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A Diagnostic Model of Learning: Three Case Studies

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A Diagnostic Model of Learning: Three Case Studies

ABSTRACT: This paper proposes a Diagnostic Model of Learning based on open systems theory, conceptualising learning processes as the complex interplay of variables such that a change in any one of these requires a change in the rest of the system in order for effective learning to occur. The paper illustrates the utility of the model with three case studies drawn from management education subjects in universities in Australia, New Zealand and Dubai.

Keywords: adult learning; business education; management training / education / development

This paper proposes a Diagnostic Model of Learning to manage the variables that impact learning effectiveness. Our Diagnostic Model proposes that formal learning, whether at university or in the workplace, can be conceptualised as an open system (Blanchard, Thacker, & Pichai, 2013) in which inputs are transformed through teaching and learning processes to produce learning outcomes, the process being modified by feedback from internal and external environments. A basic premise of systems theory is that ‘the intricate relationship of parts cannot be treated out of the context of the whole’ (Ritzer, 2008: 327). Thus, a change in one element of a learning system has effects, whether intended or not, on other parts of the system. The Diagnostic Model provides a holistic framework for understanding the inter-connectedness between the major variables in a learning system. Its diagnostic functions provide problem-solving mechanisms when any of the elements in the system change. The paper demonstrates, through three case studies, how a change in one part of a learning system requires realignment of the other parts of the system. The evidence provided in the three case studies demonstrates that understanding the relationships between the key learning components contributes to constructive alignment in learning design, more student-centric learning processes, and more effective learning outcomes (Biggs & Tang, 2011).

METHODOLOGY

The paper provides a synthesis of open system theory (Kast & Rosenzweig, 1974), constructive alignment theory (Biggs & Tang, 2011), and Mezirow’s hierarchy of learning outcomes (Mezirow, 2009). Three case studies are then cited using the Diagnostic Model to improve learning in

management subjects at three locations – in New Zealand, Australia and Dubai. The three case studies were analysed for evidence of achievement of learning outcomes through student formative assessment tasks and final marks, student evaluations, and unsolicited student feedback. The structure of claim, example, and evidence scaffolds the case study analysis.

THE DIAGNOSTIC MODEL: ESSENTIAL LEARNING ELEMENTS

As conceptualised in Figure 1 below, an open system of learning can be described as a system comprising four main elements (inputs, processes, outputs and feedback) inter-related such that a change in any one of these elements necessitates a change in the other three. The Diagnostic Model of Learning suggests that effective teaching methods are flexible in response to changes in any of the key variables in the learning system. Thus, this Diagnostic Model provides a mental schema to inform design decisions *before* a teaching situation begins; but it also provides a conceptual framework to inform adjustments to learning processes *in situ* as a learning episode unfolds. Unforeseen changes in input elements, for example, call for impromptu changes in teaching activities if the learning episode is to achieve desired learning outcomes for the student.

[Insert Figure 1 about here]

Learning outcomes

We start our description of the Diagnostic Model with a consideration of learning outcomes, which are defined by the Australian Qualifications Framework as ‘the set of knowledge, skills, and the application of the knowledge and skills a person has acquired and is able to demonstrate as a result of learning’ (*Australian qualifications framework*, 2013: 11). Clarifying intended learning outcomes is an vital cognitive process in deciding how to teach and how to assess. The alignment of such learning outcomes with teaching and learning strategies, and with assessment tasks, is critical to effective education (Kandlbinder, 2011).

Mezirow (1994, 2009), in his transformative learning theory, suggests a hierarchy of learning outcomes; different learning activities can be designed to engage students at different levels of this hierarchy of learning, represented schematically in Figure 2 below. For example, *instrumental*

learning, Mezirow's first level of learning (knowledge, skills and abilities), suggests practical activities to develop and make permanent certain skills. The second level, *communicative learning*, suggests discussions and other discursive activities designed to understand what is meant by others (Mezirow, 2009). The third level, *emancipatory learning*, refers to individuals transforming their basic frames of reference. Such transformation, which typically requires the learner being confronted with a disorienting dilemma, would rarely be accomplished by the lecture method. Writing about this deeper level of learning, Biggs (2003: 13, emphasis in original) observes that '[higher] education is about *conceptual change*, not just the acquisition of information'. Different levels of desired learning outcomes thus require learning activities that differ in content, process and duration. Systems theory enables a holistic view of both learning design in general and a specific learning episode, in aligning teaching practices, learning activities and assessment tasks with intended learning outcomes.

