
Using reflective journals to engage students in learning business process management concepts

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Abstract: Business Process Management (BPM) is an emerging discipline involving managers making a variety of decisions that have enterprise-wide impacts. The abilities to think critically and reflect on experience are capabilities required by managers in dealing with BPM-related decisions on a day-to-day basis. This paper describes the use of reflective learning journals as a way of developing reflective capabilities and engaging students in learning BPM concepts. The reflective journal entries of 102 students enrolled in a Master's level BPM unit offered by a business school are analysed using the Leximancer qualitative data analysis software tool. Through an analysis of what students write about in their journals and how their entries are constructed, key characteristics of reflective learning journals are identified in relation to the challenges of BPM education.

Keywords: BPM capabilities; Reflective learning journals; Assessment; Content analysis

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1. Introduction

Business Process Management (BPM) is a subject area which draws from both technically and organisationally-oriented bodies of knowledge and is taught in various guises across different faculties. Given the relative youth of the subject, BPM faces a number of challenges with respect to its identity, the content of BPM-related courses and the pedagogical approach that should be adopted when teaching it (Bandara et al., 2010). In business schools, BPM-related concepts are taught in order to develop the expertise and capabilities of managers who can address the wide variety of challenges and decisions faced by process-oriented organisations (Harmon, 2007). Therefore, knowledge and frameworks to guide managers when dealing with BPM-related issues in their organisation, potential BPM professionals need to develop capabilities which will enable them to effectively put BPM initiatives into practice. Increasingly important among such management capabilities are the ability to think critically and be a "reflective practitioner" (Hedberg, 2009).

One approach to developing reflective thinking is through assigning students written assessment which requires them to reflect on their learning activities and their understanding of course content over the duration of a unit of study. Reflective learning journals are recognised as an effective teaching and learning mechanism which engage students in the subject matter and extend their understanding of underlying concepts. This paper investigates how reflective learning journals can be used in BPM education and demonstrates the use of reflective journals in teaching BPM to Master's-level students in an Australian business school course. Using the Leximancer qualitative data analysis software tool, a content analysis of students' reflective journal entries is performed to examine how students can use reflective journals to engage with the content of a course and develop their understanding of the underlying concepts. Through this analysis, four characteristics of reflective learning journals are identified to address some of the challenges faced in teaching BPM.

2. Background

2.1. BPM expertise, curricula and reflective practice

Responding to the rising importance of BPM issues in organisations, there have been calls for the definition of professional roles and the development of the expertise required to address the challenges of process-based organisations (Antonucci, 2010). A typical role for example is a Business Process Analyst who might be expected to have expertise that enables him/her to perform tasks such as model processes, liaise between the IT and business communities, and conduct analyses to align process orchestrations with changing business conditions (Antonucci, 2010). Such roles require the development of a range of technical and managerial capabilities which may be taught as an entire degree program or as contributing to a single unit in a broader degree (Bandara et al., 2010).

While several organisational roles for BPM experts have been identified, the nature of these roles and associated expertise remains unclear (Kokkonen & Bandara, 2010). What is clear, however, is that all BPM roles require an understanding to some degree of both business and technical domains. In addition, as suggested by Kokkonen and Bandara's model of BPM expertise (2010), self-knowledge, thinking ability, practical sense and intuition are all important aspects of BPM expertise.

Course co-ordinators can use recommended curricula to suggest what should be taught within BPM educational programs but it is equally important to consider how the content of such curricula are taught. That is how the capabilities required of BPM professionals (including how they will think as practitioners) can best be developed. A common suggestion for developing BPM expertise is to use project work as a means to enable students to apply the concepts that they have learned in formal class settings in real-life environments. Project work is an excellent way of engaging students with the practicalities of BPM issues and developing their analytical capabilities by requiring them to examine the organisational context in which they are working. However, students need to not only analyse the situation but also to come up with creative solutions. This involves being able to judge the relevance, appropriateness and consequences of their decisions and actions and to know which questions to ask. These capabilities rely on students' ability to reflect on the situation that they are faced with (Hedberg, 2009).

"Thinking on our feet" is a phrase synonymous with Schön's (1983) concept of *reflection-in-action*. This involves building new understanding in the context of the

situation that is unfolding by looking inwardly and examining experiences, connecting with feelings, and applying theories in-use. According to Schön, there are many grey and indeterminate areas in professional practice and these can only be dealt with by having the ability to apply previous experience to new situations and to “think on your feet”. It is clear that in the practice of BPM which spans the technical and organisational domains, reflective thinking in action will be part and parcel of the BPM professional’s activity.

2.2. Reflective journals as a teaching and learning mechanism

In order to foster reflective and critical thinking, students need to be taught reflective habits (Pavlovich, Collins, & Jones, 2009). Reflective journals are becoming increasingly used as a pedagogical tool for developing reflective capabilities. Essentially a reflective journal (or learning journal) is a narrative, personal account in which students record their thoughts, feelings, attitudes and reflections on their learning in a course of study (Bisman, 2011). Learning journals can be used in a variety of ways from extensive reporting of practice (Hubbs & Brand, 2005) to a more subject focused approach in which students reflect on the content of their studies (Hedberg, 2009).

