



INVESTIGATING THE EFFECTIVENESS OF THE 'ONLINE LEARNER PROFILING QUESTIONNAIRE' IN GENERATING A PROFILE OF LEARNERS BASED ON LEARNER DISPOSITIONS: A PILOT STUDY

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Summary

The purpose of this study is to pilot a newly constructed Online Learner Profiling questionnaire (OLP) to address issues of reliability, collinearity and redundancy and to trial its capacity to generate reliable statistical data. The OLP was administered to a sample of Brunei students in the UK and in Brunei to measure their dispositions toward online learning based on the various capital and disposition types drawn from Bourdieu's Theory of Practice as placeholder dimensions. The end objective is to identify key dispositions representing these dimensions in order to effectively perform factor analysis. Through correlation tests and factor analysis, the study identified 6 to 8 discernible factors based on key dispositions which in turn were correlated against key capital that can be inferred as influential to the manifestations of these dispositions. These key capitals and dispositions create different configurations, or Bourdieu's concept of *habitus*, and these habitus is the eventual identifying mechanism for the actual study that will incorporate the finalized version of the OLP questionnaire.

Introduction

In a previous pre-pilot study (Omarali, 2015), it was concluded that the early version of the OLP (henceforth OLP V.1) was not analytically robust to generate discernible groups of online learners, mainly due to (a) the use of a conceptual framework that was guided by a synthetic amalgamation of several learning theories, and (b) the effect of a small sample size on the analytical methods performed. This pilot study builds over the flaws of the pre-piloted OLP V.1 via the process of refining items informed by a less arbitrary framework, yet still retaining the main objective of identifying learners' dispositions towards online learning.

This study has identified Bourdieu's Theory of Practice (1977) as the best fit and most overarching in organizing the items from OLP V.1 because upon attempts to analyze the generated data it was found that the use of several theories, though established as competently reliable in their respective accord, caused disarray when combined together. In addition, Bourdieu's more judicious explanation of dispositions and their interplay were found to be more design practical and content relevant, particularly in refining, omitting and adding items

to OLP V.2. The justifications for these processes are discussed in the following two sections concerning *theoretical framework* and *redesigning the instrument*. The preliminary objective of this pilot study is maintained in that it investigates the suitability and efficacy of its design and its choice of items. According to Cohen, Manion, and Morrison (2011) “the wording of questionnaires is of paramount importance and that pre-testing is crucial to their success (...) principally to increase the reliability, validity and practicality of the questionnaire” (p.402). The objective of this pilot is thus mainly to test and judge the appropriateness of the instrument and its individual items in guiding the eventual main research towards its research questions, where findings from this pilot study will allow for refinement (Gillham, 2008; pp.25-31) and the creation of a more robust instrument. Considerations on validity and reliability will be discussed throughout.

Theoretical Framework

The revised OLP (henceforth OLP V.2) has adapted Bourdieu's theory as an encompassing framework that is not only applicable to the items but also explains the interplay between items. Bourdieu's theory revolves around “the interlocking nature of his three main “thinking tools”: (...) *habitus*, *field* and *capital*” (Maton, 2014; p.50). Bourdieu believes that every individual has a portfolio of capital that shapes them notably, socio-economically (economic and social capital), academically (intellectual capital) and culturally (cultural capital) (Crossley, 2014).

More recently, Rojas, Straubhaar, Roychowdhury, and Okur (2004; pp.115-116), realizing that emerging technology is shaping individuals with newfound characteristics and dispositions, expanded the concept further with techno-capital. These capitals exist as *objectified* possessions (e.g. money, computers), as *embodiment* of the learner (e.g. intellect, ICT literacy) and as *symbolic* representations (e.g. support network). The interplay of these capitals result in the learner exhibiting a collection of dispositions called *habitus* that is embodiment of the learner (Moore, 2014; p.108). Using Bourdieu's (1977) theory of practice as a guiding profiling framework, the items in the OLP V.1 were modified in accordance with the various types of *capitals* and *dispositions* under Bourdieu's theory, as opposed to the use of standalone constructs. Constructs that were previously incorporated in OLP V.1 included digital literacy, digital nativeness, technology acceptance, study habits, learning styles and personality, among others. Grouping these concepts together resulted in the undesirable overlapping of theories as found when a factor analysis was performed on OLP V.1, resulting in items being strongly accountable for several factors. Thus, framing the dispositions based on one complete theoretical model such as Bourdieu's, as opposed to combining several models to achieve completion minimizes the overlapping of items and allows for a clear classification of dispositions and resulting factors. In addition, Bourdieu's theory encompasses all the other predetermined models, thus not deviating from the impetus of the OLP without itself being restricted to predetermined constructs due to its emphasis on inductively investigating *interactions between behaviour* as opposed to deductively investigating *behaviour per se*.