[Insert Figure 2 about here]

Learning inputs

In our Diagnostic Model, learning *inputs* can be divided into three subcategories namely people, resources and context. The *people* subset extends training needs analysis (Blanchard et al., 2013) beyond learning content towards a clearer understanding of who will be involved in the learning episode. This sub-component also reminds us to consider student approaches to learning (Kandlbinder & Peseta, 2011; Marton & Hounsell, 1997). A significant *people* variable relates to the teacher. Teaching involves a relationship between teacher and learner. The effective teacher not only provides valuable figure-ground perspective on content material, but also creates a safe and supportive learning relationship.

Teaching *resources* are limited; only so much time is available to design a lesson plan, and only so much money is available to assemble the necessary support materials. Design decisions may thus become pragmatic trade-off between time available and access to resources. Resources can aid or detract from learning; they provide important input variables which need to be understood and managed. Thankfully, students themselves bring the rich resources of their personal experiences to a

learning situation (Knowles, 1998); students' prior experiences may thus compensate for limited physical resources in a learning situation.

Learning *contexts* vary enormously. In the workplace, learning environments range from formal classrooms to informal social learning experiences. Learning is not power neutral; agendas may be imposed by dominant coalitions who seek to perpetuate the status quo (Freire, 2000), or learning can be part of a radical transformation project (Delahaye, 2011; Mezirow, 2009). The learning context may be face-to-face or online. Employees may or may not want to participate in a learning episode depending, among other things, on whether learning is valued in their workplace culture, and on whether they can see the relevance of the training to their future needs. In higher education settings, class size, configuration of lecture spaces and perceived relevance of content to professional qualifications are context factors which influence learning. Social constructivist theories of learning place emphasis on the broad social conventions in which the individual participates (Gergen, 1999). From this theoretical position, consideration needs to be given to *situated* learning: how can environments be constructed to facilitate social learning (Bandura, 1977)? Thus, the interplay between the types of learners and teachers, the types of resources available and the context in which learning is occurring all affect decisions regarding the choice of learning processes or teaching strategies.

Learning processes

Learning is by nature an active endeavour; something is happening in the cognitive domain of the student for learning to occur (Akella, 2010; Delahaye, 2011; Meyers & Jones, 1993). Thus, a central question in designing a learning episode is: what is the student *doing*? Shuell (1986: 429, emphasis added) makes the point:

It is helpful to remember that *what the student does* is actually more important in determining what is learned than what the teacher does.

What the student does suggests movement from a transmission model to a transformative model of student learning. That is, the learning outcomes desired, the attributes of the learners, the resources available and the social and political contexts in which learning is occurring all influence

choice of learning activity. While a lecture may be a suitable process for conveying 'programmed knowledge', contract learning or action learning may be more suitable for critical thinking and development of 'meta-abilities' (Delahaye, 2011: 235). The learning processes employed are thus a function not only of the level of learning outcome desired, but also of other elements in the learning system.

Feedback: Evaluating learning

Evaluating the effectiveness of a learning episode requires assessment against the desired learning outcomes. It also requires self-reflection on the part of the teacher: how effective were the learning *processes* in achieving the learning outcomes? From a systems perspective, assessment begins *before* learning processes commences. Proposed learning activities are mapped for alignment against desired learning outcomes. An effective learning episode requires the teacher to be sensitive and responsive to the dynamics of the learning situation. The ability to assess a learning situation as it unfolds enables *in situ* adjustments to learning activities when unanticipated factors affect the level of engagement of participants. These could be context factors over which the teacher has no control, such as noise, location distractors, or limitations on resources available. '*What is happening here?*' provides real-time feedback and feed-forward as the professional adjusts the learning process to align inputs, processes and outputs. Such refining processes are common in classroom settings. However, there is scant evidence of such responsiveness in most online courses because of the high input costs in designing such levels of interaction in online systems.

CASE STUDY 1: RESPECTING DIVERSITY IN A MULTICULTURAL CONTEXT

The first case reports on the use of the Diagnostic Model of Learning to restructure a postgraduate subject in the Master of Business degree at a university in New Zealand to challenge students to explore their notions of gender and ethnicity. Recognition of the need for the inclusion of diversity studies in the subject *Theory and Practice in Training and Development (T&D)* was triggered by a change in the '*people*' input variable. Over the last few years the '*people*' profile in this subject has become increasingly international as students from China, India, the Middle East, Russia,

Thailand, Vietnam and South America enrol in the course. *T&D* is one of the first subjects in which these students enrol. Additionally, the exponential increase in ethnic minority migrants in NZ and the increasing importance of the Asia-Pacific rim to business studies suggested '*contextual*' reasons for reassessing desired learning outcomes in this subject. This decision to upgrade '*learning outcomes*' to challenge students to examine their frames of reference with respect to ethnicity, gender and diversity was a move beyond instrumental and communicative learning towards emancipatory learning (Mezirow, 2009). While emancipatory learning might be a long process, the objective was to initiate the process of learning beyond individual gains towards embracing a more inclusive approach to others.