Learning journal entries in their purest form mirror the thought processes of students (Hubbs & Brand, 2005) and assist them in constructing meaning; moving their approach to learning from the assimilation of facts to a transformed and more thoughtful and critical approach (Pavlovich, Collins, & Jones, 2009). Many benefits of using learning journals have been suggested including a sense of ownership and awareness of learning on the part of students, as well as the promotion of deep rather than surface learning. Furthermore, research has been reported that suggests that in addition to developing reflective capabilities, learning journals can improve content knowledge (Bisman, 2011). Reflective writing is seen as being particularly useful when students are integrating new concepts as it helps them to contextualise their learning (Gulwadi, 2009). Learning journals are therefore a type of formative assessment which can guide the development of students’ understanding, critical thinking and collaborative capabilities (Olofsson, Lindberg, & Hauge, 2011).

The remainder of this paper describes how learning journals have been applied in the context of developing the reflective and critical capabilities of students in a BPM course. In doing so, the paper investigates the question of how reflective learning journals can be effectively used in BPM education.

3. Methodology

In order to demonstrate the use of reflective journals in teaching BPM, a case study of how student reflective journals have been used in teaching an introductory unit in Business Process Management is described. A content analysis of 102 students’ journals investigates and illustrates how students use this form of assessment to develop their understanding of key concepts.

The content analysis of the journals is conducted using the Leximancer qualitative data analysis software. Leximancer is a text mining tool that has been used in a variety of research domains including the public sector (Young & Denize, 2008), education (Rooney, McKenna, & Keenan, 2006) and accounting (Crofts & Bisman, 2010). The tool enables the textual content of documents to be analysed and to visually analyse selected information. The system searches text to select important terms based on word frequency and co-occurrence and then learns and extracts thesaurus-based concepts (Smith &

Humphreys, 2006). From a concept index, the software then applies co-occurrence matrices and clustering algorithms to produce concept maps in which identified concepts are clustered into themes (Crofts & Bisman, 2010).

Given the approach that Leximancer uses to identify concepts and themes, it can be readily used in a positivistic style. However, when used in conjunction with other manual and interpretive analyses, Leximancer has been used to inform interpretive and critical paradigms (Crofts & Bisman, 2010). In this study, Leximancer is used to address two questions related to *what* students investigate as well as *how* they construct their reflections. Firstly, in order to understand the BPM content that students choose to examine in their reflective writing, Leximancer is used to identify the themes and underlying concepts that they write about. These themes and concepts are then examined and interrogated within the Leximancer log files in order to interpret how students engage with these concepts; and how students comprehend these concepts in terms of their own practice.

4. Using reflective journals in a BPM unit of study

4.1. The BPM unit of study

In order to examine the use of reflective journals in developing BPM capabilities, a content analysis of students' reflective journals completed in a graduate foundational Business Process Management unit over a three year period was conducted. The unit is taught in a business school in a well-established Australian university and primarily attracts students who are enrolled in either a Master of Commerce (MCom) or a Master of Business Information Management (MBIM) (Table 1). The BPM unit is required for the MBIM students and the majority of MCom students have chosen to specialise in the Business Information Management sequence of units which includes the BPM unit of study. However, it is not uncommon for MCom students specialising in accounting, marketing or e-business to also take the unit. The unit is also available as an elective for students from the Computer Science Faculty studying either a Master of Computer Science or a Master of Information Technology. The students were a mix of domestic and international students with working experiences ranging from none to more than ten years.

The BPM unit comprises thirteen weeks of three hour face-to-face seminars and laboratory sessions which introduce students to the fundamental concepts associated with BPM. The content of the unit is roughly akin to Antonucci's (2010) description of a Foundation BPM course. Given that the unit contributes primarily to business degree programs, there is an emphasis on managerial issues and decisions associated with BPM in organisations. However, the learning outcomes for the unit focus on providing students with the concepts, language and capabilities to participate in BPM-related projects. Therefore, in addition to introducing students to the theories, concepts and frameworks associated with BPM, the unit also comprises practical elements in which students are exposed to process modelling using BPMN and the use of ERP software in support of standardised business processes. To further emphasise the application of concepts, as suggested by Bandara et al. (2010) the unit also requires students to participate in a group project which analyses a selected business process in a real-life organisation.

The unit has been taught for three years by the same instructor and has developed and maintained stable content around the following topics:

- The Nature and Evolution of BPM

- Business Strategy and Value Chain Analysis
- Enterprise Architecture / Process Architecture and Business Strategy
- Process Modelling – Introduction to BPMN
- Process analysis
- ERP systems and BPM
- Cultural Issues in BPM implementation
- Measuring Process Performance
- Six Sigma and Lean
- BPM Governance
- BPM Technologies (BPM Suites).

Table 1
Enrolments in the BPM unit by Degree Program

DEGREE PROGRAM	2010	2011	2012	TOTAL
Master of Commerce	13	24	14	51
Master of Business Information Management	8	7	8	23
Master of Marketing	1	-	2	3
Master of Business Administration	1	-	-	1
Master of Professional Accounting	3	1	3	7
Master of Computer Science	3	-	6	9
Master of Information Technology	2	3	3	8
Total	31	35	36	102

Seminars involve the lecturer providing an overview of the topic and outlining key concepts followed by a group activity, discussion or laboratory session. The topics discussed during the seminar sessions draw on a variety of source material including book chapters, journal articles, industry case studies and web sites. Across the three years, there have been some changes to the required readings and the ordering of lecture topics but the method of instruction and the content delivered to each cohort was consistent.

4.2. The reflective journal assignment

The reflective journal component of the BPM course had both pragmatic and pedagogical purposes. From a pragmatic perspective, the reflective journal assignment firstly asked students to summarise the key points of the seminar so that the key concepts discussed were reinforced after the seminar. This exercise in itself is a limited form of reflection – asking students to think about all of the issues discussed during the seminar and think about how they relate to one another.

