

# Perspectives and Practices on Outcomes-Based Assessment (OBA) among College Mathematics Educators in Northeastern Luzon Philippines

Asia Pacific Journal of  
Multidisciplinary Research  
Vol. 6 No.2, 18-25  
May 2018 Part II  
P-ISSN 2350-7756  
E-ISSN 2350-8442  
www.apjmr.com

<sup>1</sup>Januard D. Dagdag and <sup>2</sup>Roldan S. Cardona

Isabela State University<sup>1</sup>, Philippine Normal University<sup>2</sup>  
januard\_15@yahoo.com<sup>1</sup>, cardona.rs@pnu.edu.ph<sup>2</sup>

Date Received: February 26, 2018; Date Revised: May 15, 2018

**Abstract** – In the light of implementing outcomes-based education (OBE) in the Philippines, this study describes quantitatively and qualitatively how the forty-seven college mathematics educators of twenty-two tertiary education institutions in Isabela, Philippines understand and implement outcomes-based assessment (OBA). Mixed methods of research were utilized through a triangulation of true-false test, essay, interview, and document review to exhaust and draw out their knowledge, attitudes, and experiences toward OBA. Percent, mean, and content analysis were utilized to analyze the data. Findings revealed that more than half of the educators find it difficult to distinguish the features of OBA. Some cannot yet get away with traditional non-OBA practices such as permanently recorded and graded scores and attendance, and utilizing mostly pen-and-paper tests. Identified impediments to their implementation of OBA include their non-OBA-oriented beliefs, attitudes and understanding, and the institutional policies to quantitative markings. Hence, revisiting the theories and principles of OBE and OBA, regular trainings on these topics, and shifting to qualitative assessment using rubrics are essential measures for OBA to work effectively with educators in ascertaining that every student transforms according to the stipulated goals of their respective institutions.

**Keywords** –Outcomes-based Assessment, Outcomes-based Education, Perspectives, Practice

## INTRODUCTION

In this ever-changing landscape, structuring curricular changes is aimed toward on the needs of the times. In the Philippines, the Outcomes-based Education (OBE) is the ultimate thrust of higher education institutions (HEIs) to align the educational standards with global trends [1-2]. OBE means transforming the educational paradigm from being an input-based to one that leans on learning outcomes – real world knowledge and skills students can understand and do as a result of learning [3-5]. By expecting students to successfully perform learning outcomes at the end of instruction, OBE brings great opportunity for schools to produce more successful and competent individuals in relevant context. But this prospect calls the attention of all educators to shift to student-centered approach [6-7] particularly, in assessment, to adopt and employ what is called Outcomes-based Assessment (OBA).

OBA is part of constructive alignment which means focusing clearly the assessment tasks to the intended learning outcomes (ILOs) set before the curricular implementation [8-11]. It is the act of developing and

utilizing appropriate, valid, reliable and fair assessment tools and procedures to measure students' attainment of the ILOs and support their learning progress. OBA plays a critical role in OBE since without it, one cannot tell what and how the students have achieved against what they are intended to learn.

OBA is a comprehensive and consistent approach to classroom assessment [10-11]. Basically, it is criterion-referenced not norm-referenced [3,8-10], thus, compares student's performance solely against the ILOs, not with other students' hence, eliminates competition and discrimination but improves cooperation among student [12]. It gives emphasis therefore on qualitative assessment of final performance rather than on permanently recording and averaging of scores as basis in judging students' academic performance [3,10]. Likewise, OBA is formative and summative, a continuous support for and a measure of student's success in education [4],[13-15]. Similarly, it is authentic [4],[15,16] – performance-based and product-oriented producing tangible evidences of learning which are reliable reflection of competence. With OBA, teachers can easily observe

