Volume 13 Issue 24
Originally issued as G9

Global Journal of human social science
Linguistics & Education
Volume 13 Issue 9 Version1.0 Year 2013
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-460X&Print ISSN: 0975-587X

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GJHSS-G Classification : *FOR Code: 930203p, 930102p*



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The Impacts of Aligned Teaching on Students' Perceived Engagement in Independent Learning and Satisfaction: An Empirical Investigation in Hong Kong

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Abstract - In response to the move towards Outcomes-based Education in Hong Kong, our paper aims at investigating the impacts of the Outcomes-based Teaching and Learning approach (OBTL) on students' satisfaction and perceived engagement in independent learning in the context of higher education. Building upon the principle of "constructive alignment", we propose a theoretical model to examine the impacts of constructively aligned teaching and learning that is conceptualized as the constructive alignment Index in our paper. An empirical study of undergraduate students (n=253) found that the constructive alignment index (CAI) positively predicted students' satisfaction and their perceived engagement in independent learning. Implications for research and practice are discussed.

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I. Introduction

The adoption of outcomes-based education (OBE) (Spady, 1994) has become a global trend to enhance teaching and learning (Botha, 2002; Killen, 2004; Ross & Davies, 1999). With the use of OBE, an approach in which the design of the curriculum is driven by the learning outcomes that students should display at the end of the courses and programmes (Davis et al., 2007; Harden, Crosby, & Davis, 1999), quality of teaching and learning could be assured by the continuous assessment of learning outcomes achieved by students (Hill, 2007). As a result, quality assurance agencies have utilized the framework for programme outcomes assessment in the higher education in different Asia-pacific and western countries, including Australia (Barrie, Ginns, & M, 2005; Treleaven & Voola, 2008), the USA (Borrego & Cutler, 2010), the UK (Rust, 2002), Vietnam (Tran, Nguyen, & Nguyen, 2010), and Singapore (Davis et al., 2007). As a world city aiming to develop itself into a regional education hub, Hong Kong cannot be immune from such worldwide movement. Indeed, Hong Kong's higher education sector can be regarded as an interesting context for inquiry, reflected by its changing landscape, growing international recognition and blend of Asian and Western cultures in affecting teaching and learning (Ho, 2005). Since 2012, Hong Kong has been preparing for an education reform with a prominent feature to embrace Outcomes-based Teaching and Learning (OBTL), a form of OBE framework building upon the concept of constructive alignment (Biggs & Tang, 2003, 2007, 2011), in the higher education curricula.

Constructive alignment (CA) is indeed a pedagogical approach that is embedded in the constructivist theory (Biggs & Tang, 2003, 2007, 2011), emphasizing the alignment between the intended learning outcomes (ILOs), teaching and learning activities (TLAs) and assessment tasks [ATs]. It is believed that courses designed upon CA will enhance student-centered learning by encouraging students to take an active and independent role in constructing their own knowledge (Tran et al., 2010; Wang et al., 2011). Thus, independent learning is an essential outcome element in OBTL as students, with the help of effective teaching and learning activities, are encouraged to explore the intended outcomes beyond information, conception and understanding (Biggs & Tang, 2007).

In particular, Biggs and Tang (2007) stated that instructors adopting the CA approach should [1] clearly describe the ILOs in class, [2] create a learning environment and TLAs conducive to the ILOs which allow students to construct their knowledge to achieves the outcomes, and [3] establish assessment on how well students' could achieve the corresponding ILOs. These three components of constructively aligned teaching constitute important pillars in OBTL.

However, whether courses with constructively aligned ILOs, TLAs, and ATs would encourage students to take an independent and active role in learning in

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Hong Kong remains a question rarely answered. Recognizing that one of the main objective for OBTL is to enhance student-centered learning through constructive alignment with which students are expected to be more self-directed and confident in learning independently (Tran et al., 2010; Wang et al., 2011), the evaluation of whether and how CA could promote independent learning in the local Chinese context is hence imperative. The purpose of this study is to explore the relationship between the adoption of CA and students' perceived engagement in independent learning. The impact on students' satisfaction with courses will also be investigated.

This empirical study is expected to make contributions to both education researchers and practitioners. On the research side, we propose a theoretical model to enhance our understanding of constructive alignment, an underpinning concept of OBTL, and its impacts in the context of higher education in Hong Kong. On the practical side, the result of this study informs and reinforces educators of the benefits of implementing OBTL.

