from factor analysis | Criterion value from parallel analysis | Decision |
|---|---|---|---|
| 1 | 4.21 | 1.41 | accept |
| 2 | 1.97 | 1.29 | accept |
| 3 | 1.10 | 1.23 | reject |

Table 2. Principal components analysis results: Factor loading and reliability estimates.

| Autonomous Learning Scale: Original item number and content | | Factor 1 | Factor 2 |
|---|---|---|---|
| [12] | I enjoy new learning experiences | **.79** | .09 |
| [7] | I am open to new ways of doing familiar things | **.76** | .01 |
| [8] | I enjoy being set a challenge | **.75** | .02 |
| [1] | I enjoy finding information about new topics on my own | **.75** | .11 |
| [6] | Even when tasks are difficult I try to stick with them | **.70** | .29 |
| [10] | I tend to be motivated to work by assessment deadlines | **.60** | .05 |
| [11] | I take responsibility for my learning experiences. | **.49** | .37 |
| [4] | My time management is good. | .12 | .86 |
| [3] | I am good at meeting deadlines | .14 | **.76** |
| [9] | I plan my time for study effectively | .28 | **.76** |
| [2] | I frequently find excuses for not getting down to work. | .03 | **.66** |
| [5] | I am happy working on my own. | -.01 | **.47** |
| Scale reliability estimates | | *F*1 | *F*2 |
| Coefficient alpha: (Total scale = .81) | | .83 | .72 |
| Mean inter item correlations | | .69 | .70 |
| Standard deviation of inter item correlation | | .11 | .15 |

Table 3. Comparison of eigenvalues from principal components analysis and the corresponding criterion values obtained from parallel analysis in Study 2.

| Component | Eigenvalue from factor analysis | Criterion value from parallel analysis | Decision |
|---|---|---|---|
| 1 | 4.13 | 1.45 | accept |
| 2 | 1.77 | 1.33 | accept |
| 3 | 1.10 | 1.24 | reject |

Table 4. Principal components analysis study 2: Factor loading and reliability estimates.

| Autonomous Learning Scale: Original item number and content | | Factor 1 | Factor 2 |
|---|---|---|---|
| [12] | I enjoy new learning experiences | **.86** | .09 |
| [6] | Even when tasks are difficult I try to stick with them | **.72** | .29 |
| [1] | I enjoy finding information about new topics on my own | **.65** | .11 |
| [7] | I am open to new ways of doing familiar things | **.61** | .01 |
| [11] | I take responsibility for my learning experiences. | **.57** | .37 |
| [8] | I enjoy being set a challenge | **.51** | .02 |
| [10] | I tend to be motivated to work by assessment deadlines | **.40** | .05 |
| [2] | I frequently find excuses for not getting down to work. | .03 | **.86** |
| [9] | I plan my time for study effectively | .28 | **.85** |
| [3] | I am good at meeting deadlines | .14 | **.80** |
| [4] | My time management is good. | .12 | **.76** |
| [5] | I am happy working on my own. | .08 | **.40** |

| Scale reliability estimates | *F*1 | *F*2 |
|---|---|---|
| Coefficient alpha: (Total scale = .78) | .73 | .76 |
| Mean inter item correlations | .61 | .73 |
| Standard deviation of inter item correlation | .13 | .19 |

Table 5. Means, Standard Deviations, Alpha Coefficients, Ranges for the Scales and Subscales ($N$ = 172).

| Scales | *M* | *SD* | α | Range |
|---|---|---|---|---|
| SDLRS total scale | 153.49 | 19.72 | .93 | 40 - 200 |
| SDLRS Self-management | 43.45 | 8.49 | .88 | 13 - 65 |
| SDLRS Desire for learning | 52.58 | 6.91 | .83 | 12 - 60 |
| SDRLS Self-control | 53.98 | 6.30 | .80 | 15 - 75 |
| Autonomous learning (AL) total scale | 38.30 | 5.86 | .81 | 12 - 60 |
| AL Independence of learning | 21.60 | 2.64 | .83 | 7 - 35 |
| AL Study habits | 16.70 | 4.45 | .72 | 7 - 25 |

Table 6. Correlations between Self -directed Learning Readiness Scale (SDLRS), the Autonomous Learning Scale and their subscales.

| *N*= 172 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| 1. SDLRS total | -- | | | | | | |
| 2. SDLRS Self-management | .89* | -- | | | | | |
| 3. SDLRS Desire for Learning | .88* | .66* | -- | | | | |
| 4. SDLRS Self-control | .88* | .66* | .72* | -- | | | |
| 5. Autonomous learning total | .71 * | .69* | .65* | .53* | -- | | |
| 6. Independence of Learning | .56* | .40* | .60* | .52* | .70* | -- | |
| 7. Study habits | .61* | .68* | .51* | .38* | .91* | .33* | -- |

* $p < .001$

Word Count: 4,048