whether students are successful in education, and are informed and guided on what to do in order to reinforce more students toward meeting the required performance making it a fact that students are more likely to succeed than fail. The most challenging part however, is on how educators would implement it. Teachers in the traditional education are indulged to a large extent with inputs-based practices such as lecturing, using mostly pen-and-paper assessment, assessing students only at the end of instruction [17], and permanently recording and grading of all forms of scores including seat works, assignment and attendance [13]. Hence, educators may certainly encounter difficulties in implementing paradigm shift to outcomes-based assessment. Previous studies underscored that although educators aimed to implement outcomes-based education, they were not able to indicate enough understanding of, and they inappropriately used, the OBE premises and principles [16,17]. Similarly, in one state university in the Philippines, Laguador and Dotong [2] found that college educators have the least extent of understanding on the use of appropriate assessment.

Undeniably, college math educators are challenged the most when it comes to OBA. Perhaps, in a traditional education, particularly in tertiary level, they are the most involved individuals in using chalkboard method and traditional pen and paper test because math as a course seems to be the most abstract and objective compared to other courses. Therefore, they are likely to use quantitative assessment using scores rather than performance-based assessment using rubrics.

Hence, this study investigates if math educators have already shifted from the traditional assessment system to OBA as they are already required by CHED to implement OBE since year 2012 [6]. The study aims to determine the degree to which they can distinguish an outcomes-based approach to assessment, and what they believe to be true about OBA which could reflect the assessment system they are putting into practice. It also establishes the way they view and understand OBA as well as the manner they implement it, to reveal whether they can comply with the standards set by CHED. This study might serve as a monitoring tool of the extent OBA is being implemented by math educators, and needs assessment toward the formulation of a training program that can effectively improve math educators' OBA practices.

According to SEI-DOST and MATHTED [18], mathematics educators cannot effectively put into reality the ideas and concepts they are not a master of.

This assertion is based on the Cognitivist theory that what people think impacts their behavioral responses [19] which implies that educators cannot put into practice educational theories they do not know and understand. On the other hand, theories they know and understand are indicators of what they can probably apply in their instruction. As stated by Ramoroka [17], if educators do not understand OBE, they cannot implement it correctly and effectively. Therefore, in assessment, educators' understanding is also the basic requirement that can enable educators to effectively implement OBA. Hence, the extent of implementation of OBE among HEIs can be traced by assessing the understanding of educators toward OBE since their understanding would clearly reflect the extent they can implement it.

### **OBJECTIVES OF THE STUDY**

The study aims to determine and examine the understanding and practice of mathematics educators on OBA. It intends to quantify the proportion of educators who can at least distinguish OBA; and qualify the in-depth views of the educators regarding the salient features of OBA, to reveal the way they implement OBE through OBA.

### **METHODS**

#### **Research Design**

The study employed descriptive research design through simultaneously gathering and comparing of quantitative data and qualitative data to establish the understanding and practice of educators regarding outcomes-based assessment.

#### **Participants**

The research locale is the Isabela Province, the second largest province in the country, situated in the Northeastern Luzon. All tertiary institutions in Isabela were totally enumerated. However, due to the limitations of the researchers, only twenty-two state and private schools were included. Forty-seven mathematics educators were purposefully selected as participants from these schools. These educators were teaching mathematics courses for at least two years and have at least one-day training on OBE. Most (70%) of them were from Teacher Education Department; 19% were from Engineering Department; while 11% were from Information Technology Department and College of Arts and Sciences. Also, 49% were female educators and 51% were male educators.