Investigating the Effectiveness of the ‘Online Learner Profiling Questionnaire’ in Generating a Profile of Learners Based on Learner Dispositions: A Pilot Study

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According to Bourdieu, “power and dominance derive not only from possession of material resources but also possession of cultural and social resources” (Crossley, 2014; p.86). In the field of learning, power and dominance is a learner’s ability to function in the learning system. Therefore, possession of resources – whether it is monetary such as having money to spend, objectified such as owning digital devices, social such as receiving family support or cultural such as having been nurtured into a confident learner – can be regarded as *capital* and as such represented as items in the OLP V.2. The possession of these different types of capital in theory influences a learner’s disposition towards the online learning system. A collection of dispositions is conceptualized by Bourdieu as *habitus*. As drawn from Bourdieu, “the habitus is (...) both structured by material conditions of existence and generates practices, beliefs, perceptions, feelings and so forth in accordance with its own structure” and in addition “is structured by one’s past and present circumstances such as family upbringing and educational experiences” (Maton, 2014; p.50). The relationship between capital and habitus is widely documented in Bourdieu’s work and thus the OLP V.2 has dedicated its main sections for *capital* and *dispositions* respectively for its wide applicability to what makes the embodiment or profile of a learner.

In revising the items to relate to Bourdieu’s theory, statements representing capital were based on capital types, viz. social capital, techno capital, cultural capital and intellectual capital further extending to sub-types of objectified, embodied, symbolic and intellectualized ownership. Similarly, statements representing dispositions were based on study dispositions and techno dispositions leaning towards student behaviour. The interplay between these capitals and dispositions, represented as items in the OLP V.2 is illustrated in Figure 1.

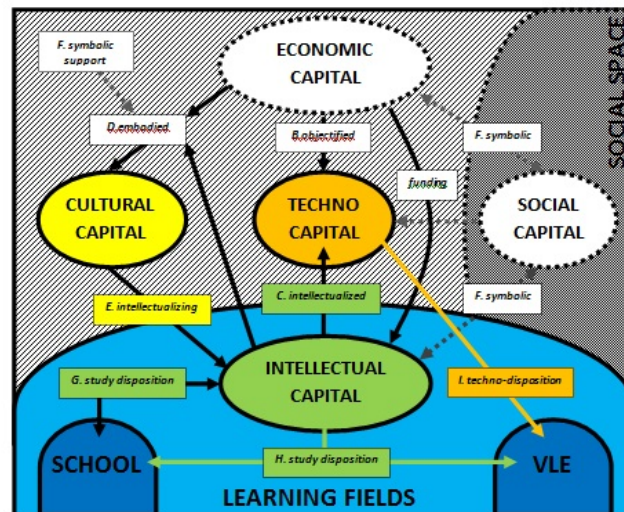


Figure 1. The habitus: The interactions of capitals and dispositions within a learner

Methodology

The questionnaire retained its method of online delivery via Lime Survey due to the practical compatibility of the survey tool with SPSS. The questionnaire was active for 5 weeks within which it managed to collect 126 complete responses and 23 incomplete responses. The

sampling strategy employed was convenient sampling whereby a link to the survey was distributed to Brunei student societies residing in various countries as well as to the three higher institutions in Brunei viz. Universiti Brunei Darussalam, Institut Teknologi Brunei and Politeknik Brunei; thus targeting undergraduate and postgraduate students who share similar characteristics with the target population of the main study. The pilot considered necessary measures to ensure that the data it generates was protected from threats and thus be valid and reliable. For example, piloting a questionnaire with a larger list of items provided an opportunity to amend the instrument and remove items that exhibit collinearity, as well as ensuring instrument reliability through correlating items to check for internal consistency (Cohen et al., 2011; p.201).

