Leveraging Elements of Process Education to Extend Biggs' Model of Constructive Alignment for Increasing Learner Achievement

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Abstract

During the academic year 2014-15, a pilot study was conducted to compare the student achievement in a traditional versus a collaborative learning environment in two sections of the same course at a Historically Black College and University (HBCU). The finding, a deviation from the conventional evidence, indicated the traditional group's academic achievement to be slightly higher than the collaborative group's. The conclusion prompted considerable reflection about what teaching and learning components may have impacted student achievement of the intended learning outcomes in the collaborative environment. As a result, we propose a process-based theoretical model extending on Biggs' model of constructive alignment to incorporate essential Process Education's (PE) principles and practices. The new process model incorporates four pillars of PE supporting student growth, where the concept of student growth involves the process of learning to learn in addition to the achievement of student learning outcomes. The four pillars are: (1) Creating a Quality Learning Environment (2) Instructional Design (3) Facilitation, and (4) Assessment. Further, we suggest this new model is particularly relevant for educators having culturally diverse learners.

Introduction

Biggs' (1996) model of constructive alignment consisting of three cornerstones, intended student learning outcomes, teaching and learning activities designed to elicit these outcomes, and targeted methods for assessment of how well students achieve these outcomes, is a well-known tool used to guide outcomes-based curriculum design (Jennings, Surgenor, & McMahon, 2015). Implementing Biggs' model can be very helpful in fostering the current shift from teaching-centric instruction towards learning-centric instruction (Barr & Tagg, 1995; Tagg, 2003), or as represented by the 14 aspects of the Transformation of Education underlying much of Process Education (Hintze-Yates, Beyerlein, Apple, & Holmes, 2011). The dynamics of how to generate optimal student performance, however, are not addressed completely by the constructive alignment model. Even when employed with the best of intentions, constructive alignment does not directly address the human dimension of how well students will be able to achieve the intended student learning outcomes, given their learning context, nor how the instructor might be able to adapt to the dynamics of the situation. Miller and Bester (2008) recognized this issue and chose to analyze constructive alignment in the context of Fink's (2003) taxonomy of significant learning. They chose not to adapt the model of constructive alignment, but rather to adapt Fink's model. Here, we propose a **constructive alignment process model**, extending the constructive alignment model to incorporate elements of Process Education which may more directly include consideration of the learning context and learning dynamics during instruction.

In the remainder of this paper, we first provide a brief background introducing an instructional intervention which fit the constructive alignment model but did not result in improved student learning. We then share elements of a deep reflection by the instructor, in consultation with several experts in Process Education, about why the intervention did not improve student learning in this instance. Finally, we introduce the constructive alignment process model emerging from this reflection, breaking down each component of the model.

Background — An Unsuccessful Instructional Intervention

As a pilot for a planned longitudinal comparative research project, we conducted a study comparing student achievement in a traditional education setting with lecture and individual learning versus a setting using an instructional intervention consisting of a series of collaborative learning activities conducted in fixed groups as detailed in Jain & Utschig (2015). In the study, we explored the question: "Does collaborative learning result in students achieving higher academic performance?"

First, we describe the intervention in terms of the three components of constructive alignment: (1) student learning outcomes, (2) teaching and learning tasks, and (3) as-

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sessment. The student learning outcome that was to be addressed is the student's ability to apply knowledge of political science so as to propose solutions for contemporary issues in local and state government. The instructional intervention for the experimental group involved the use of in-class collaboration to solve a problem as the learning task. The participants were divided into seven fixed groups with five students in each group. On a rotational basis, each member of the group was assigned the role of captain, planner, note-taker, spokesperson, or timekeeper. All seven groups were given a single problem to solve. The control group's learning method involved traditional individual activities addressing the same problems tackled by the experimental groups, but no group activities were performed by the control group. In this study, the summative measure used for assessment of student performance was a set of identical exams addressing course content. Formative methods of assessment consisted of collecting summary information from students or groups documenting their work addressing the problem to be solved.

The population of 130 students for this study comprised of undergraduate students in four sections of a State and Local Governments course at a Historically Black College/University (HBCU) taught over a period of two semesters. Statistical findings using a two-tailed t-test did not show a statistically significant difference in the average exam scores of the control and experimental groups. Further, descriptive statistics showed a slightly higher mean score for the control group as compared to the experimental group. These results are inconsistent with a number of meta-analyses and research reviews, such as Kalaian & Kasim (2014) in statistics, Prince (2004) in engineering, Means et al. for online courses (2010), and Kyndt et al. (2013).