This change in learning outcomes led to a need to reappraise '*learning processes*' to achieve these desired outcomes. The aim was to provide a learning process which gently nudged students to explore their own conceptions of diversity. Specific learning activities were designed to create porosity in the mental models of students to generate transformational insights. Learning processes were constructed around individual and group activities as formative assessment. The first consisted of a self-reflexive case study on a diversity experience within the workplace or outside the organisation. There was also a group assessment task which involved the design and delivery of a training program. The groups were formed based on each group having a mix of gender and ethnic diversity. These groups worked together to create their training program which they then delivered to the rest of the class, recognizing the diversity in this cohort. The learning processes involved structured experiences in class so that students could interact with each other and seek feedback from each other and the lecturer. A series of guest speakers, intentionally chosen to represent a diversity of ethnicity and gender, added to the mix of learning processes, as did a process of 'abundance sharing' where students brought shared lunch for industry visits, food diversity adding to the conversation around respecting diversity in organisations.

The Diagnostic Model suggests feedback as an important variable in a learning system. Student feedback (through teaching evaluation surveys and unsolicited emails) together with the quality of work on their literature reviews and in their final grade distributions, provide evidence for the successful interweaving of diversity learning processes throughout the *T&D* subject. In terms of

feedback, all students in the subject stated that the content was useful for them, and that the course helped them to better understand themselves and their fellow classmates. They also indicated that their eyes had been opened as to how diversity issues are played out in organisations. An initial challenge in the subject was student understanding of self-reflection at the cognitive, emotional and behavioural levels. While students found the cognitive reflection easy, they struggled with the emotional level. Students struggled with working in a multicultural team because of different understandings of time management, quality and quantity of work. While instrumental learning was relatively easy for most of the students, they struggled with communicative learning and were reticent in giving feedback to their team members. However, by the end of the subject, all groups achieved some level of synchronicity in their group work as they were assessed on the delivery of their training programs.

In terms of the Diagnostic Model, learning outcomes were dependent on the people in the groups, working together in a multicultural context with limited time resources, to produce through communicative learning processes, an output which challenged their pre-existing frames of reference. Students were challenged – indeed compelled if they wished success – to seek solutions to the issues they faced in working together. Feedback after students have completed their degree, via unsolicited email, expresses gratitude for ‘forcing’ an understanding of ethnic and gender diversity through this T&D subject.

CASE STUDY 2: LEARNING ABOUT EUROPEAN WORKS COUNCILS

The second example of using the Diagnostic Model of Learning to improve student learning concerns an International Business undergraduate subject at an Australian university, namely *International and Comparative Human Resource Management*. This subject challenges students to think critically about some of the salient features of managing people in multinational enterprises. The comparative aspect of the subject requires students to analyse the employment relations environments in a number of countries and identify institutional factors that influence HRM practices in various countries. This subject has traditionally had a high failure rate, especially for international students. Additionally a large number of students just pass, displaying poor comprehension of the challenges and complexities of managing people in multinational contexts. Since 2010, the Diagnostic Model has

been used as a framework through which to analyse reasons for the high rate of poor performance, and to design and implement more effective learning strategies to achieve better learning outcomes for our students. The Diagnostic Model has provided problem-solving guidance towards improving student learning outcomes in this subject.

One of the key concepts in the comparative HRM module of the subject relates to the notion of employee participation in workplace governance procedures. European Works Councils, which are 'a medium through which employers can fulfil a statutory obligation to inform and consult workers' representatives on company-level matters that are transnational in scope' (Timming, 2010: 522), are studied as an example of employee 'voice'. An analysis of exam scripts in the subject in 2010 and 2011 revealed that, given a choice of 3 questions out of 5 for the essay section of the final exam, the majority of students avoided the question on European Works Councils. However, where students did attempt this question, those who failed the exam scored on average a paltry 1/10 for this question, and those that just passed the subject scored on average 2.5/10 for this question. Faced with such evidence of underperforming student inability to explain the purpose for European Works Councils, and how well EWCs are fulfilling their purpose, the Diagnostic Model provided a framework for change in learning strategies.