## Research Instrument

The developed questionnaire is composed of true or false test and open-ended questions. According to Michelle Schwartz [20], a true or false test requires one to recognize correct statement of fact, or identify beliefs. In the study, this test type intends to determine objectively if educators can recognize and distinguish outcomes-based approach to assessment, and to identify their beliefs regarding such type of assessment. On the other hand, the open-ended questions are aimed at bringing out the in-depth views and attitudes of the educators as regards OBA. This questionnaire was validated by three experts in the field of OBE: a dean of College of Arts and Sciences; a dean for academic and related affairs of an Outcomes-based Teacher Education Curriculum (OBTEC); and a regional CHED Education Supervisor. This validity aimed to evaluate the representativeness of the test items with the objectives of the study [21]. The expected responses or the key to corrections were based on the concepts laid by originators of OBE like Spady [3], Barr and Tagg [22], Biggs and Tang [8]-[9], Malan [4], Killen [16] and the Commission on Higher Education [6,7]. Some items, however, were revised and deleted after the experts' validation. After which, the questionnaire was piloted to selected thirty educators of an institution to further check the validity of the open-ended questions and to establish the reliability of the true-false test. Analysis through SPSS Kuder Richardson revealed that the reliability coefficient of the seventy-five item-instrument is .723. However, this study is only a part of a bigger study thus, only the 10 true-false items intended for OBA were presented and discussed here. On the other hand, the four validated open-ended questions include "What is OBE and OBA and their essence in mathematics education?", "What are learning outcomes and how do they affect teaching-learning and assessment in math?", "What is the difference between outcomes-based approach and traditional approach to math education?", and "What are the OBE premises and principles and how does each operate in math education?".

## Data Collection

During AY 2015-2016, the researchers personally asked permission from campus administrator, president, chairmen, or registrar of each institution. When the request was granted, they explained the purpose of the study to the target participants and asked consent from them for their voluntary participation in the study. Upon approval, the questionnaire was

administered to them. Then, a personal individual interview with a portion of document review was conducted among twenty of the educators. Some questions like "What is outcomes-based assessment" and "How do you describe and practice an outcomes-based assessment" were asked. The researchers facilitated the interview in a manner where participants can freely express their opinions, perceptions, attitudes, and views, and support their claims with documents like syllabus and test questionnaires. In circumstances where verification or additional information is needed, email, social networking site like Facebook or phone calls were utilized.

## Data Analysis

Frequency count and percent were used to determine the quantity of educators who can correctly distinguish outcomes-based assessment for each true-false test item. Correct answers for each item were taken from various sources, particularly from Spady [3], Barr and Tagg [22], CHED Handbook on Typology, OBE and ISA [7] Biggs and Tang [8], [9], Malan [4], and Killen [16]. Mean was utilized to determine the average number of educators in percent who correctly identified outcomes-based assessment. On the other hand, content analysis was used for the qualitative data whose expected responses were taken from Spady [3], CHED [6]-[7], and Biggs and Tang [8]-[9]-[10]. These quantitative and qualitative analyses were compared to see whether they validate each other, to clearly establish how the educators understand outcomes-based assessment.

## RESULTS

It can be gleaned in Table 1 that forty-seven per cent (47%) of the educators correctly indicated the characteristics of an outcomes-based assessment. Three in every four educators indicated that curriculum and assessment should be constructively aligned to the intended learning outcomes. Sixty-four per cent (64%) answered that educators should define first the results they desired and then work backwards to identify the building blocks that learners must achieve to reach the end-outcomes. Also, eighty-seven per cent (87%) responded that educators should treat the curriculum, instruction and assessment as alterable means to make students achieve the end goals of education. These responses reflect their understanding that the curriculum and assessment should perfectly match, and facilitate the students' achievement of, the outcomes.

Educators like R47, R44, R12, R17, R28, and R42 responded ideas similar to this:

*“Learning outcome are the objectives of instruction. It makes instruction designed to attain outcomes. It affects assessment because it measures whether the outcome has been attained or not.”*

learning outcomes. R4, R15, R27, R38, R42, and R47 also said that assessment measures whether or not the outcome has been successfully attained by students, by stating the same thought like this:

*“By observing these outcomes, educators can evaluate whether a student has learned and understood the lesson, or should the educator makes adjustment for the students.”*

Table 1. *Percent of Educators who Correctly Indicated Outcomes-based Assessment*