Pedagogically, the reflective journal assignment required students to reflect on their own experiences in relation to the topic, seminar discussions and the required readings. As part of this process, students were encouraged to identify one or more readings or web sites of relevance and supply annotations outlining why the identified reading was relevant. Therefore, where students could not directly relate the topic to their own working or wider life experience, they were given the opportunity to reflect on the topic in terms of their wider reading.

Over the course of the semester, each student was required to submit journal entries for six topics examined in seminar sessions – three topics from weeks 1 to 6 and three topics from weeks 7 to 12. At the commencement of the semester, the nature and role of the reflective journal assessment was discussed during class. No word or page limit was provided but students were advised that each journal entry should be 1-2 pages in length. Journals were submitted electronically using the learning management system and assessed online. In the spirit of formative assessment (Olofsson, Lindberg, & Hauge, 2011), the first submission was generously assessed and returned with written feedback in cases where students appeared to have failed to comprehend the nature of the reflective task. The reflective journal component contributed to twenty per cent of the students' overall grade.

5. The content of student journals

A total of 612 reflective journal entries drawn from the BPM unit over a three year period were analysed using Leximancer. In writing their reflections, students frequently used terms that were directly related to the teaching of the unit such as "lectures", "seminars", "the lecturer", "article" etc. Therefore, in order to maintain a focus on the central BPM-related themes and concepts that were discussed in the journal entries, these terms were removed from the concept seed list prior to final processing. In addition, similar terms such as "organise and organize" and "BPM and Business Process Management" were merged to represent a single seed concept.

The concept map output from Leximancer can be thought of as a bird's-eye view of the data illustrating how the main concepts are related. The concept map in Fig. 1 depicts how concepts extracted from student journals are grouped into "themes". A theme is a cluster of concepts that have some commonality or connectedness within the text. The underlying concepts are represented by the linked nodes in the concept map. When displaying concept maps in Leximancer, it is possible to adjust the sensitivity of theme output on a range of 0-100. A higher level setting is more sensitive to the contribution of concepts to a theme name and therefore will display fewer themes. The default setting of 33% is used throughout this analysis because it displays a manageable number of meaningful themes. The themes, underlying concepts and associated example text from journals are shown in Table 2.

Each of the themes which emerged from the analysis of all student journals cover several of the topics examined in the seminars. For example, the most prominent theme "process" addresses underlying concepts including "management", "architecture", "design" and "performance". As such, themes in the analysis do not directly represent single topics of study but rather they indicate how concepts group together across the course – based on the topics selected by the students.

The measure of connectivity depicted in Table 2, provides an estimation of the coverage of the theme across the data. Therefore, the theme "process" is seen to be relevant to 100% of the analysed journal entries whereas, the "BPMN" theme is

connected to only 4% of entries. This is not a measure of the relative number of journal entries that analysed a particular topic but rather, the relationship of a theme across the aggregated text of all journals. For instance, nearly all students chose to reflect on the topic of BPMN but the low connectivity measure indicates that BPMN was rarely mentioned in reflections on other topics. “Process”, “strategy” and “improvement” on the other hand, were themes that emerged consistently in student reflections across different topics.

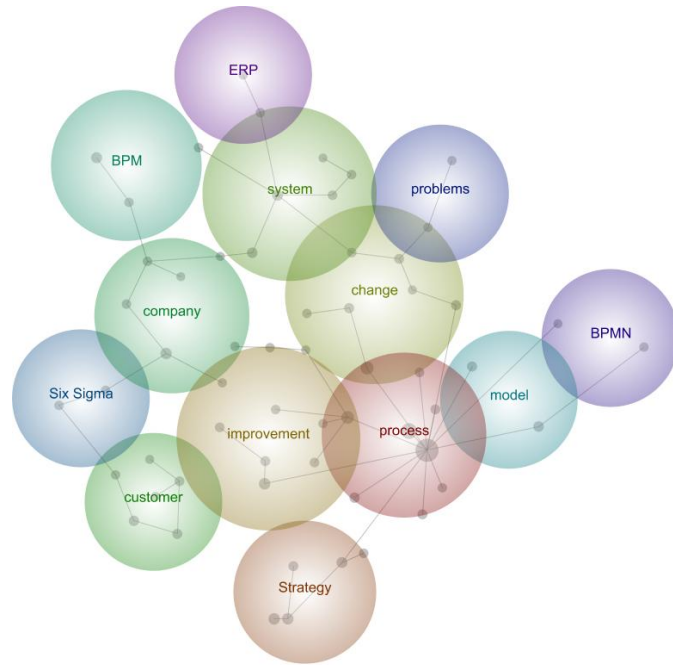


Fig. 1. Themes in student reflective journals

Table 2
Themes, concepts and journal extracts 2010-2012

THEME	UNDERLYING CONCEPTS	CONNECTIVITY	JOURNAL EXTRACTS
process	process, business, management, organisation, performance, level, design	100%	<p>... the third wave of process management where process ...</p> <p>... and why they are relevant to the success of any business...</p> <p>... the reality is that even simple processes can and do go wrong ...</p> <p>... reduce communication to ensure the process runs smoothly ...</p> <p>... may also incorporate automation and change in process ...</p>

