

Constructive Alignment: A bibliometric analysis

Siti Adila Mohamad Yazil¹, Nurdiyanah Fatin Ruslan¹, Farah Zahidah Mohamad Noor²

¹Kolej Komuniti Arau, Perlis, Malaysia

²Kolej Komuniti Bukit Beruang, Melaka, Malaysia

Abstract: This study examined previous research publication on constructive alignment. The purpose of this study is to present sources of information regarding constructive alignment especially on its relation to education. Several bibliometric indicators were used to trace research publications related to constructive alignment in education from Web of Science online database. The research areas, countries, publication years, source titles, authorship, and citations were examined and the results of these analyses were discussed and presented. It was eminent that constructive alignment was discussed widely in education rather than other fields.

Key words: *Constructive Alignment, Education, Educational Research*

INTRODUCTION

The ecosystem of education comprises many elements not only teaching and learning implementation, but also assessment. For many decades, researchers have developed many studies to cater the means of education for future betterment. In recent years, particularly discussing on Malaysia-based education system, firm connotation have been implemented on assessment. Pen and paper driven emphasis now had swayed to outcome based assessment where learning outcomes are given emphasis.

According to Adamson et. al, [1] in Rumapea, Syahputra, & Surya [2], there will be rise on the studies of learning outcomes for few reasons. Learning outcomes suggested by Biggs [3] is to incorporate appropriate *verbs* so that it enable learners to ‘perform’ their understanding of what they learnt from teaching and learning process. SOLO Taxonomy [3] provides list of verbs by level to define learning outcome. Other than that, Bloom’s taxonomy [4] is also commonly referred to when planning for learning outcomes.

Although outcome-based education system has been gaining popularity, limited considerations has been given to constructive alignment. Constructive alignment is an approach where it suggests that teaching and learning process should be coordinated to prior defined

learning outcomes hence assessment. Tricio & Montt [5] found out significant difference on students learning approach that was from surface learning approach to deep learning approach before and after the implementation of constructive alignment respectively.

Seeing the rose of constructive alignment in future trends in education, there is a need for extensive study especially on how this alignment has or has not yet yielded promising implications as a whole. Therefore, this paper provides related references for novice researchers to orientate them to suitable journals, scholars, and sources regarding constructive alignment.

CONCEPT

Constructive alignment has its history many decades ago based on a book by Ralph W. Tyler [6]. The same motion had also been mentioned by Biggs [7] that is constructive alignment was initially proposed by Tyler [8]. Constructive alignment summed by Biggs [3], as a whole set of system where students must be able to proof on the lessons they acquired in learning process and in order to achieve this, teaching must also be dynamic and tailored to meet the said objectives. Assessment as part of the system should also be enlighten to learners to that they are acquainted on what they are going to be assessed and what is expected from them to demonstrate as evidence of learning.

In Malaysian education system context, constructive alignment can be noted to have been taken a firm consideration by the Malaysian Ministry of Higher Education where training of trainers has once been held [9]. This is parallel to the claim that for constructive alignments to work best, it is needed to be scaffold by supportive environment [7].

Constructive alignment comes hand in hand with outcome-based education approach when prior to teaching and learning exercises, specific learning outcomes are outlined. Due to this, the system takes into account pre and post planning of teaching and learning in class. Biggs [3] stated that constructive alignment allow teacher and learners to be directed to the same goal in the process of learning. Hence, in constructive alignment, teaching method is aligned to the needs of curriculum as well as the assessments so that it could achieve the said learning outcomes [7].

METHODOLOGY

This study utilised the data from the Web of Science online database. In order to analyse the research publication outputs, the keyword ‘constructive alignment’ was first used to extract relevant papers from Web of Science core collection in terms of topic for all existing years. Through the keyword of ‘constructive alignment’, a total of 134 related publications were managed to be tracked. However, as the keyword used was quite broad, refined search was done by using education educational research or education scientific disciplines. Following this, the results were refined again according to countries, universities, WOS categories, and publication years. As for publication years, the result presented data retrieved from 1998 but then it was further filtered to the range of years from 2005 to 2017 for the recentness purposes.

FINDINGS

The analysis of the WOS database on 134 publications related to the constructive alignment in education included articles, proceedings paper, and book chapters focusing on constructive alignment research. The bibliometric indicators used to present the analysis of these publications were as the followings:

- i) research areas and number of publications
- ii) countries and number of publications
- iii) publication years and number of publications
- iv) source titles and number of publications
- v) citations and author

Table 1. Research areas and number of publications

RESEARCH AREAS	NUMBER OF PUBLICATIONS
Education Educational Research	127
Engineering	17
Linguistics	7
Geography	5
Nursing	4
Computer Science	4
Social Sciences Other Topics	3
Psychology	2
Physiology	2
Health Care Sciences Services	2
Biochemistry Molecular	
Biology	2
Art	2

Table 1 shows the number of publications published according to the research areas. Based on the analysis, it is evident that publications on constructive alignment were found mainly in education educational research areas where a total of 127 publications were published. Subsequently, constructive alignment was also presented in other research areas including engineering, linguistics, geography, etc. (refer table. 1). However, the figures revealed a vast difference between the number of publications and between the use of constructive alignment in the education educational research and other mentioned research areas. Hence, the finding indicated that constructive alignment was a highly relevant issue or in the education field.