<i>To make an Outcomes-based Assessment, mathematics educators should . . .</i>	Expected Response	%
1. align primarily the curriculum and assessment to the intended learning outcomes, not to the subject matter/content.	True	74
2. employ a system of norm-referenced evaluation in determining the standing or performance level of a student in a class.	False	15
3. use public assessment so that students know if they are able to achieve the intended learning outcome.	True	21
4. define the desirable end results and work backwards to identify the building blocks that learners must achieve to reach the end-outcomes.	True	64
5. treat curriculum, instruction and assessment as alterable or flexible means to achieve the end goals of education.	True	87
6. change the student record when there is an improved learning and performance that warrants it.	True	36
7. assess student learning only at the end of the learning period.	False	51
8. use student achievement at the end of the learning period as the final result of all student prior learning, not the average of all the results of the students' activities.	True	36
9. test and permanently grade students every step of the way on all segments of the curriculum.	False	15
10. view that assessment of learner learning is separate from teaching and occurs entirely through testing.	False	68
<b>Average</b>		<b>47</b>

This statement tells that they also believe that it would be easier for the teacher to determine whether or not learning took place to students because the outcomes are observable such as products or performance. It follows that the teacher is guided on his/her decisions whether or not to supplement or reinforce learning, to conduct remedial action, or to allow students proceed to a higher level of learning experience.

However, there are educators whose understanding does not jive with this alignment of the assessment to both outcomes and instruction. R26, to mention, stated when asked to give a teaching-learning activity and an assessment of the outcome “students able to illustrate the graph of a quadratic”:

*“The teacher should teach the students about the behavior of the graph of a quadratic function and then let the students graph it. In the assessment, the students identify the different behaviors of graph of quadratic. It could also be done in a multiple choice such that students will choose from among choices the graph of a given quadratic function.”*

While the suggested instruction involves illustrating the graph of quadratic functions, the assessment requires students in identifying and choosing the graph of quadratic functions. To identify and to choose, yet, differ from to illustrate.

This understanding was validated among twenty educators by reviewing their syllabi and test papers. It was revealed that their assessment procedures mostly do not directly measures the ILOs because their major examinations and quizzes are pen-and-paper tests while most of the specified ILOs require performance demonstration.

Another point that violates the principle of constructive alignment is indicated by thirty-two per cent (32%) of the respondents that assessment is separate from teaching and occurs entirely through testing. This understanding links the idea of forty-nine

Although learning outcome and objectives differ, these educators recognize that instruction and assessment are both focused on what students should learn. Biggs and Tang [8]-[9] support this idea that teaching/learning processes and assessment are aligned both with the intended learning outcome. They further illustrate that assessment and teaching/learning activities are also aligned with each other with outcome as the ultimate basis of both structures.

Malan [4] asserts too that the ultimate purpose of assessment is to validate the student’s achievement of

per cent (49%) of the respondents that assessment of student learning in OBE is done only at the end of instruction. As R22 responded:

*“If the teaching-learning process is already done, assessment by using an instrument can now be used to measure the [achievement of] learning outcomes.”*

The respondent assert that assessment will only take place after the teaching learning activities for the purpose of validating the students’ achievement of the outcomes.

In contrary to this view, various literatures support that outcomes-based assessment takes the form of formative and diagnostic which are done during instruction [14] and summative which is done after instruction [4]-[13]. CHED writes that both formative and diagnostic, classified as assessments for learning, occur throughout the teaching-learning process to provide students with feedback for learning progress, while summative assessment is used to make judgment on student’s achievement [7].