The rest of the paper is structured as follows. First, we outline the contextual and theoretical background, and propose a theoretical model. Then, we describe our research methodology including the survey and data collection procedures. Next, we present and discuss the findings of our empirical study. Finally, we conclude the paper by discussing the implications for both research and practice, and suggestions for future research.

II. Constructive Alignment and Perceived Engagement in Independent Learning

There is general consensus in the education literature that the goal of education is to enable students to learn independently (Gow & Kember, 1990). Although independent learning is not a new concept, there seems to lack a universal understanding towards its meaning (Broad, 2006). However, in looking at the literature on independent learning (Broad, 2006; Hanks, 1986; Lewis, 1978; Souto & Turner, 2000; Williamson, 1995), it becomes apparent that alternative terms are used to describe the same idea - empowerment of students in their learning not only in a specific context but beyond. In other words, students are able to learn for themselves not only in a course but in a broader context. Williamson (1995) stated that this could be achieved by encouraging acceptance of responsibility and involvement of students in their studies. Perceived engagement in independent learning by students is measured in this study as a proxy.

Aforementioned, OBTL is an education approach in which student-centered learning is emphasized (Tran et al., 2010; Wang et al., 2011). Instructors who adopted the CA approach actively involve students in learning and it is found to be effective in promoting learning, particularly in achieving higher order outcomes (Hoddinott, 2000; McMahon & Thakore, 2006; Morris, 2008; Taylor & Canfield, 2007). Within an aligned system, students would therefore be able to see that the teaching/learning environment and assessment tasks are closely related to what they are supposed to be learning. As a result, interpretation and reasoning would be made easier. Comprehension of prior learning and the associations amongst learning tasks would be made more systematically which favor constructivism to be taken place. It is believed that students are more willing to take the responsibility and be active in the learning process. So the higher the alignment between ILOs, TLA, and TAs, the higher the engagement in independent learning will be perceived by students. Thus, in this study, we propose that:

H1: Constructive alignment Index is positively associated with perceived engagement in independent learning

III. Constructive Alignment and Students' Satisfaction

The enhancement of students' satisfaction through improvements in aspects of teaching and learning have been well documented (Anderson, Banks, & Leary, 2002; Helms, Alvis, & Willis, 2005; Yazici, 2004). Student satisfaction is typically based on *"a cognitive process in which students compare their prior expectations of their educational experience to those actually experienced from attending a university or a course"* (Elliott & Shin, 1999). Student satisfaction results when actual performance meets or exceeds their expectations (Elliott & Shin, 1999; Zeithmal, Berry, & Parasuraman, 1993). Forrester and Parkinson (2004)'s study found that the gap existed between students' expectation and actual needs may influence their satisfaction on a distant learning course. Thus, we believe that under a constructively aligned teaching and learning environment, students [1] should be very clear as to what they have to learn, [2] should see the teaching actively engages them in learning that is appropriate to achieving what they are supposed to learn, and [3] should see assessment as addressing what they are supposed to have learned. More importantly, students receive formative feedback which allows them to evaluate their own performance in a continuous timeframe. As a result, we believe that within a constructively aligned teaching and learning environment, the gap between students' expectation and actual performance would be narrowed. Students' level of satisfaction is likely to be higher. In addition, constructively aligned courses/programme curricula are designed to include materials, strategies, and approaches which are interesting, motivating and

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requiring students to actively engage. In such a highly interactive environment, students would enjoy their learning, and be more motivated to achieve the intended learning outcomes. It is very likely that students' satisfaction towards their learning in the course. The more aligned the system is, the higher the students satisfaction would be. Thus, we propose that:

H2: Constructive Alignment Index is positively associated with students' satisfaction.

IV. The Proposed Research Model

Figure 1 depicts our research model. In this study, we aim at exploring the role of a constructive alignment index in impacting students' satisfaction and perceived engagement in independent learning in the higher education context.