Analysis

According to Cohen et al. (2011; p.402), a pilot study serves two functions and this study attempted to address both. The pilot study involves (a) the analysis on the instrument design to investigate on response rates and types (Kgaile & Morrison, 2006), and (b) the analysis on the generated data to investigate the collective robustness (i.e. reliability, validity and practicality) of the items in generating statistically significant data (Oppenheim, 1992). Findings from both perspectives will ultimately establish the reliability of the questionnaire to be used in the main study.

The approximate population for this pilot given the sampling strategy is roughly $N = 4,000$, with $n = 149$ responding to the questionnaire (3.8%). However, what is more important is that the response managed to exceed the minimum $n = 100$ requirement for factor analysis (MacCallum, Widaman, Zhang, & Hong, 1999) and leaning towards the Rule of 150 minimum requirement (Hutcheson & Sofroniou, 1999). In addition, there is a significant improvement in completion rate as this pilot had 15.4% partial response rate, compared to 42.8% in OLP V.1. The respondent sample has a gender distribution of 76 females (60.3%) and 50 males (39.7%). The mean age is 21.8, with median = 21.0, and range = 19.0 (minimum = 17.0, maximum = 36.0). The academic background ranges from PND $n = 3$, ND $n = 11$, HND/AD $n = 5$, First Degree $n = 86$, Masters Degree $n = 9$ and PhD $n = 2$. On experience with formal online learning, $n = 64$ have experienced online learning while $n = 62$ have not. According to Morrison, "an unrepresentative, skewed sample, one that is too small, can easily distort the data, and indeed, in the case of very small samples, prohibit statistical analysis" (1993; cited in Cohen et al, 2011; p.209). In all three demographic profiling, the data indicated acceptable ratio and spread reflecting the general population, albeit with the clear distinction that experience in online learning is attributed to either a student studying in Brunei (hence no online learning) or abroad (hence possible online learning). Overall, the sample was adequate for statistical analysis.

The OLP V.2 data set comprising of 149 responses were imported to SPSS. The extent of completion among the 23 incomplete responses widely varied and therefore these cases were omitted from the actual data set instead of performing multiple and/or fractional imputation

(Durrant, 2009) to maintain 126 complete responses for further analysis. In order to identify the interplay among the items in the data set, the items as per their respective placeholder sections, were analyzed separately into *demographic* data, *capitals* data and *dispositions* data subsets, with emphasis on identifying via statistical analysis (a) the types of dispositions exhibited in varying extent by all respondents, and (b) the types of capital that associate with the dispositions. Objective (a) will be realized via factor analysis, and objective (b) via correlation tests.

Analysing Dispositions data

The 35 items were correlated against the items that represented the 4 forms of capitals in the OLP V.2, viz. (a) technology ownership, (b) internet/technology skills, (c) personality, and (d) learning skills to establish if these capitals were contributing to the manifestations of the dispositions. Correlation tests involved juxtaposing one set of items representing one of the four capitals, against one set of items representing one of the 8 component factors, thus involving 32 separate correlation tests. The criteria for inclusion is an alpha coefficient of $p = .05$ with value of $r = \leq -.520$ or $\geq .520$ to denote strong correlation. However, none of the capitals established evidence of strong correlation. It is thus alluded at this juncture that the sample exhibit near homogeneity with regards to capital.

The 66 items representing dispositions are sets of manifest variables that determine a yet unclassified set of latent variables. According to Hutcheson and Safroniou (1999; p.218), “exploratory factor analysis identifies relationships among variables which are often far from obvious in the original data”. When an initial exploratory factor analysis was attempted, the computation however resulted in a *not positive definite* matrix with rotation failing to converge in 25 iterations. This finding indicated the possible presence of redundant items that were prevalent in the design of OLP V.1 and OLP V.2. Omitting these redundant items will not only improve the case-item ratio favourable for factor analysis but also strengthen the analysis because “variables that do not appear to be related to other variables will not easily form factors and should be removed from the analysis” (Hutcheson & Safroniou, 1999; p.223). In addition to removing weakly correlating items, the finding earlier also indicated the need for data screening processes to ensure that items are not violating the assumptions for a robust factor analysis. Hutcheson and Safroniou underlined tests for normality and outliers (1999, p.222) and as such these procedures were performed prior to performing correlation tests. A Shapiro-Wilk normality test was first performed on the items to establish its distribution and the items were found to be non-normally distributed. Nonetheless, Bishara and Hittner (2014; pp.1-2) found that “in the social sciences, nonnormality is common that it is arguably the norm”, expanding further that an analysis by Micceri (1989) on several hundred psychometric and achievement data distributions in education and psychology found that “31% were extremely asymmetric, 29% had more than one peak, and 49% had at least one extremely heavy tail” (Bishara & Hittner, 2014; p.2).