Moreover, relative to the final rating given to students, majority (64%) disagrees that students’ record can be changed when an improved learning performance warrants it. Likewise, sixty-four per cent (64%) also disagree that the students’ achievement at the end of learning period is the final result of all the student prior learning, not the average of all the prior learning. On the other hand, Spady [3] writes:

*“Culminating achievement is the ultimate “So what?” of all things students do on a daily basis to develop and improve their learning. It is the highest level performance and the final result of all of their prior learning and practice, not the average of all of that prior learning” (p. 38)*

Spady argues that the basis of students’ overall achievement must be the competence students can demonstrate as they exit the course. He also asserts that the students’ record of performance must be changed as students improved in their performance. He opposes the practice of many HEIs which was reflected through the response of majority (85%) of the respondents that “outcomes-based assessment makes teachers test and permanently grade students every step of the way on all segments of the curriculum”. This orientation is shown in their grading system in which seat works, assignments, behaviors and attendance are all

permanently recorded and served as bases for their grades. This manifests their understanding that the results of any assessment are permanently recorded in a class record, and are determiners of the students’ final grade.

Spady [3] discouraged such assessment system where all assessment results are recorded because, accordingly, students who make prior mistakes can no longer catch up with consistent performers since their mistakes are permanently recorded. That, even they perform competently at present their failures in the past tell that that they are just partially successful. CHED [7] also clarifies that the results of formative tests are recorded but not graded since they are just use to monitor students’ learning progress.

Furthermore, majority (85%) of the educators indicate that OBE employs norm-referenced evaluation in determining students’ class performance. Although, they know that criterion-based assessment is utilized in OBE. As R29 responded:

*“In OBE, teachers use criterion assessment [while] in traditional, teachers use comparative assessment.”*

Some indicated their point why norm-referenced assessment must still be used in OBE. R20 raised that OBE uses both criterion-based and norm-based assessment. Accordingly, “Norm-referenced assessment is still useful in doing research for the purpose of data analysis.” Another educator, R17, said that norm-referenced assessment could serve as a challenge for low performing students to be stimulated by the consistent performers to strive also in their studies and be better achievers:

*“However, it is also necessary that their performances must be compared from one another so that those students belong to the lower ranks will be challenged to those at the topmost ranks for them also to excel in their studies.”*

These educators believe that norm-referenced assessment is still useful in the tertiary education for specific purposes like in research and in reinforcing low-performing students. But then, Spady [3] and Biggs [10] argue that such approach limits the number of successful learners. They assert that such approach uses win or lose comparison although the differences

of students' achievement are just very slight. As Spady [3] opined,

*"Students who finished a particular course with 97 average got a D, those who finished with 98 average got a C, those who finished with a 99 average got a B, and those who got perfect 100 averages got an A" (p. 35).*

They convey that scores or symbols may not reflect the actual performance of the students because the fact that they are categorized, it means that they finish their course with differing level of achievement such as successful, less successful, or more failures which leads to losers and winners, best and worst, or outstanding and poor [3], [10].

## DISCUSSION

After some years of OBE from inception in the Philippines' educational landscape, college teachers specifically the mathematics educators continuously attempt to capture the transformational ideas that may be brought by the new approach. Intertwined with its potential to draw new horizon in our education are the challenges as more than half of the educators are baffled embracing the philosophy of OBE making it difficult to perform paradigm-shift from input-based to outcomes-based approach. Although they are mandated to adopt OBE in practice, their responses reflect evidences that they are still employing non-outcomes-based assessment practices such as making emphasis on pen-and-paper test rather than performance-based assessment, and permanently recording and averaging of results of any assessment like seat works and assignments. This only shows that they cannot yet get away with the traditional assessment system. Perhaps, they believe it is still practical in the modern times. This resistance to adopt curriculum changes, however, is a main concern in the implementation of OBE [23]. Probably, their belief about students' success influence the attitude they bring inside the classroom. If they do not believe and clearly understand that all students can successfully learn in different ways and time intervals [3], there is tendency that they employ approaches that can put students at a disadvantage.