THEME	UNDERLYING CONCEPTS	CONNECTIVITY	JOURNAL EXTRACTS
strategy	strategy, value, chain, activities	30%	<p>... <i>how to add value for knowledgeable institutions ...</i></p> <p>... <i>to bring some of the concepts of the value chain together ...</i></p> <p>... <i>increases value to customers and other stakeholders ...</i></p> <p>... <i>not only to support the strategy but to protect it from competition ...</i></p>
improvement	improvement, important, support	29%	<p>... <i>provide a baseline for future improvements ...</i></p> <p>... <i>improves its own efficiency ...</i></p> <p>... <i>Improve recycling rates using Six Sigma ...</i></p> <p>... <i>are about supporting these improvements ...</i></p> <p>... <i>the support of customers which can improve the product ...</i></p>
change	change, different, work, information	23%	<p>... <i>do not make fine distinctions about the changing trends ...</i></p> <p>... <i>result in system changing rather than work processes ...</i></p> <p>... <i>improving organisational effectiveness by avoiding work duplication ...</i></p>
system	System, implementation, software	23%	<p>... <i>shift from data-centred to process-centred systems ...</i></p> <p>... <i>pre-defined in the system makes it easier to implement best practices ...</i></p> <p>... <i>off-the-shelf software applications became popular ...</i></p>
customer	customer, products, service	20%	<p>... <i>effects on profitability, productivity and customer satisfaction ...</i></p> <p>... <i>value that customers could receive ...</i></p> <p>... <i>sold materials or services reach customers ...</i></p>
company	company	20%	<p>... <i>determine why companies undertake BPM initiatives ...</i></p> <p>... <i>leading companies are interested in developing enterprise-wide business process architecture ...</i></p>
BPM	BPM	13%	<p>... <i>different understanding of BPM depending on their experience and environment ...</i></p> <p>... <i>BPM has a long history, starting with scientific management ...</i></p>

THEME	UNDERLYING CONCEPTS	CONNECTIVITY	JOURNAL EXTRACTS
model	model, understanding	10%	... the main idea of these models is to facilitate communication implementing the model easy to get confused when designing a BPMN model ...
Six Sigma	Six Sigma	6%	... organisation-wide commitment to Six Sigma Six Sigma is a radical change from the original scientific management style ...
problems	problems	5%	... identifying the problems that can be encountered in business process re-design can only identify the problems not the underlying causes ...
BPMN	BPMN	4%	... BPMN tools are supposed to be used by business managers elements of BPMN and what we should be aware of when developing a model ...
ERP	ERP, SAP	3%	... instances in which the application of ERP worsens the existing constraints and lack of unification among business processes vendors such as SAP moved beyond simply controlling the data ...

Although the content of the course has not varied greatly over the years, different student cohorts may experience quite different classroom dynamics. This may subsequently impact on their approach to the subject matter. As noted above, each cohort was made up of students enrolled in a variety of degree programs, included a mix of international and domestic students, and had a wide range of working experience. Table 3 identifies the emergent themes for each cohort and Table 4 compares students enrolled for a Business degree with those enrolled for a Computer Science degree.

From the aggregated journal entries for each year’s cohort, Table 3 shows that the three most highly connected themes are in common for each year with little variation for the less connected themes. The theme “ERP” did not emerge in the 2010 journal entries, which is probably because the topic of ERP received greater emphasis in 2011 and 2012 seminars.

The comparison of Business students with Computer Science students in Table 4 shows that while the major themes (e.g. process, BPM, strategy) remain relatively constant, there is some variation in emphasis. “Company”, “implementation”, “model” and “flow” emerge in the top ten themes for Business students but not for Computer Science students. Similarly, “value chain”, “analysis”, “software” and “performance” emerge in the top ten themes for Computer Science students but not for Business students. This preliminary analysis indicates that there may be some differences in what Business students and Computer Science students choose to include in their reflective journals.

However, a more fine-grained analysis is necessary to further investigate these differences.

Table 3

Emergent themes for each cohort (theme identification = 33%)

2010		2011		2012	
THEME	CONNEC TIVITY	THEME	CONNEC TIVITY	THEME	CONNEC TIVITY
process	100	process	100	process	100
strategy	36	strategy	27	strategy	40
organisation / company	33	company	25	company	27
BPM	26	system	24	improvement	20
system	26	improvement	22	BPM	14
change	17	customer	19	quality	7
customer	15	implementation	16	ERP	6
analysis	14	BPM	14	customer	6
problems	9	ERP	6	BPMN	4
data	9	BPMS	3	people	4
BPMN	2	BPMN	3	model	3

Table 4

Emergent themes for business students versus computer science students (theme identification = 33%)

BUSINESS STUDENTS (N=68)		COMPUTER SCIENCE STUDENTS (N=34)	
THEME	CONNECTIVITY	THEME	CONNECTIVITY
process	100	process	100
strategy	29	systems	37
company	23	value chain	28
system	17	analysis	17
BPM	14	software	16
customer	11	BPM	15
Six Sigma	8	strategy	11
implementation	7	customer	10
model (BPMN)	6	performance	7
flow	1	Six Sigma	6

6. How students construct their journal entries

While the forgoing analysis provides a description of the content of student reflective journals, in order to explore how students used the journal assignment to develop their knowledge of BPM concepts, it is necessary to examine the content of individual journal entries. The students were not constrained by a strictly structured template with respect to the format that reflective journal entries should take. Beyond the general guidelines provided in introductory discussions, they were free (and encouraged) to develop a

personal style in presenting their reflections. It is therefore not surprising to find that students adopted quite different approaches to their analyses of similar topics.