The method of factor analysis involves the “identification of factors (...) based on correlations between variables {and that} for a good solution, groups of variables need to be correlated” (Hutcheson & Safroniou, 1999; p.233). Therefore, in order for the solution to be robust, it must be determined beforehand that the variables computed into the analysis are indeed correlated. The non-normality of the data posed a problem because factors are determined by Pearson correlation. However, “Pearson’s r may inflate Type I error rates and reduce power” (Bishara & Hittner, 2012) and that “Pearson r could be exaggerated by non-normal data {whereby} bias could be as high as $+0.14$, particularly with a Heavy-Tailed distribution for one variable and a small sample size ($n = 10$)” (Bishara & Hittner, 2014; p.10). In literature, the sensitivity of Pearson’s r for non-normal data led to suggestions for either data transformation to restore normality, or the use of other correlation methods. This pilot study has identified Spearman’s ρ as an alternative method that is less sensitive to non-normal data. It is also less sensitive to outliers compared to Pearson (Abdullah, 1990; Balakrishnan & Lai, 2009) because a few variables tested positive for outliers. Nonetheless, the opted correlation testing was Spearman as most relevant for non-normally distributed ordinal data. Items with 2-tailed statistical significance with moderate correlation coefficient $r \geq 0.5$ were maintained whereas items that were below the coefficient threshold were omitted, resulting in 35 items of recognized correlations. Consequently, a second factor analysis was performed on the 35 items, resulting in a definite positive matrix with a Varimax rotation converging in 12 iterations (see Table 1).

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Table 1: Rotated Component Matrix

	1	2	3	Component		6	7	8
				4	5			
[Strong cultural values due to the support I have] 10. I believe that I have...	.765	.061	.257	-	.052	-	.432	-
[Strong ICT skills due to the support I have] 10. I believe that I have...	.546	.289	.492	.047	.162	.007	.155	.049
[Relative academic success due to the support I have] 10. I believe that I have...	.657	.329	-	.135	.201	.290	.547	.067
[Reading printed books or notes] 11. I prefer learning through...	.859	.173	.075	-	-	.096	.056	.199
[Watching videos] 11. I prefer learning through...	.032	.699	.029	.145	.202	.215	.260	.278
[Watching how others do their work] 11. I prefer learning through...	-	.298	.295	.158	.134	-	.625	-
[Browsing the internet for information] 11. I prefer learning through...	.051	.331	.348	.392	.331	.115	.323	.206
[Interactive software] 11. I prefer learning through...	.012	.331	.309	.185	.672	.205	-	.055
[Online groups] 11. I prefer learning through...	.500	.418	.130	-	.189	.083	.056	.595
[E-mail or chats for communication] 11. I prefer learning through...	.367	.531	.254	.091	.511	.157	.117	-
[Mobile apps for activities and accessing notes] 11. I prefer learning through...	.558	.489	.138	.091	.501	.127	.244	.021
[Online notes that are readable/ downloadable] 11. I prefer learning through...	.551	.159	.477	.109	.479	.250	.039	.127
[Seek the opinions and advice of others] 12. In my studies, I...	.652	.208	.381	.109	.220	.265	.165	-
[Follow a strict daily/ weekly schedule] 12. In my studies, I...	-	.223	.064	.829	.362	.200	.097	.048
[Firstly plan on how I will do my work] 12. In my studies, I...	.100	.552	.069	.419	-	.087	.065	.112
[Am always calm and stress-free] 12. In my studies, I...	.192	.727	.202	.099	.086	.110	.258	.067
[Am motivated to learn when using the internet] 12. In my studies, I...	.381	.613	.212	.291	-	-	-	-
[I first go to websites that I am most familiar with] 13. When I use the internet, I...	.535	.606	-	-	.153	.034	.015	.211
[Never get lost in the large amount of internet information] 13. When I use the internet, I...	.808	.165	.012	.134	.277	.119	.131	.050
[Skim quickly through information] 13. When I use the internet, I...	.446	.647	.094	.052	.129	.283	-	.130
[Do multiple things at the same time (multitask)] 13. When I use the internet, I...	.485	.355	.011	.089	.434	.179	.032	.232
[Communicate with people easier online] 13. When I use the internet, I...	.308	.134	.365	.089	.434	.179	-	.264
[Am careful with the truthfulness of information] 13. When I use the internet, I...	.140	.119	.831	-	.222	.232	.051	.032
[Choose the easiest/ most convenient internet feature] 13. When I use the internet, I...	.652	.374	.306	.045	-	.295	.034	.139
[Become more motivated to do my school work] 13. When I use the internet, I...	.547	.257	.620	.212	.183	.062	.066	.171
[Skip information that I don't like or find boring] 13. When I use the internet, I...	.666	.455	.162	.372	.237	-	.044	.021
[Concentrate better when doing activities online] 13. When I use the internet, I...	.731	.088	.291	.043	.438	.169	.102	.017
[Consulting my teachers] 11. I prefer learning through...	.681	.218	.307	.075	.395	-	.051	.098
[Group work] 11. I prefer learning through...	.175	.078	.001	.918	-	.001	.054	.116
[engaging practical or hands-on activities] 11. I prefer learning through...	.178	.129	.398	.724	.004	.258	.365	.077
[Work at my own pace] 12. In my studies, I...	.343	.246	.128	.184	.038	.301	.731	.204
[Use it continuously throughout the day] 13. When I use the internet, I...	.298	.597	.138	.055	.159	.460	.028	.248
[Prefer looking at photos and videos] 13. When I use the internet, I...	.233	.054	.229	.008	.169	.835	-	-
[Expect to quickly find the information I need] 13. When I use the internet, I...	.244	.208	.722	.285	.025	.308	.161	.145
[Sufficient money to spend on what I need] 10. I believe that I have...	.141	-	.045	.057	.775	.200	.017	.279
	.069	.009	.163	.258	.097	-	.023	.894
						.022		