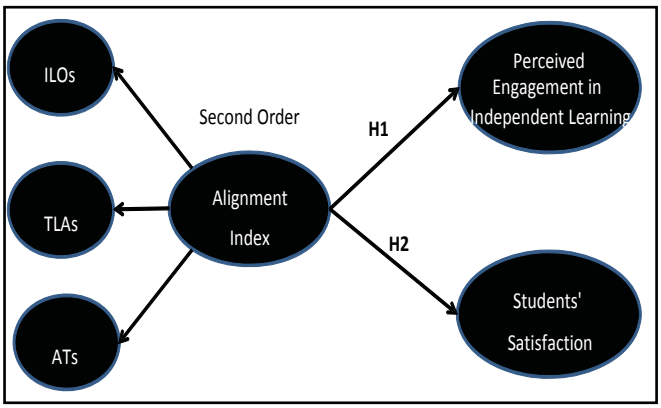

Figure 1 : Research Model

V. Methodology

This section provides the details of data collection procedures, measurement, common method bias test and data analysis.

a) Data Collection Procedures

A course alignment questionnaire, adapted from the working paper of Biggs, Tang and Wong (2013), was administrated in class to undergraduate students in 4 courses offered by the same faculty in a Hong Kong university with a overall response rate of 60.9%. A total of 253 usable questionnaires were collected at the end of the first semester of academic year 2010-2011. Among the respondents, 53.2% are female. Details of courses and response rate are shown in Table 1.

Courses	Instructors	No. of valid responses	% of Valid Responses
Course A	Instructor A	32	52.5%
Course B	Instructor B	55	40.7%
Course C	Instructor C	117	73.2%
Course D	Instructor D	48	81.3%
		253	**60.9%**

Table 1 : Details of participating courses and response rates

b) Measurement

Measurement in this study was based on a validated five-point scale. All first-order constructs: [1] Intended Learning Outcomes (ILOs); [2] Teaching and Learning Activities (TLAs); [3] Assessment Tasks [ATs] ; (4) Students' Satisfaction; (5) Perceived Engagement in Independent Learning were assessed by adapting the course alignment questionnaire (Biggs et al., 2013), which was designed upon the OBTL framework (Biggs & Tang, 2007, 2011). The second-order construct, the Constructive Alignment index, was reflectively measured by the three first-order constructs: ILOs, TLAs, and ATs. Sample questions for ILOs, TLAs, and ATs include: *"I had a clear idea of what I was to learn in this course"; "The teaching and learning activities helped me learn what I was supposed to learn in this course"; "I have achieved what I was supposed to learn in this course". Sample questions for satisfaction and perceived engagement in independent learning include: "I really enjoyed this course" and "I am now able to work out my own ways to continue to learn and evaluate myself".*

c) Common Method Variance

Due to the fact that the data was collected from a single source (i.e. Self-report questionnaire), there is a potential for the occurrence of common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). A Harman's one-factor test (Harman, 1967; Podsakoff & Organ, 1986) was performed with SPSS 16 to determine the extent to the method variance in the current data. All 20 variables in the inventory were subjected to an exploratory factor analysis (principle components factor analysis with no rotation). According to this test, if a single factor emerges from the factor analysis which accounts for most of the variance (>50%), common method variance is deemed present. Results suggested that no single factor explained more than 50% of the variance, indicating the common method bias were not likely to be presented in the current study.

d) Data Analysis

Data analysis was performed in a holistic manner using partial least square (PLS) path modeling. PLS is a component-based structural equation modeling technique that is commonly used in behavioral research. SmartPLS version 2.0.M.3 was used in the current study. PLS technique was chosen because of its high ability in modeling latent constructs under conditions of non-normality and in small to medium sized samples well (Chin, 1998; Chin & Gopal, 1995; Ringle & Wende, 2005). Specifying of relationships among the conceptual factors of interest and the measures underlying each constructs were allowed in PLS to enable the simultaneous analysis of the measurement model and structural model respectively. The technique is appropriate for testing theories that are in an early stage

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of their development. In our analysis, the path weighing scheme was used. Tests of significant of all paths were performed using the bootstrap resampling procedures with 500 iterations.

VI. Results

Following the two-stage analytical approach, we first examined the measurement model and then assessed the structural model.

a) Measurement Model

To access the internal consistency, convergent validity and discriminant validity of the measurements, the constructs' composite reliability [CR] and the average variance extracted [AVE] were calculated using PLS.

b) Convergent Validity

Convergent validity is an approach to evaluate a measure based upon how well the measure conforms with theoretical expectation (De Vaus, 1996). Table 2a shows that all coefficients of the constructive alignment index (CAI) are significant at 0.001 level, which means that ILOs, TLAs, and ATs are good representatives of CAI. Table 2b presents information about the loadings of the measures of our research model. All items have significant path loadings ($p < 0.001$) at 0.700 or above on their respective constructs in the model.