Table 2. Countries and number of publications

COUNTRIES/ TERRITORIES	NUMBER OF PUBLICATIONS
Australia	39
England	27
Sweden	16
USA	13
Canada	9
Scotland	7
New Zealand	6
Malaysia	6
South Africa	5
Portugal	3
Peoples R China	3
Finland	3
Spain	2
Netherlands	2
Estonia	2

Based on table 2, it could be seen that Australia is heading the list of number of publications produced with 39 publications. This is followed by England with 27 publications, Sweden with 16 publications, and USA with 13 publications. This list does not provide information on the education system implementation in those respective countries. However, it could be seen that the countries which produced the top numbers of publication are considered as developed nation as claimed by a study [10].

Table 3. Publication years and number of publications

PUBLICATION YEARS	NUMBER OF PUBLICATIONS
2017	2
2016	18
2015	22
2014	18
2013	21
2012	11
2011	9
2010	7
2009	8
2008	8
2007	4
2005	2

Table 3 shows publication years and number of publications related to constructive alignment. The search for the concept of constructive alignment in the WOS showed that publications on constructive alignment can be traced back to 1998. However, after sorting, it was decided that only publications from 2005 to 2017 would be discussed. In general, there has been an increase in the publications on constructive alignment. The highest number of publications reported was in 2015 while, the least number of publications was in 2005 and 2017 with two publications each. The number of publications for the year 2017 nevertheless, could rise as the record for the complete year is still generating to date.

Table 4. Source titles and number of publications

SOURCE TITLES	NUMBER OF PUBLICATIONS
Higher Education Research Development	9
Assessment Evaluation in Higher Education	8
Procedia Social and Behavioral Sciences	7
Teaching in Higher Education	6
Journal of Geography in Higher Education	5

Edulearn Proceedings	5
Nurse Education Today	4
International Journal of Engineering Education	4
IEEE Transactions on Education	4
BMC Medical Education	4

Table 4 displays the results of the top 10 sources of articles based on the number of publications. 9 articles were traced from the Higher Education Research Development. Other sources such as Assessment Evaluation in Higher Education, Procedia Social and Behavioral Sciences, Teaching in Higher Education were reported to publish more than 5 articles on constructive alignment. Although it was previously reported that publications on constructive alignment were also discussed in areas other than education, it could be seen that many of the publications were related to education area.

Table 5. Total citations and authors

TOTAL CITATIONS	AUTHORS
407	Biggs, J
105	Thistlethwaite, Jill
29	Solomon, Yvette
26	Borrego, Maura; Cutler, Stephanie
25	Edstrom, Kristina
24	Kirkwood, Adrian
19	Furman, GC
17	Robinson, Viviane M. J.; Timperley, Helen S.
16	Haigh, Martin
	Spronken-Smith, Rachel; Walker, Rebecca; Batchelor, Julie; O'Steen, Billy; Angelo, Tom
13	Tom

According to Duque Olivia et al. [11], the number of citations received by an article and the studies cited in article are two most popular bibliometric indicators that are used to determine the quality of the articles. Table 5 depicts the information on the top 10 authors who received the high number of citations for publications on constructive alignment. Biggs was listed as the most prolific author on constructive alignment with 407 citations. This finding is expected as Biggs is the scholar who popularized the concept of constructive alignment [7]. On the other hand, Thistlethwaite who was reported to be cited 105 times is not directly associated to works on constructive alignment but the works of education, specifically in medical field as traced through Google Scholar. Discussions on authors' citation however were limited to only the number of

citations received. H-index that is an indicator of research performance [12], of the authors was not retrieved. Therefore, the finding is not robust enough to ascertain the impact of the publications due to insufficient information on the H-index based from this table.

CONCLUSION

This study presented a bibliometric analysis on constructive alignment researches. Nevertheless, it also provided insights on related researches as per keyword used constructive alignment which then refined to the WOS categories respectively. It can be noted that constructive alignment appears closely to the field of education based on the keyword search. Meanwhile, the countries that hold the most number of publications related to this are Australia and England. As these two are developed countries, it could be predicted that constructive alignment has long been given emphasis as the history of constructive alignment has started back in late 1940s. The bibliometric analysis also gathered sources from as early as 1998 but refined to 2005 to 2017 as the range of publications produced within the range of years provided vivid patterns to be observed. Lastly, it could be seen that the most cited author on constructive alignment was Biggs, (407 citations) based on his works on constructive alignment that is tailored to the needs of curriculum through aligned teaching methods and methods of assessment and interpreting comprehension of knowledge by learners prior to the setting of learning outcomes. This study is limited as it utilized data only from the Web of Science online database as well as it also provided publications in general context of education as parts of constructive alignment.

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