Considering the '*people*' dimension of the model, final exam scripts indicated that students from non-European countries performed more poorly on this topic, perhaps because they were less familiar with notions of democracy in the workplace. Did we assume too much prior knowledge? In considering the '*resources*' dimension of the model, a re-evaluation of the textbook indicated that the section on European Works Councils was rather cursory. Students, as independent learners, had been expected to take the initiative to learn more about EWCs from European Union webpages. However since this self-directed learning strategy had not generated good results, the Diagnostic Model suggested a need to shore up the topic by providing more accessible and relevant resources. Additionally, when examining '*learning processes*' it became clear that the topic of EWCs had been talked about in a lecture, and there had been verbal discussion about EWCs in a tutorial in the subject, but students had not been engaged in active learning for assessment on the topic.

In order to address these variables, in 2012 a short paper on European Works Councils was added to the assessment tasks as a formative learning exercise, and additional resources were provided on the subject's e-learning platform in the form of recent academic journal articles on the topic. Students then brought these papers to class and discussed in small groups their findings relative to whether EWCs were fulfilling their intended purposes. Whereas in 2011, 23.3% of international (onshore) students failed this subject, in 2012, after adding EWC resources online, an EWC assessment task, and including an active EWC learning process in tutorials, the fail rate dropped to 14.8% for international (onshore) students. There was a demonstrable qualitative improvement in student responses to this question on the final exam in 2012 compared to 2010 and 2011 responses. There are clearly other factors involved in pass rates in this subject, but there is firm evidence for the Diagnostic Model's utility in guiding constructive response to an identified learning deficit.

CASE STUDY 3: CHANGE MANAGEMENT

A third example of the Diagnostic Model of Learning in facilitating deeper learning among students involves a postgraduate subject, *Management of Change*, in a university in Dubai, UAE. The subject has a strong practitioner focus and challenges students to adopt an integrated and critical approach to diagnosing various internal and external alignment issues faced by organisations undergoing evolutionary and revolutionary changes. While students demonstrated a comprehension of key issues related to diagnosing and managing change, very few students were able to integrate and synthesize key topics associated with incremental and transformational changes in organisations. Adopting the Diagnostic Model's systems approach facilitated changes in resources and learning processes which led to the achievement of higher-level learning outcomes for students.

One of the core '*learning outcomes*' for *Management of Change* is that students must be able to analyse and critique the core concepts in change management by adopting an integrative, multi-disciplinary approach. The subject was designed based on principles of constructive alignment (Biggs & Tang, 2011). Two assessments were included in addition to a comprehensive final exam. Assessment 1, an individual assignment, was relevant to instrumental learning outcomes and required

students to select and critically review eight to ten scholarly (peer reviewed) articles relevant to key topics in change management. Assessment 2, a group assignment, aimed to achieve both communicative and emancipatory levels of learning and required students to write a case-study (followed by a presentation and submission of written report) of a specific change introduced in any UAE or gulf-based organisation and apply the change management concepts and models. The presentation included a peer assessment component to facilitate collaboration and increased accountabilities. Assessment 3, a three hour exam, tested integrated understanding of key concepts based on analyses of a pre-assigned case study of transformational change.

Regarding the *'people'* element of the Diagnostic Model, students from various Masters streams, including Engineering, Information Technology and Management, Quality Management, International Business and Business Administration choose the subject as an elective while for students from the Master of Strategic Human Resource Management stream this as a core subject. The class profile is reflective of UAE's multicultural population and comprises at least 20 different nationalities in a single class at a given point of time. The cohort thus comprises students who have had very different learning *'contexts'* with a majority of students having experienced teacher-centric rather than student-centric learning; they are not used to expectations that the learner be self-directed and responsible for their own learning (Knowles, 1998). A cohort comprising various disciplines brings different skill-sets and motivations related to the subject itself. Some students from engineering and information technology approach learning looking for absolute truths in a subject which takes a contingency approach. Additionally, English is not the first language for 95% of the student cohort thereby compounding the challenges associated with a theory-intensive subject with its associated technical vocabulary.

To address these challenges the first intervention was in the subject matter itself. The various key themes introduced in each class were continually framed within the context of one generic process model of change with students required to identify how the themes fit the generic model, thus extending students' sense-making processes. Case studies specifically from the region, with students bringing examples from their own organisations, further contextualized learning experiences. To

facilitate student progress from instrumental to communicative and emancipatory levels, the subject began using a consultative style. Extensive formative feedback and support was provided in academic writing and critical thinking on Assignment 1, in addition to spending substantial time on reviewing and discussing draft assignments. Formative feedback was further provided during in-class presentation of cases, which was then incorporated by the students in their case report and final exam (Assessments 2 and 3). Group tasks and exercises further enabled students to learn from colleagues' rich experiences, thus providing them with opportunities to synergize their learning. Most importantly, since the assessment and learning processes were incrementally building on preceding skill levels, there was a clear progression from transactional to transformative learning as predicted by the Diagnostic Model.