Table 2a and 2b also demonstrate that all our constructs fulfill the recommended levels concerning composite reliability [CR] and average variance extracted [AVE]. As shown in Table 2a and 1b, all items are higher than the cut-off of 0.50 for AVE as recommended by (Fornell & Larcker, 1981), ranging from 0.517 to 0.661. Similarly, the values for CR are very good, ranging from 0.857 to 0.923, well above the reliability value of 0.70, which is the suggested benchmark for acceptable reliability (Chin, 1998). These results indicate that the instrument has displayed both item internal consistency reliability and item convergent validity.

Second-Order Factor	First-Order Factor	Weights	St. Error	t-value
Constructive Alignment Index (CAI)	Intended Learning Outcomes (ILOs)	0.907	0.004	69.893
	Teaching and Learning Activities (TLAs)	0.933	0.004	113.86
	Assessment Tasks [ATs]	0.913	0.004	81.104
(CR=0.923; AVE =0.517)				

Table 2a : Psychometric Table of Measure - 2nd Order Construct

c) Discriminant Validity

Discriminant validity involves demonstrating a lack or very low correlation among different constructs (Kinnear & Taylor, 1996). Discriminant validity was confirmed with the squared root of the average variance extracted (AVE) for each construct higher than the correlations between it and all other constructs (Fornell & Larcker, 1981). Table 3 shows that each construct shares greater variance with its own block of measures than with the other constructs representing a different block of measure. In addition, as we can find that no pair of measures have correlations exceeding the criterion of 0.9 as suggested by (Hair, Anderson, Tatham, & Black, 1998), which implies that no multicollinearity existed among these constructs.

	CAI	SS	PEIL
Constructive Alignment Index (CAI)	0.719		
Students' Satisfaction (SS)	0.611	0.783	
Perceived Engagement in Independent Learning (PEIL)	0.607	0.629	0.814

Table 3 : Corrections between Constructs with Reflective Measures (Diagonal Elements are Square Roots of the Average Variance Extracted)

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Construct	Item	Loading	St. Error	t-value
Constructive Alignment Index				
Intended Learning Outcomes (ILOs)				
CR=0.861	ILO1	0.799	0.013	24.786
AVE=0.607	ILO2	0.777	0.015	21.309
	ILO3	0.763	0.014	21.564
	ILO4	0.776	0.018	19.247
Teaching and Learning Activities (TLAs)				
CR=0.876	TLA1	0.802	0.013	25.039
AVE =0.639	TLA2	0.808	0.010	28.238
	TLA3	0.791	0.011	29.472
	TLA4	0.852	0.012	24.008
Assessment Tasks [ATs]				
CR=0.857	AT1	0.797	0.015	23.995
AVE=0.600	AT2	0.752	0.015	20.562
	AT3	0.742	0.014	22.527
	AT4	0.804	0.014	23.240
Satisfaction (SS)				
CR=0.863	SS1	0.794	0.014	23.275
AVE=0.613	SS2	0.758	0.015	18.273
	SS3	0.725	0.017	20.150
	SS4	0.849	0.018	19.896
Perceived Engagement in Independent Learning (PEIL)				
CR=0.886	PEIL1	0.802	0.013	21.717
AVE=0.662	PEIL 2	0.808	0.016	18.236
	PEIL 3	0.791	0.016	19.115
	PEIL 4	0.852	0.017	20.714

Table 2b : Psychometric Table of Measure - 1st Order Constructs

d) Structural Model

Using SmartPLS (Version 2.0 M3), the structural model and hypotheses were assessed by examining path coefficients and their significance levels (Chin, 1998). The proposed model conceptualized three first-order constructs (ILOs, TLAs, and ATs) modeled as reflective indicators of the second-order construct – constructive alignment index. Because SmartPLS does not directly permit the representation of second-order latent constructs, it was necessary to separately test the first order-constructs that formed the second-order constructs. We then used the computed first-order factor scores obtained from the test as manifest indicators of the second-order construct.

This model (please refer to Fig 1.) accounts for 58.9 percent in perceived engagement in independent learning and 71.6 percent of variance in students' satisfaction. All hypothesized paths (H1 and H2) in the research model were found statistically significant. As such, the findings support the proposed research model, and demonstrate how the CAI plays a role in impacting students' satisfaction and perceived engagement in independent learning.