Reflection — Factors Impacting the Success of the Intervention

The researchers' post-study reflection to examine and reconsider the research study design consisted of three levels. The first level was recognizing several constraints impacting student performance. The second level addressed what student performance was actually desired (i.e., what is really meant by *achievement of the student learning outcomes*). The third level of reflection addressed what factors underlying the design of the learning process itself might impact student achievement.

In the first level of reflection, several constraints and observations surfaced which may have impacted group performance and ultimately student achievement, as measured by performance on exams, in the course. Some of these include:

- Participant absenteeism
- Student reluctance to contribute to group discussions
- Expectation of additional reward for participation
- Personality conflicts within participant groups
- The "hitchhiker" problem (unprepared students taking advantage of those in the group who come prepared and complete a project)
- Participants' propensity to avoid perceived judgmental evaluation of peers

Thus, results for academic achievement in the experimental group, in light of these constraints and observations, merit reconsideration within the context of the teaching and learning environment created during the study.

Reflection on Student Learning Outcomes and Learning to Learn

The second level of reflection addressed student achievement of the learning outcomes. In short, the instructor's reflection clarified her position that true achievement of the learning outcomes involves students growing as learners, and not simply acquiring content knowledge or skills. In other words, the learning process should transform the students. This insight prompted a critical reflection on the learning process itself.

Psychologists and pedagogical theorists (Bruner, 1961; Dewey, 1915; Piaget, 1950; Vygotsky, 1978) have consistently articulated that as a contextualized action, learning is an active process of **constructing** rather than simply **acquiring** knowledge. Further advancing the theory, contemporary researchers (Apple, Morgan, & Hintze, 2013; Bruffee 2009; Cuseo, 1992 and 2002) find importance in the opportunity to engage with others when facilitating knowledge construction and in supporting development of writing, critical thinking, and revision skills, all of which help foster self-growth and learning. Adapting Richard Mayer's (2002) description of learning, Ambrose et al. (2010) define learning as "a process that leads to change, which occurs as a result of experience and increases the potential for improved performance and future learning" (p. 3). Thus, learning is not an end product but a continuous process that can be measured over time.

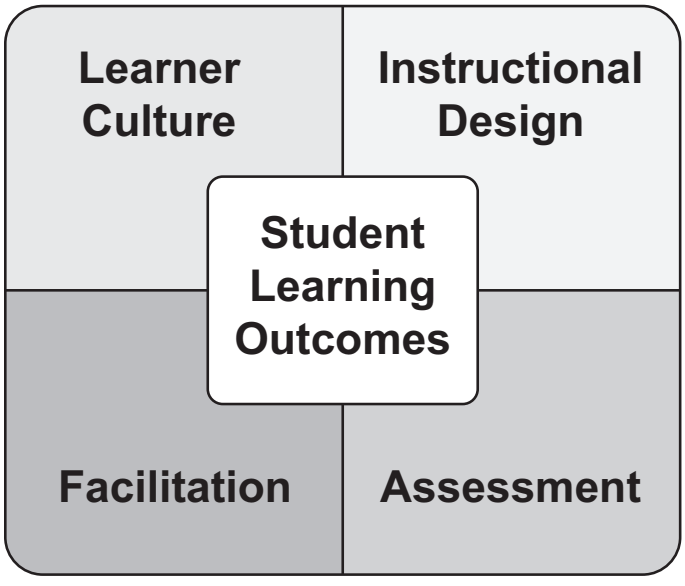
Contemporary theorists advocate engaging transformational instructional methods as a means to maximize learner success. Slavich and Zimbardo (2012) suggest using transformational pedagogy in "creating dynamic relationships between teachers, students, and a shared body of knowledge to promote student learning and personal growth" (p. 569). They define transformative pedagogy as "the expressed or unexpressed goal to

increase students' mastery of key course concepts while transforming their learning-related attitudes, values, beliefs, and skills" (p. 576). In conformance with Sternberg's (2008) idea of *learners without expiration date*, Leverett and Rosebrough (2011) advocate education to be more than inspiration and information and suggest pedagogy incorporating transformation of students in mind, body, and spirit. Others perceive metacognition as an essential condition toward the process of learning (Ambrose, 2010; Apple, Morgan, & Hintze, 2013). The practice, when applied as *Learning to Learn* (L2L), helps streamline the "nature vs. nurture" argument and advocates everyone having the potential to grow one's intelligence (Dweck, 2006; Kuszewski, 2011; Sternberg, 2008). L2L also distinguishes two key principles: as a process, one first needs to understand how one learns, and second, this practice requires reflection and assessment.