The learning processes were chosen to achieve alignment at two levels: Level 1 Alignment (Context) between inputs- processes-outcomes-feedback as proposed by the Diagnostic Model and Level 2 Alignment (Content) with the content of learning itself presented in a holistic and integrated manner. In a class of 57 students, there were only five students who failed overall and these were students who had consistently failed to attend classes. Almost 32% of the class achieved a final mark above 75%, a number much higher than in earlier semesters. Feedback from the cohort further confirmed that students benefitted substantially from the *two-tiered systems approach* to learning which focuses on constructive alignment with regard to both subject content and overall learning context, thus further strengthening and extending the Diagnostic Model. Almost 80% of the students indicated through formal and informal feedback that this subject had challenged them to take a deeper approach to learning, and that the subject had relevance to their careers besides making them more conscious of the need to address organisational challenges in a holistic manner.

CONCLUSION

Based on open systems theory, this paper has proposed a Diagnostic Model of Learning to conceptualise learning as the complex interplay of a range of variables such that a change in any one of these elements requires a change in the rest of the system in order for effective learning to occur. This Diagnostic Model thus provides a holistic approach to improving learning through taking

multiple dimensions of a learning system into account. Through examples drawn from Australia, New Zealand and Dubai, we have demonstrated the use of the Diagnostic Model in analysing learning deficits; the Diagnostic Model has thus informed changes in learning strategies to improve learning outcomes for students, at both undergraduate and postgraduate levels across a range of subjects.

Additionally, we have found that the Diagnostic Model can be used as a mental schema to assess what is happening *during* a learning event in order to make whatever *in situ* adjustments are necessary to align inputs, processes and outputs. An open system perspective also raises awareness of external influences on the learning process, such as whether the organisation encourages and rewards a learning culture, and various social, resource, and political pressures that may be bearing on the participants. We suggest that the Diagnostic Model provides a useful device for making sense of the complex interplay of factors extant in any learning situation. It is hoped that this model will be tested by, and found useful to, those wishing to improve the quality of learning outcomes for their students in a volatile and changing world.

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Figure 1 A Diagnostic Model of Learning: An Open Systems Perspective

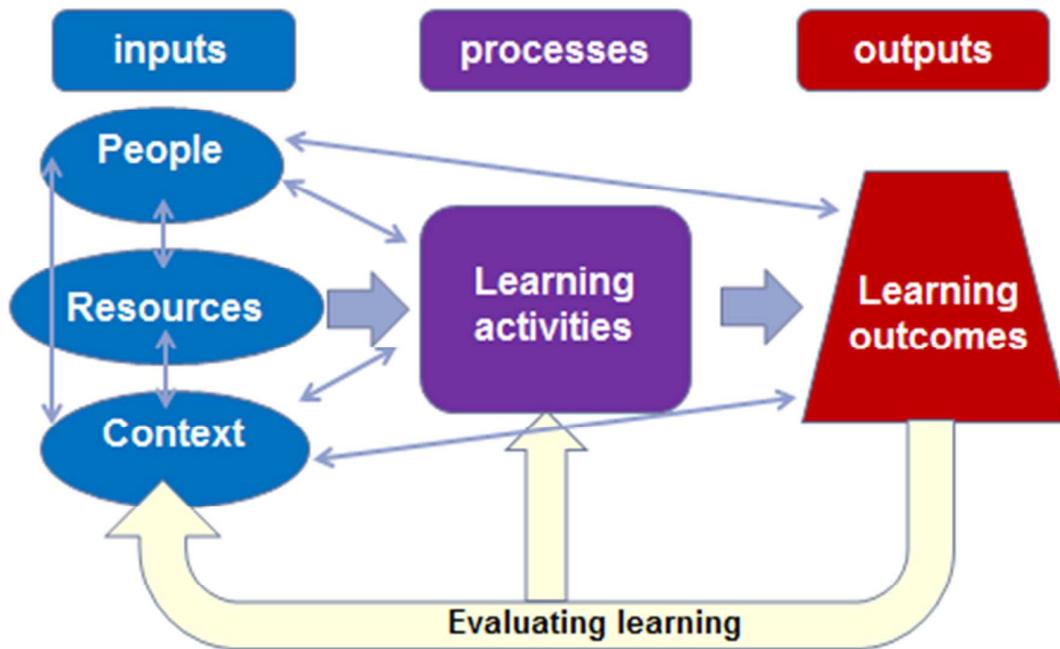


Figure 2: Mezirow's Hierarchy of Learning Outcomes
Source: Adapted from Mezirow (1994)