Most students' journal entries commenced with a brief descriptive outline of a chosen topic in highlighting the key issues presented and discussed in the seminars. Beyond summarising the essential points of a topic, how students chose to demonstrate their understanding tended to be in one (or a combination) of three ways:

- **Recounting of seminar activities**

"... we were divided into groups and asked to model an organisation's value chain using Porter's Generic Value Chain model. We were also given a question sheet related to the discussion reading ..."

- **Discussion of assigned readings**

"... important to have implemented Process Management in a business so that business processes can support a businesses' strategic goals (Palmborg 2010) ... aligned with the deployment of the process (Küing and Hagen 2007) ..."

- **Relation to additional self-sourced material**

"... An article written by Bruce Silver that provides us with useful tips on BPMN: <http://www.bpminstitute.org>...I found this article particular interesting since it not only gives us tips about the notation of BPMN and how to do that right, but actually how we can make the best possible model that is intuitive and easy to interpret ..."

A more detailed analysis of the nature of student reflections will be discussed in the following section but in relation to the general structure of journal entries, many students also chose to present the topic content in a matter-of-fact manner followed by a separate section titled "Personal Reflection". However, this approach was not universal with many reflections being integrated into the discussion of the content.

The individuality of approaches to the assignment can be further illustrated by the knowledge pathway facility in Leximancer. The Leximancer tool suggests clusters of meaning based on word groupings (Crofts & Bisman, 2010). A knowledge pathway displays and describes the most likely relationship between two concepts linked through other concepts. The pathway traverses the most likely route between pairs of concepts that are most closely related in the text. Therefore, a knowledge pathway between two concepts in a student's set of reflective journal entries depicts a storyline representing how that student has expressed their understanding of related concepts.

As an illustration of the different ways that students expressed their understanding in learning journals, the knowledge pathway between the concepts "BPM" and "applications" for three different students is presented in Fig. 2 below. The figure compares the knowledge pathway for the entire set of student reflections with those of three students who achieved a grade of high distinction. Student 1 is a Master of Computer Science with an undergraduate degree in computer science, Student 2 is a Master of Commerce student with an undergraduate degree in accounting and Student 3 is a Master of Business Information Management student with an undergraduate degree in IT and extensive IT industry experience. Each student's concept map is slightly different in terms of the themes and concepts that emerged. There are, however, many concepts in common and the knowledge pathway between any of these could be analysed.

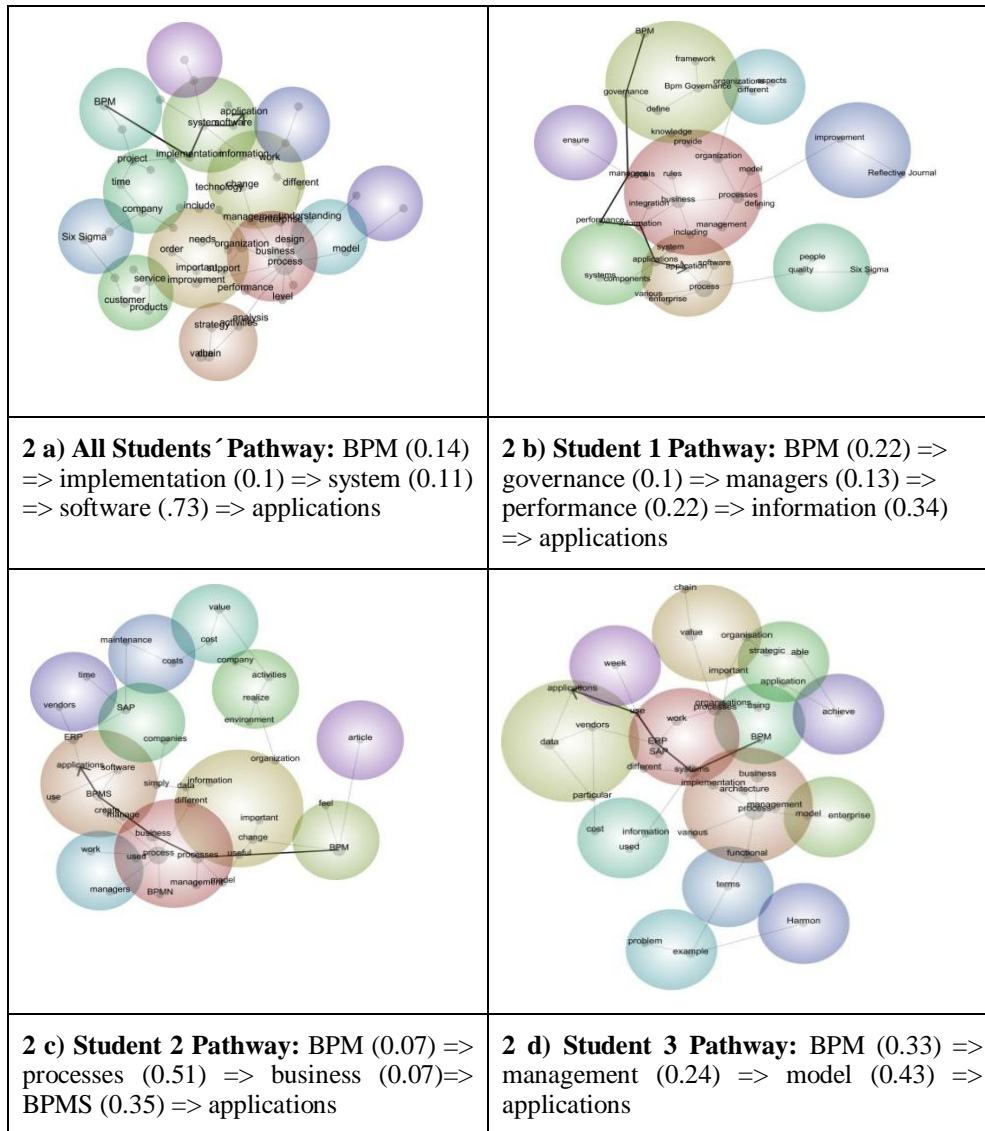


Fig 2. Alternative student knowledge pathways “BPM” to “applications”