Moreover, it was observed that some math educators are puzzled in constructively aligning the assessment to the ILOs. As a result, some of their assessment procedures are not aligned to the ILOs. This happens mostly when they assess outcomes through objective pen-and-paper test which are supposedly

measured through performance demonstration as how these outcomes are stated in their syllabus. Possibly, this mistake on the validity of assessment is not only due to their difficulty in aligning the assessment to the outcome. Other factors such as the objectivity and ease in scoring to save the limited time of teaching and learning, aligning the type of test to the licensure examination that is also multiple-choice, and the institutional policies to grading, are associated directly with their assessment practices. This shows that educators are fun of quantitative assessment using marks or scores not just because of what they know and believe, but because this practice is embedded in their internal and external policies. Literatures say that this procedure is logistically easy for those who are used to it but sends adverse messages to students by categorizing their capabilities based on their obtained scores with even very small differences [3]-[10]-[16]. The categories are different level of achievement denoting that some students are successful but others are less successful or more failure. According to Spady [3] and Biggs [10], for outcomes-based approach to work, all impediments like policies to grading on the curve and quantitative marking must be removed in the system. This suggests, on the other hand, that in OBE, educators should assess students qualitatively by using rubrics to appropriately describe how well the students are doing against the ILOs [10]-[11]. Thus, although no attempt was made to investigate the schools' policies, the participants' responses and documents (e. g. syllabus) reveal that their institutional policies regarding quantitative marking is a big factor that determines their assessment practices since they are required to comply with it.

With these non-outcomes-based oriented belief and understanding, deep-rooted practices, and institutional policies, the math educators can hardly implement outcomes-based approach. Hence, although they might see themselves now as knowledgeable in OBE [2], their actual context reveals that they need to exert more lots of efforts and utilize more millions of means to adopt a transformational OBE.

## CONCLUSION

Apparently, the mathematics teachers involved in the study hold gray areas of concerns in their perspectives and practices of OBA.

**RECOMMENDATION**

The math educators should revisit the fundamentals of outcomes-based education written by authors on OBE like Spady [3], Killen [16], Malan [4], Biggs and Tang [8]-[9], and CHED [6]-[7]. Tertiary institutions should allocate funds for math educators' development to OBE implementation, invited OBE proponents as speakers to seminars and workshops, and benchmarking to schools abroad adopting a transformational OBE. Educators should undergo trainings on outcomes-based education approaches such as qualitative assessment grading by rubrics or constructive alignment, development of assessment tools and techniques, and rubrics; hence, institutions should remove their policies to quantitative markings gradually so that a genuine outcomes-based approach to assessment could work.

This investigation focused only to forty-seven math educators from twenty-two tertiary institutions in Isabela, Philippines. Only two to three educators were purposively selected as participants per institution hence, findings may not be generalized to every math educator within these institutions as well as to other institutions that are not involved in the study. The selection criterion set is an educator with at least 1 training on OBE. Since most of participants had only 1 training on OBE, thus, influencing their awareness and understanding of OBA. Also, the researchers relied on the mandate of CHED in CMO 46 series of 2012, presuming that HEIs are implementing OBE; but no attempt was made to verify if the institutions already started to comply with this standard. Likewise, only syllabi and test papers were reviewed among selected interviewees per university or college.

Future research should consider a continuous broad-based longitudinal qualitative study to continuously monitor and triangulate the extent of OBA implementation across all specializations, and reveal the root causes of the impediments to the adoption of OBE. After years of adoption, future research should assess the impact of OBE to students' and graduates' performance and the community at large.