Reflection on Four Processes Underlying Student Growth

The third and final level of reflection by the instructor addressed underlying processes supporting student ability to achieve the learning outcomes. This process of in-depth deliberation revealed four transformational facets of teaching and learning that may have affected the pilot study results: (1) learner culture, (2) instructional design, (3) facilitation, and (4) assessment. Process Education scholarship addresses each of these pedagogical considerations, and while the facet of learner culture may be more implicit, entire sections (multiple modules) of the *Faculty Guidebook* (2007) are devoted to transforming practice with respect to the others. These four considerations, as depicted in Figure 1, underlie student success in achieving learning outcomes.

Figure 1 Pedagogical Considerations



Learner Culture

In the pilot study, it appeared that the prevailing learning culture among students did not naturally align well with collaborative group work, as indicated in the constraints identified in the initial reflection. *Learner culture*, a term consistently and increasingly manifested within the modern pedagogy, is a holistic incorporation of the values, beliefs, and social conventions of the learners to increase knowledge, competence, and performance. It is grounded in the theory of human communication. Learner culture is also affected by learner diversity, which encompasses an extensive array of complex, interrelated dimensions to consider. The dimension of diversity can include race, culture, national origin, age, gender, religious beliefs, physical capability, socio-economic background, level of academic learning, emotional maturity, the desire for self-growth, academic preparedness, preferred learning styles, and preferred modality for learning including face-to-face, online and hybrid.

Mentoring is one way to address learner culture. The contemporary literature offers numerous studies that focus on the impact of cultural connectivity and learning through mentoring. In their study on the benefits and outcomes associated with having a mentor role model, Erkut and Mokros (1984) used a questionnaire among sophomores and seniors involving five coeducational and one women's liberal arts college. They found that most of the mentoring role models tended to confine their role to academic and scholarly interests with little influence on lifestyle, outside interests, careers, jobs, and so forth. Townsend (2006), however, found that social involvement (including interaction with professors) for many first-year African American students provides experience that helps them be successful. It may be that a transition in their learning approach during the freshman year to manage or modify some aspects of their cultural orientation helps them persist within the university's culture. Additionally, Campbell and Campbell's (2007) empirical study of 339 matched pairs of mentored and non-mentored students concluded no apparent advantage associated based on gender, but that students matched with mentors of the same ethnicity showed a higher cumulative GPA, higher graduation rate, and higher rate of entrance to graduate study. These conditions of mentoring activity and a same ethnicity role model were absent in the pilot study.

In addressing cultural dimensions of learning for online environments, Parrish and Linder-Vanberschot (2010) proposed a three-part Cultural Dimensions of Learning Framework (CDLF): culture, personality, and human nature. From these dimensions, they draw a set of eight cultural parameters regarding social relationships,

epistemological beliefs, and temporal perceptions (p. 2). They conclude that at a minimum, awareness of CDLF provides a rich set of tools for both educators and learners. In a recent study analyzing a pilot program on ethnic studies classes at three San Francisco high schools involving 1400 students, Stanford researchers Dee and Penner (2016) found "culturally relevant" teaching to be an important part of the education for at-risk students; those most likely to flunk or drop out. Their research indicated a strong improvement in students' academic performance if they participated in a course offered on race and ethnicity. Though a specific course is not a part of the pilot project, introducing the CDLF to students in future iterations of the course is a possibility.

In the context of Process Education, Apple, Morgan and Hintze (2013) distinguish Learning to Learn (L2L) as the basis of performance. Expanding the concept, Apple and Ellis (2015) identify five different components that shape a learner's performance (p. 21):

1. Identity
2. Knowledge
3. Learning skills
4. Context (of performance)
5. Personal factors

Of these, we propose that learner culture is related to identity, context, and personal factors. The goal of L2L is to facilitate self-growth by strengthening identity, learning skills, knowledge, and ability to address life's challenges to increase a student's level of performance in new and more difficult situations. As the foundation for self-growth, L2L offers a continuous, life-long process strengthened by ten critical attributes (Jain, Apple, & Ellis, 2015):