Whereas the aggregated knowledge pathway for all students traverses concepts which group around the two themes of BPM and Systems, each of the selected student pathways take alternative routes across different themes between the two concepts. Interestingly, the Computer Science student’s pathway (Student 1) traversed concepts related to management such as governance and performance; Student 2’s knowledge pathway traversed process and business before linking with the technically-oriented BPMS (BPM suites) and Student 3’s knowledge pathway is through information systems related concepts (systems; ERP) before linking with use and applications. Each pathway concept in the map has an associated contribution score (e.g. BPM: 0.14). This score indicates the contribution of that concept in linking together the start and end of the pathway. One interpretation of the pathway between “BPM” and “applications” is that

Student 1's analysis of the concept "applications" is oriented toward the management of performance and information, Student 2 relates "applications" to using BPM suites in support of processes and Student 3 sees applications in relatively even terms of BPM, management and models. Manual interrogation of each student's journal entries supported this interpretation.

These knowledge pathways do not explain how each student has learned about and integrated these concepts. Nor can the pathways be attributed to individual student characteristics. Any individual student's concept map and concept linkages will be unique, even if their journals discuss the same concepts. The pathways do, however, represent a storyline depicting how each student has expressed concepts in their journal. Even though each student example above has a different focus in how they have written about the same concepts, each journal was evaluated as being of a high distinction quality. The salient point from this observation is that students may take quite different approaches to how they express their understanding of similar concepts and still achieve the same outcome.

7. Sources of student reflections

A critical component of the reflective journal task is for students to internalise the content of the subject matter by reflecting on their own experiences. How an individual student approaches this task is dependent on their level of experience and expertise. In a typical class, some students may have experience with BPM or a similar environment; others may have experience working in completely different domains and others may have little if any working experience to draw on for their reflections. While those with experience will be advantaged to some extent, it is emphasised to students during the unit orientation discussions that they can draw on any of their own life experiences. Such experiences may include any interactions with organisational business processes that they encounter in their day-to-day life, their university environment or their other studies. Furthermore, they are encouraged to read more widely around the topic and can choose to reflect on how their wider reading has contributed to their understanding. The examples below illustrate the variety of sources for student reflections:

- **Reflections based on working experience**

I think the genesis of this is that customers/clients generally report symptoms and have no interest in interpreting or reporting causes of problems. This may be due to a genuine lack of knowledge, but even if the cause of a problem is readily apparent you cannot rely on customers to report this.

- **Reflection on self-sourced reading in comparison to prescribed reading (Harmon, 2007)**

Interestingly he refers to the similarity of the Six Sigma terminology to the ideas we have already examined and reinforces the notion that Six Sigma, although useful, is not particularly original. For example what Six Sigma would refer to as 'process management' Harmon would describe as 'process architecture' (page 318) and process improvement and redesign are used similarly although Harmon would include the use of non-statistical techniques for process improvement and considers this should be continuous and not just project driven as is typical of Six Sigma efforts.

- **Reflection based on general personal experience**

From my own observations businesses that have a clear view of their objectives, consistent and clear communication between management and the rest of the business are able to succeed with the strategy they have developed. Also I learnt that for strategies to work they have to be closely aligned with business processes otherwise the objectives of the business will never be reached. Therefore I conclude that from my understanding business strategy along with business process that ensure goals are reached, will allow businesses to succeed.

- **Reflection based on high school learning**

I think BPMN is a really important tool and important to have knowledge about when I will start working. In high school I learned about both entity-relationship model (ERM) and Data flow diagram. You can say that BPMN is most like Data flow diagram when it comes to those two, but still there are many differences. BPMN focuses on processes, but Data flow diagram focuses on where information flows. You can say that Data flow diagrams and Rich Picture is partly the same, just that Rich Picture is a little more freely when it comes to notations. In the beginning it was kind of hard to do the BPMN right, because my brain focused on where information flows and not the processes. But when I got the concept I realized that BPMN is a really helpful tool!

- **Reflection based on undergraduate studies**

There are several questions arising in my mind after reading some articles about the implementation of Six Sigma. Based on my understanding of these concepts, Six Sigma method emphasizes on the process and cost analysis. I wonder how Six Sigma could address the needs of organisation in doing innovation. I have never worked in any business firm. However, I attempt to correlate this topic by recall with my experience studying accounting major during my undergraduate degree.

- **Personal reflection about the unit content**

I find the reading of this paper allowed me to recognize the limitations of BPM and the difficulty in teaching the topic. Because so many definitions, methods and interpretations exist, the one thing I think is fundamental is the “approach” taken to Business Process Management. Making people the centre of the business process and part of the solution. As an introductory, found it quite difficult to grapple with concepts of the evolutionary phases of development and the six-sigma movement. However, I don’t think this is an important part of the course and I think my understanding of BPM has improved simply by not understanding because in reality, BPM cannot be defined but rather a series of definitions that change relative to different contexts in which it is applied.