Examinations on sampling adequacy suggested that the sample was favourable (KMO = .609) and on sphericity with Bartlett's significance index of $p < .001$ respectively verified the statistical reliability of the factor analysis process (see Table 2).

Table 2: KMO and Bartlett's Test (8 Factor Model)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	Bartlett's Test of Sphericity		
	Approx. Chi- Square	Df	Sig.
.609	7804.978	595	.000

Discussion

With regards to the reliability of the OLP V.2 in generating and identifying factors, the study managed to generate from two factor analysis processes, an 8-factor model and a 6-factor model. The reliability of these factor models were validated via KMO's test of sampling adequacy and Bartlett's test of sphericity taking into consideration measures for identifying the characteristics of the dataset including its distribution, outliers, and undertaking procedures to establish internal consistency via correlation tests, thus eliminating redundant items.

Although discussion on the proper taxonomy of the factor models fall within the scope of the eventual main study, it is promising that the items that constitute certain factors share thematic aspects. On the 8 factor model, it was inferred that items of specific factors were describable to respective forms of dispositions that builds upon the placeholder taxonomy based on Bourdieu's theory. These dispositions were dependent on and thus can be thematically categorized into (a) conditioned skills and expertise (automaticity), (b) maintaining control of one's learning, (c) simplifying the learning process, (d) desire to learn together or with assistance, (e) having information at one's fingertips, (f) what the internet expects from the students, (g) learning processes made possible by the learning environment, and (h) dependent on access to technology.

Based on the preceding discussed findings, the pilot study established that there are 35 items representing *dispositions* that have managed to establish a workable 8-factor model. At the same time, this study revealed that a majority of items representing *capital* did not register as significant items of query. Therefore, from the 137 items included in OLP V.2, this pilot study has managed to identify and remove redundant items and consequently truncate the questionnaire to the size of 48 items on capital and dispositions. This further strengthens the reliability of the instrument particularly in factor analysis in terms of subject-to-variable ratio which for this pilot study was identified as 1:3; a minimum requirement for factor analysis. Furthermore, with a nuanced understanding of the taxonomy to be used in the final version of the OLP, these items can be refined and truncated further into sets of items that abide to

Bourdieu's theory, thus aligning its theoretical foundation in parallel with consequent studies. At this juncture however, the process of profiling learners based on habitus as supported by the analysis is established as more realistic compared to using existing standalone models or a combination of standalone models as attempted in a preceding pilot study (Omarali, 2015).

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