1. Having a growth mindset
2. Planning
3. Having a life vision
4. Setting one's performance criteria
5. Self-assessment
6. Reflection
7. Self-challenge
8. Grit
9. Passion
10. Mentoring

As inherent or learned traits, the ten self-growth attributes could help mitigate aspects of learning culture that might otherwise adversely affect performance. This result is especially true if they are explicitly addressed from the outset as an integral component of the course. A focus on learning to learn allows an individual to understand, analyze, and contextualize one's own behaviors and constraints, as well as optimize their learning environment toward self-growth. Therefore, in the context of designing a course or activity, the instructor's task is to leverage these elements of L2L to help students uncover the salient aspects of the given content domain and achieve the associated student learning outcomes within a finite duration; within each class session as well as the semester. Organizing the content across learning tasks while remaining sensitive to learner culture is critical for students' academic success.

A proposed improvement for the next iteration of the course incorporates implementation of a survey questionnaire to be administered during the first week of the semester for assessment and better understanding of the student culture. Although challenging, the aim is to determine learners' existing academic preparedness, level of comprehension, and academic preparation, academic endurance, and continuity (i.e., whether a first-time college student), as well as level of self-growth in order to develop a customized facilitation plan.

Instructional Design

As described earlier, Biggs' model for instructional design has three components: student learning outcomes, teaching and learning tasks designed to achieve the intended outcomes, and assessment of learning. How do we adapt this model to address the concept of learning to learn? Approaching instructional design from multiple perspectives, Merrill et al. (2010) describe it as "instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing…(it) is the technology of creating, learning experiences and learning environments which promote these instructional activities" (p. 6). Other researchers distinguish levels of learner knowledge to be hierarchical (Apple, Morgan, & Hintze, 2013; Gagne, 1985; Gagne, Briggs, & Wagner, 1992). Advocating levels of learning as the basis for the sequencing of instruction, Gagne (1985) suggests specific conditions for learning as the basis for designing instruction and that learning tasks for intellectual skills can be organized in a hierarchy according to complexity. Gagne classifies this hierarchy as stimulus recognition, response generation, procedure following, use of terminology, discriminations, concept formation, rule application, and problem solving. The Process Education model of instructional design (Davis, 2007) includes three nested levels that are hierarchical in scope: program, course, and activity design. Nine principles of instructional design underlie each of these three levels. Three of the nine principles for instructional design in Process

Education that are particularly relevant to our discussion are: outcomes-centeredness, flexibility, and the use of a specific design methodology. Being outcomes-centered is fully consistent with Biggs' model, but flexibility to address ongoing issues through facilitation adds to this model. In addition, the methodologies employed for instructional design in Process Education all utilize steps identifying *learning* skills, which adds to focus on acquiring domain-based content and skills underlying the outcomes in Biggs' model. Explicitly practicing specific learning skills in order to achieve the learning outcomes addressed by the group learning activities may be one way to enhance learner achievement and growth in the context of this study.

Bloom's (1956) original taxonomy of learning skills, and the revised version (Anderson et al., 2001) distinguish three learning-skill domains: cognitive, affective, and psychomotor. These models continue to serve as the basis of modern instructional design. However, Bloom's classification overlooks a critical facet that helps address learner culture -- the social domain. Bandura (1977) begins to fill this void with his articulation of social-learning theory. However, the application of Bandura's work tended to focus on understanding the relationship between cognition and behavior from a social perspective rather than on improving the learning process itself. Apple, Morgan, and Hintze (2013) combine all four domains within the context of a Process Education perspective, which takes into consideration that the purpose of education is the development of skills that are transferable across contexts (including cultural) empowering individuals to continuously improve their learning process (and their mastery of the subject matter during that process).

Understanding these four learning skill domains within the context of instructional design for courses and learning activities helps create a holistic foundation for educational enrichment and suggests the need to incorporate assessment tools within the design to help facilitate a learner's growth and development. In this vein, the instructor will consider facilitating individual and team assessment processes as prescribed in the *Student Success Toolbox* (Pacific Crest, 2013). Students will also be provided with both team and individual performance assessment instruments with a clear explanation of instructions and including an exemplar for students to use as a model. This process should help avoid subjectivity and reluctance to participate, and will provide the instructor with tools from which one constructively intervene to elevate performance.