All students demonstrated their ability to use the reflective journal assignments to recap and reinforce the concepts discussed during class. However, not all students were able to demonstrate that they could “reflect” on the topic and integrate concepts into their broader understanding. Some students in their first submission (especially those from a non-English speaking background) are hesitant to take a reflective approach in their writing and, consequently, they are encouraged through written feedback to “place more of themselves” in their analysis.

8. Assessing reflections

One difficulty faced when assigning reflective journals is determining ways to assess personal reflections that do not readily lend themselves to standardised criteria and require a degree of subjectivity on behalf of the assessor (Pavlovich, Collins, & Jones, 2009). Reflections are less productive if they rely on description and do not look deeper to uncover hidden assumptions, question the rationale for decision making or consider alternative perspectives (Gulwadi, 2009). A simple approach to assessing reflective journals is to use a dichotomy such as “surface/non-reflective” versus “deep/reflective” journals (Bisman, 2011). However, for the purposes of the BPM unit, the reflective journal assessment was for both formative and summative purposes. Therefore it was decided that a more fine mechanism which took into account degrees of descriptive and reflective analysis was necessary.

Hatton and Smith’s (Hatton & Smith, 1995) classification scheme provides four classification levels from purely descriptive levels through to critical reflections. This scheme has by and large been used in the past to assess reflective journals where students are engaged in practicums or experiential learning environments (Gulwadi, 2009). Given that the purpose of the reflective journal for the BPM assessment was to reflect on the unit content rather than reflect on practice itself, Hatton and Smith’s typology was modified to provide the basis for the marking criteria presented in Table 5.

Table 5
Learning journal assessment criteria

GRADE	CATEGORY BY HATTON AND SMITH (1995)	DESCRIPTION	% OF STUDENTS ACHIEVING OVERALL GRADE (N=102)
Pass	Descriptive	<i>Non-reflective rote reporting of facts with no discussion beyond descriptions of events and prescribed literature</i>	5.9
Credit	Descriptive reflections	<i>Descriptive journal entry that extends reporting of events to wider literature and secondary sources</i>	26.5
Distinction	Dialogic reflection	<i>Provides extended descriptive entry and additionally demonstrates “stepping back” from content to provide analysis linking content to personal beliefs and experiences</i>	65.68
High Distinction	Critical Reflection	<i>Demonstrates awareness of multiple perspectives providing an integrated logical analysis of the topic in relation to personal beliefs and experiences</i>	11.76

Ideally, the outcome for students on completion of the BPM unit would for them to be capable of “critical reflection” as this would be indicative of their ability to be a reflective BPM practitioner. As noted above, the ability to reflect does not come easily to all students. It is therefore important to provide mechanisms for students to be able to

develop their abilities toward the desirable outcome of critical reflection. In the BPM unit described in this case, there are two submission dates across the semester with the first three journal entries submitted at mid-semester and the second three entries submitted at the end of semester. Each journal entry receives an individual grade based on the content and the quality of the reflection, which contributes to the overall grade shown in Table 5. The distribution of grades is skewed to the higher end due to the desire to use the assessment as a formative component of critical and reflective thinking. All students demonstrated their ability to use the reflective journal assignments to recap and reinforce the concepts discussed during class but as noted above, some had difficulty with the reflective component. The weighting of marks for the quality of reflection was reduced for the first submission so that students who had initial difficulties with the reflective task were not greatly disadvantaged. In general, it was found that students responded well to the initial feedback and prompting. Those students, who in their first submission made a good attempt at reflective writing, were encouraged to continue and develop this approach further for the second submission.

9. Discussion

9.1. *Reflective learning journals and BPM education*

Given BPM's relative youth as a specific field of education, teaching BPM faces several challenges including a lack of availability of appropriate teaching material as well as the problems associated with the interdisciplinary nature of the discipline (Bandara et al., 2010). Furthermore, in the absence of a defined career path, the roles and requisite skill set for graduates of BPM programs is only just emerging (Kokkonen & Bandara, 2010). What is clear in this developing context is that BPM education should not only develop competency in specific subjects (such as process modelling, process performance measurement, process governance) but it should also endeavour to enable BPM graduates to apply their knowledge in dynamic organisational contexts. Based on the analysis of the reflective learning journal assessment analysed in the previous section, four characteristics of reflective learning journals are proposed to address some of the challenges of BPM education.

- **Reflective learning journals cater for the multidisciplinary of BPM and the heterogeneity of students' background and experience**

Given that BPM draws its content from technical and managerial disciplines, finding an appropriate balance of BPM-related material is a challenge for course developers. Furthermore, the educational and working background of students in introductory postgraduate BPM courses may be quite varied. A central feature of reflective learning journals is that they encourage students to personalise their learning. Therefore, when faced with texts and course material which span both technical and managerial topics, students can approach these from their own frame of reference.

Allowing students a choice of topics (and sub-topics) to reflect on provides them with the freedom to focus on those topics and concepts that they wish to engage with. It might be expected that students with a more technical background would be drawn to technically-oriented topics and those with a business background drawn to managerial topics. Therefore, if a student is particularly interested in BPM software they can choose to reflect on that topic in more detail than is examined during the seminar or they may choose to examine the strategic dimensions of BPM. While requiring further

investigation, the high-level analysis of Business versus Computer Science students described did indicate that there may be some variation in the focus of journal entries by students from different disciplinary backgrounds.