Figure 2 summarizes the model-testing results with overall explanatory powers, and estimated path coefficients (all significant paths are indicated with asterisks). Supporting hypothesis 1 and 2, the second-order factor, constructive alignment index, had significant positive direct effect on perceived engagement in independent learning (β=0.767, t=24.503) as well as students' satisfaction (β=0.846, t=48.674).

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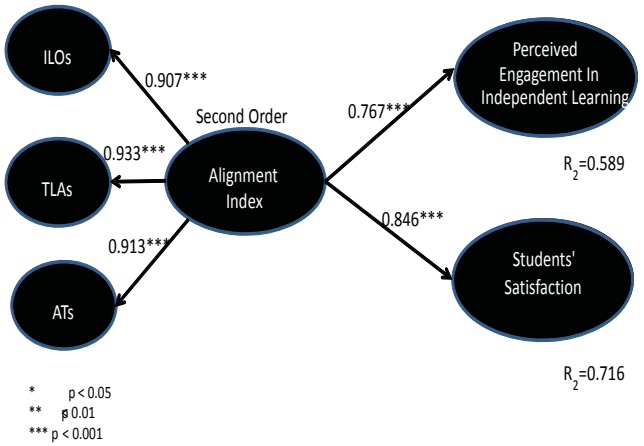

Figure 2 : Standardize Path Coefficient for the Structural Model

VII. Conclusion and Discussion

This study has its genesis from exploring the role of constructive alignment in impacting students' satisfaction and perceived engagement in independent learning. Constructive alignment is conceptualized as the alignment between ILOs, TLAs, and ATs through which students are able to construct knowledge on their own. The research model is developed based on extant literature. Constructive alignment index is explained in terms of three elements – ILOs, TLAs and ATs. The measurement model is confirmed with adequate convergent and discriminant validity of all measures, and the structural model explains 58.9 percent in perceived engagement in independent learning and 71.6 percent of variance in students' satisfaction. All path coefficients are found statistically significant in the research model. The results show that the OBTL approach positively increases students' satisfaction and perceived engagement in independent learning, illustrating the benefits of the implementation of the OBTL pedagogy.

VIII. Contributions

While the urge to implement Outcomes-based Education is apparent, there is relatively little empirical research available in the educational literature to address the process of alignment and its impacts in the Asian Chinese context. Although there are some investigations on the impacts of adoption of CA in the educational literature (Souto and Turner 2000; William 1995; Hanks 1996; Lewis 1987; Broad 2006), there is a significant gap in highlighting how student's perceived engagement of independent learning is impacted through constructive alignment and the role of constructive alignment in the process. This study offers empirical evidence to help scholars understand the constructive alignment process and its impacts on students' satisfaction and engagement in independent learning.

Apart from theoretical contributions, the results of this study also provide some insights for education practitioners. In particular, a lot of front line teachers, who have been teaching for years, are very used to the traditional teacher-centred teaching method. They might not be very confident or convinced with the new alignment pedagogy. The results of our study not only enhance their understanding on the constructive alignment concept but also inform and reinforce teachers of the possible benefits of adopting CA and implementing OBTL.

IX. Limitations and Future Research

In interpreting the results of this study, one must pay attention to a few limitations. First, to keep the model parsimonious, the proposed model only focuses on the impacts of CA adoption on two outcomes– student's satisfaction and perceived engagement in independent learning. Future studies should continue to enrich the existing model by adding more learning outcomes (e.g. teamwork, creativity, etc...). Second, because of the cross-sectional nature of the study, spurious case-effect inferences may be presented. A longitudinal design is needed in future to avoid the problem and to validate the inferences. Particularly, it would be interesting to examine the change of engagement level of independent learning across semesters. Third, the measure of engagement in independent learning was by students' perception. Objective data could be collected to increase the robustness of the study. Fourth, the study represents mostly students in higher education context which only includes one Faculty at a local university that offer degree courses. In future studies, researchers could extend the sample by including students who take sub-degree or higher diploma courses.

Considering that this study has raised some interesting questions, it is believed that the current study triggers additional theorizing and empirical investigation aiming at a better understanding on the concept of constructive alignment in the higher education context. Future research should continue along this line by investigating the underlying social and psychological process embedded within the model.

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