Facilitation

Facilitation refers to learner stimulus through various engagement techniques to enhance the learning process. Apple, Morgan, & Hintze (2013) refer to it as the process of faculty letting students do the learning and support the learner developing key supporting learning-processes utilizing skills such as information processing, reading, writing, team learning, research, problem solving, communication and utilization of technology. Traditionally, a course syllabus incorporates the overall facilitation approach to help make the learner aware of how the instructor intends to organize the learning activities, to minimize learner stress, and to prevent future conflict if the learner expectations about how they will learn are different than the actual learning experience. In the pilot study, a description of the group learning facilitation process was not included on the syllabus. Only the group project's relationship to the schedule and grading was included.

Smith (2007b) advises that facilitation is an effective tool that is equally useful to learners, educators, researchers, and professional organizations. He considers facilitation as "a mindset of helping others perform better by creating growth opportunities and by providing coaching that allows others to take on ownership and control of their performance" (p. 343). Smith suggests six behaviors for a facilitator as depicted in Figure 2: preparing, assessing audience needs, setup, facilitating experience, closure and follow-up. Smith (2007c) also describes 13 principles of a quality facilitator (p. 343). He advocates facilitation as a 12-step process that begins with outlining key measurable outcomes and progresses to planning of follow-up activities (p. 351). A common element among these facilitator behaviors, facilitation principles, and the

Figure 2 Smith's Facilitation Methodology

facilitation methodology is the idea that one must conduct assessment of the learning process, in addition to learning outcomes, so that the facilitator can be flexible and intervene appropriately. This aspect of monitoring and adapting the learning process itself in real-time is often missing or must be inferred in traditional instructional design approaches. Another Process Education scholar, Minderhout (2007, p. 359), emphasizes facilitation plans as the means to asses a facilitator's own performance after each activity. In the pilot study, the instructor recognized that students had significant needs regarding how to learn in small groups, but was not able to adapt sufficiently to this need due to prior constraints in the course schedule and ongoing nature of the research experiment.

As an established facilitation method, small group learning was the intervention applied for the pilot research study addressed in this paper. This approach is a widely-practiced strategy at all levels of instruction. However, among its two key variations, cooperative and collaborative, there are marked differences.

Collaborative learning refers to the "mutual engagement of participants in a coordinated effort to solve a problem together" (Lai, 2011, p. 2). Roschelle and Teasley (1995) define *collaboration* as "a coordinated, synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem" (p. 70). Collaboration involves participants working together on the same task rather than parallel or separate portions of the task, as is the case with cooperative learning. Proponents of collaborative learning advocate active exchange of ideas within small groups to increase interest among the participants to promote critical thinking (Lai, 2011). Collaborative pedagogy theorists Bruffee (2009) and Trimbur (2009) go so far as to assert that the traditional concept of *individual learning* may be counterproductive to learners' critical thinking and writing, two essential components of academic achievement. Others caution about its complex learner dynamics, i.e., group composition and task characteristics, all of which play a critical role (Jain & Utschig, 2015). Further, in collaboration, one must consider the design of opportunities for quality interaction, especially the degree of interactivity and negotiability, which can be challenging (Dillenbourg, 1999). Since collaboration by nature tends to conceal individual contributions in the final product, assessment can become difficult with respect to distinguishing superior and low achievers, a constraint that was observed during our pilot research study.

By design, a cooperative structure supports group members' positive interdependent behavior because it rewards the quality or quantity of the group product according to a fixed set of performance standards. Sherman's (1991) perspectives on cooperative pedagogical strategies offer a noteworthy alternative for overcoming the constraints of collaborative activities. He identifies three structural goals of a cooperative activity: cooperative, individually competitive, and individualistic. In an individualistic goal structure, students are given individual goals using a criterion-referenced evaluation system and assigned individual rewards. For a cooperative activity to be effective, Johnson and Johnson (1994) identify the following five key elements of cooperative learning: (1) Clearly perceived positive interdependence; (2) Considerable promotive (face-to-face) interaction; (3) Clearly perceived individual accountability and personal responsibility to achieve the group's goals; (4) Frequent use of the relevant interpersonal and small-group skills; and (5) Frequent and regular group processing of current functioning to improve the group's future effectiveness. Incorporating these cooperative learning concepts into the design and facilitation of small-group activities in future versions of the course may improve student learning outcomes. As evidenced by several studies (Augustine et al., 1989 &1990; Johnson & Johnson, 1994; Slavin, 1990), cooperative learning methods prove to be a more effective technique as it fosters individual accountability, and thus, individual participation. The combined individual responsibility and accountability aspect of a cooperative learning approach is expected to help mitigate absenteeism and hitch-hiker problems.