**REFERENCES**

- [1] Espiritu, J. & Budhrani, K. (2015). Implementing an outcomes-based education (OBE) framework in the teaching of I/O Psychology. *DLSU Research Congress*. De La Salle University, Manila Philippines. Retrieved from <https://goo.gl/MIJQ1v>
- [2] Laguador, J. M. and Dotong, C. I. (2014). Knowledge versus Practice on the Outcomes-based Education Implementation of the Engineering Faculty Members in LPU. *International Journal of Academic Research in Progressive Education and Development*, 3(1), 63-74.
- [3] Spady, W. (1994). *Outcome-based Education: Critical issues and answers*. Arlington, VA: American Association of School Administrators. Retrieved [September 10, 2015] from <http://files.eric.ed.gov/fulltext/ED380910.pdf>
- [4] Malan, B. (2000). The New Paradigm of Outcomes-based Education in Perspectives. *Tydskrif vir Verbruikerwetenskappe*, 28, 22-28. Retrieved [September 10, 2015] from <https://goo.gl/w7TeJz>
- [5] Butler, M.B. (2004). *Outcomes based/focused education overview*: Prepared for the Education Department of Western Australia
- [6] CHED Memorandum Order (CMO) No. 46, Series of 2012.
- [7] Commission on Higher Education (2014). *Handbook on Typology, Outcomes-based Education, and Institutional Sustainable Assessment*. Retrieved from <https://goo.gl/R7ufGw>
- [8] Biggs, J. & Tang, C. (2009). *Applying constructive alignment to outcomes-based teaching and learning*.
- [9] Biggs, J. & Tang, C. (2007). *Teaching for quality learning at university (3rd edn)*. Society for Research into Higher Education. McGraw-Hill.
- [10] Biggs, J. (May, 2009). Enhancing learning through constructive alignment. Open University. Retrieved from <https://goo.gl/ifByYf>
- [11] Biggs, J. (n. d.). Constructive alignment in university teaching. *HERDSA Review of Higher Education*, 1, 5-22. Retrieved from <https://goo.gl/hBs4ma>
- [12] Byrne, M., and Flood, B. (2003). Assessing the Teaching Quality of Accounting Programmes: An evaluation of the Course Experience Questionnaire. *Assessment & Evaluation in Higher Education* 28(2), 135-145.
- [13] Crespo, R. M., Najjar, J., Derntl, M., Leony, D., Neumann, S., Oberhuemer, P., Totschnig, M., Simon, B., Gutierrez, I., & Delgado Kloos, C. (2010). Aligning Assessment with Learning Outcomes in Outcomes-based Education. *IEEE Education Engineering*, 1239-1246. Retrieved from <https://goo.gl/SSA884>
- [14] Powers, J. H. (2008). Converting Class Syllabi to Outcomes-based Teaching and Learning Format. Communication Studies Department, Hong Kong Baptist University. Retrieved from <https://goo.gl/MKJT9Q>
- [15] Rhodes University (2012). *A brief guide to Outcomes-based Assessment*. Centre for Higher Education Research, Teaching and Learning.
- [16] Killen, R. (2000). *Outcomes-based education: Principles and possibilities*. Unpublished manuscript, University of Newcastle, Faculty of Education. Retrieved [September 10, 2015] from <https://goo.gl/gBoLKV>

- [17] Ramoroka, N. J. (2007). Educators' understanding of the premises underpinning outcomes-based education and its impact in their classroom practices. *University of Pretoria*. Retrieved from <https://goo.gl/qHzQzQ>
- [18] SEI-DOST & MATHTED, (2011). Framework for Philippine mathematics teacher education. Manila: SEI-DOST & MATHTED
- [19] Wijayanti, D. N. (2013). Cognitivism theory of language teaching and learning. Mydreamarea. Retrieved from <https://goo.gl/FV9S5s>
- [20] Michelle Schwartz, Research Associate, for the Learning & Teaching Office. Retrieved from <https://goo.gl/w17QiZ>
- [21] Calmorin, L.P. (2004). *Measurement and evaluation*. National Book Store. Manila, Philippines.
- [22] Barr, R. B. & Tagg, J. (1995). *From teaching to learning: A new paradigm for undergraduate education*. Retrieved from <https://goo.gl/kOCHK>
- [23] Onsman, A. (2015). Constructively aligning the curriculum of a 'New Generation' Bachelor of Environments degree from a social realism perspective. *Cogent Education*, 2, 1-12. <https://goo.gl/xu8qAQ>

#### **COPYRIGHTS**

Copyright of this article is retained by the author/s, with first publication rights granted to APJMR. This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4>).