It was clear from the content analysis that by giving students the freedom to choose what they reflect on and how they go about writing up their reflections, individuals engaged with the concepts in different ways. This was illustrated by the comparison of three students' knowledge paths between the "BPM" and "applications" concepts described above. Each of these students achieved a high distinction grade which indicates that all three produced journals with well-developed content as well as deep reflections. Each, however, appeared to integrate the material in an individual way. The reflective journal assessment appears in this way to cater for individual learning styles and frees students from the constraints of didactic delivery of course material.

- **Reflective learning journals develop a source of shared BPM learning material**

Given that there are few suitable standard textbooks for BPM, it is common for course designers to rely on a variety of source material to deliver the core content. The reflective journal assignment described in this paper facilitates the collection and development of additional resources to assist with student learning.

While course readings and other material formed the basis of seminars, students were encouraged to find related resources beyond the prescribed readings and integrate them into their reflections on particular topics. The students were encouraged to critically reflect on non-traditional resources such as blog postings and vendor case studies in relation to a chosen topic. As such, over the course of the semester each student was able to build up a set of learning resources that were individually tailored to their own interests. The best of these additional resources were linked to the learning management system and have been used in subsequent years.

- **Reflective learning journals provide an environment for developing reflective practice**

In the context of BPM education, assigning reflective learning journals can be seen as an approach to developing graduates' abilities to apply reflective thinking when faced with the variety of situations that they might encounter. The assessment mechanism described and analysed in this paper was designed to develop a reflective mind-set among students rather than formally assess their ability to "think on their feet". In this respect, the reflective journal assignment provides the framework to create a reflective learning environment that encourages students to reflect on their learning. The course designer can facilitate a reflective learning environment for developing students' reflective capabilities through the provision of orientation material outlining the purpose of the assessment together with general guidance on how to construct journal entries. Furthermore, students should be provided with feedback throughout the semester. This can take the form of formal written feedback as well as opportunities in class for students to informally share their reflections during class in small groups.

Many BPM courses include project work (frequently in teams) in which students analyse and report on "real-world" business processes. In such cases, students should be encouraged to keep a journal of their experiences in relation to their interactions with the client organisation as well as the dynamics of their project team. The reflective thinking component may then be incorporated as an individual submission of the group assignment.

- **Reflective learning journals provide for both formative and summative assessment**

The assignment contained both formative and summative elements with the dual objectives of firstly consolidating the content of the unit and secondly to engaging students in reflective practice by relating the content to personal experience. Formative assessment is increasingly recognised as good teaching practice by providing a way of shaping students learning and developing competencies (Sadler, 1989). When combined with feedback, formative assessment can provide students with opportunities to “develop a better understanding of their own learning activities combined with an understanding of learning for life” (Olofsson, Lindberg, & Hauge, 2011), p.184). As was discovered in the analysis and evaluation of journal entries, reflection does not necessarily come easily to all students – whether due to an innate hesitancy in expressing personal thoughts or a lack of real-world experience. The reflective journal assignment therefore provided a scaffold for students to develop reflective capabilities prior to applying them in real-world scenarios.

While the primary objective of the reflective journal assessment was to engage students in the subject matter by relating it to personal experiences or understanding as illustrated in Table 5, at the end of the semester each student’s collection of journal entries forms the basis for their understanding of the unit as an integrated whole. Thus reading a student’s journal entries should in essence summarise their understanding of multiple concepts and form the basis of their exam preparation (summative assessment).

9.2. *Limitations of the study*

The objective of this paper is to demonstrate how reflective learning journals can be effectively used in BPM education. To meet this objective, Leximancer has been used as a qualitative data analysis platform for investigating *what* students write about in their reflections as well as *how* they construct their analyses. While the Leximancer software lends itself to a highly quantitative approach to text analysis, the analysis of the concepts and themes that emerged from student journals should not be interpreted in a positivistic sense. The software has been used in this study to merely surface what students chose to write about in their journals. While the output provides an indication of the key concepts and themes, there are too many uncontrolled variables at play to test hypotheses or generalise the findings. For example, the comparison between themes identified for the entire sample and themes by cohort and enrolment in Table 3 and Table 4 at a very general level shows little variation in themes. A more fine grained analysis on smaller samples however, which takes into account a variety of factors, such as the student nationality, work and educational background, year of study, week of submission etc., would be necessary to remove any panel effects and bias inherent in the analyses. Similarly, the pathway analyses depicted in Fig. 2 are for illustrative purposes only.

The distribution of grades indicating the quality of student reflections depicted in Table 5 should also be read with caution. A more formal study, which aims to examine how student reflections developed, would involve multiple coders categorising each journal entry and include an analysis of inter-rater reliability. In this study, all entries were rated at the time of submission by a single coder. While a standard marking guide was used in rating journal entries, the grading does not account for variations in the student cohort or the time period in which they were marked.

10. Conclusion

The education of BPM professionals relies on more than just developing their understanding of concepts and frameworks that they can apply in practice. In addition, it is important that BPM professionals are able to think on their feet and take appropriate courses of action as they arise. These capabilities require students to develop skills in reflective and critical thinking. In this paper, the use of reflective journals as a means of formative assessment in a BPM unit has been described. The content analysis of student journal entries has also illustrated how students use reflective journals to develop their understanding of concepts and integrate these concepts across the course of a semester.

The benefits of using reflective journals in BPM education arise from developing a reflective learning environment in which students are given the relative freedom and autonomy to explore and reflect on topics of their choosing and to personally tailor a set of additional readings and resources. When coupled with other forms of assessment such as real-life project work, well designed reflective journal assessments have the potential to become a valuable tool in teaching BPM.

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