Assessment

The Process Education philosophy (Apple, Morgan, & Hintze, 2013) describes assessment as a mindset and set of practices that incorporate the **S**trength, **I**mprovement and **I**nsight (SII) model for feedback on performance with focus on improving one's own or others' next or future performance. In contrast to evaluation which produces a summative judgment, the purpose of the SII assessment tool is to emphasize continual improvement in performance. Apple and Baehr (2007) advocate four basic steps in applying the model SII as an assessment tool:

1. Assessor's development of clear guidelines/criteria describing the qualities of a performance or product;
2. Agreement upon the criteria to be used for the assessment by both the assessor and the assessee;
3. Collection of data for evidence-based analysis within the SII structure; and
4. Reporting of the assessment to the assessee.

The SII-based assessment facilitates transformation from teacher-centered paradigms to learner-centered paradigms.

The SII approach is consistent with Astin's (1996) recommendation that the purpose of assessment must focus on improvement based on certain criteria, whether for a performance or product. Further, space to generate mutual understanding and agreement between an assessor and assessee must be incorporated into the instructional design process and facilitation plans if one is to meet the second condition suggested by Apple and Baehr. Finally, analyzing and reporting the assessment must involve careful consideration of the evidence in light of the assessee's current range of abilities, with improvement along the scale set by the assessor as the intended outcome.

In the pilot study, agreement on assessment criteria was only sought once challenges within the intervention activity were identified. Agreement might be sought at the outset in future iterations of the course, and assessment of the learning process itself might be included, as this could take pressure off of the eventual evaluation of the work produced by focusing on how students can be successful. Consistent adherence to the assessment methodology at each group activity will be practiced for teacher and learner performance alike. Such practice should help prevent group participants from being perceived as judgmental of peer performance. At least one assessment practice session among the experimental group will be conducted prior to the implementation of the intervention and reiterated repeatedly through sharing of a completed assessment sheet to ensure accuracy and completeness.

Putting it together — creating the "constructive alignment process model"

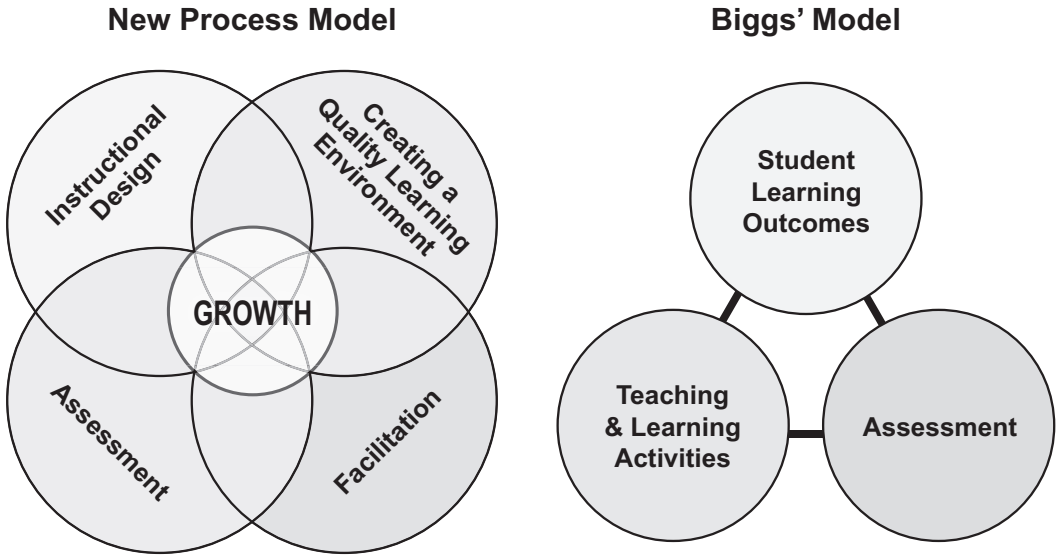
Utilizing the results of the instructor's reflection, we can extend Biggs' model for constructive alignment. We begin by explaining how the elements of constructive alignment in Biggs' model are related to the results of the five areas of instructor's reflection. This comparison is depicted in Table 1 and Figure 3, as well as our proposed Constructive Alignment Process Model.

Table 1 Components of Constructive Alignment

Instructor Reflection	Biggs	New Process Model
Student learning outcomes including learning to learn	Student learning outcomes	Growth*
Instructional design	Teaching and learning tasks	Instructional design**
Learner culture	(missing or implied)	Creating a quality learning environment
Facilitation	(missing or implied)	Facilitation
Assessment	Assessment	Assessment

* **Growth** encompasses both learner performance (learning to learn) and achievement of learning outcomes
** **Instructional design** incorporates program, course, and activity design

Figure 3 Process Model of Constructive Alignment Compared with Biggs' Original Model



Student Learning Outcomes — The instructor viewed student learning-outcomes to include elements of learning to learn, which is a performance-based process. While learning to learn is not excluded in Biggs' model, outcomes in Biggs' model tend to fall into the more traditional, product-oriented categories of knowledge, skills (within a discipline), and attitudes. The growth-oriented philosophy of Process Education allows us to combine learning to learn with the traditional student learning outcome categories. The resulting overarching "growth" process then encompasses both learning performance and achievement of student learning outcomes.

Instructional Design — The instructor reflected on instructional design in light of the goal of helping students learn to learn. Instructional design for learning to learn requires a holistic approach addressing specific learning skills across the cognitive, social, affective, and psychomotor domains in addition to addressing intended disciplinary-based student learning outcomes. This adds a dimension to instructional design that transforms the somewhat distinct and separate "teaching" and "learning" tasks described by Biggs into a single facilitated learning process. Therefore, we replace Biggs' more product-oriented terminology with the more process-oriented term, *instructional design*.

Learner Culture — The instructor found that several components of the prevailing learning culture presented obstacles to the success of the attempted collaborative small group instructional intervention. This concept of a learner culture is not directly addressed in Bigg's model of constructive alignment. However, addressing learning culture is embedded in the process of creating a quality learning environment in Process Education. This process of creating a quality learning environment should be evident in the teaching and learning tasks of Bigg's model, but can be missed if not explicitly addressed. The methodology for creating a quality learning environment is described by Apple and Smith (2007), and includes processes for establishing initial respect without prejudging (Smith, 2007a), and getting student buy-in (Burke, 2007). Thus, we have broadened the concept of a *learner culture* with the more general process of creating a quality learning environment and added it to the new process model.

Facilitation — The instructor reflected on the dynamic nature of a facilitator transferring ownership of the learning to the students, being flexible, and constantly monitoring the learning process in addition to how well students might be achieving the intended student learning outcomes. The concept of a dynamic and flexible facilitation process based on real-time assessment of student performance as learners is, again, not directly addressed in Bigg's model of constructive alignment, though it might be inferred to be present as part of the teaching and learning activities. We feel that without explicit reference, the critical process of facilitation can be overlooked in favor of mindlessly applying pre-designed teaching and learning tasks. Thus, we have added *facilitation* to the new process model of constructive alignment.

Assessment — The instructor distinguished between the terms *assessment* and *evaluation*, which are often referred to as formative and summative feedback. We retain the term *assessment* but interpret the word here to include the process of delivering ongoing feedback to improve student performance (in other words, facilitating student growth), in addition to evaluating the level at which students are achieving student learning outcomes. Thus, the assessment process is integral to facilitation and to creating a quality learning environment.

Together, the four pillars of instructional design, creating a quality learning environment, facilitation, and assessment work together to support student growth in their performance as learners and in achieving intended student learning outcomes.

Conclusion

The purpose of this paper was to propose a new, expanded process model for constructive alignment. This model was developed based upon reflection on challenges encountered during a pilot research study involving the impact of collaborative learning on students' academic performance. In that study, student performance in the experimental group did not improve despite apparent consistency with Biggs' constructive alignment model for outcomes-based education. The new process model for constructive alignment replaces *student learning outcomes* with the **process** of student *growth*; replaces *teaching and learning activities* with the **process** of *instructional design*, reinterprets *assessment* to also include the **process** of *ongoing assessment of the learning process itself*, and adds the two **processes** of *creating a quality learning environment* and *facilitation* which explicitly address the dynamic, social nature of learning. Future work might include a comparison of the proposed process model for constructive alignment to other models for instructional design such as the ADDIE, Dick and Carey, Gagne's Nine Events, Kirkpatrick's Levels of Evaluation, and Merrill's First Principles Models (see Alsogoff, 2016, for a graphical depiction of several of these models).

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