

### **Educational/pedagogical issues**

Business has transformed in the social media era. However, the business education system is still inadequate for preparing students to meet the requirements of business transformation in this era. This study suggests that new pedagogies in a university learning environment that business students are provided with social media and text mining tools in new product development (NPD). The study is designed to illustrate the application of social media and text mining in NPD. Students are provided with first-hand experience of the NPD cycle via role-play exercises. The exercises allow the students to act as R&D managers and designers. Role-plays can also teach students how to develop their products. Students identify the “voice of the customer” by text mining skills and techniques by means of different social media platforms (e.g., customer blogs). Students should find related information on product features, prices, and customer views on the product and services via the Internet or social media platforms. The simulations provide students with a “live” chance to experience the changes of NPD in the new social media era by applying key tools (e.g., social media, rich site summary, and text analytics) and techniques and best practices. We adopt a learning-by-doing method in class. This activity is an active means of learning text analytics. We provide actual scenarios and allow students to conduct the

exercise through “learning by doing.” These activities help students not only review the course material before applying suitable skills and techniques, but also enjoy learning about cases by actual analysis of real-world scenarios in NPD. This study examines student attitudes toward introductory learning of social media and text mining via a NPD exercise using a non-traditional teaching approach. The quantitative data on student perceptions and value of the assignments in supporting the learning outcomes are collected. Evaluation results indicate that this teaching approach can achieve the intended outcomes and make learning more enjoyable, worthwhile and challenging than traditional textbook-based learning. This proposed teaching and learning approach uses learning-discovery pedagogy to address business transformation in the social media era. It can enhance the knowledge and skills of students to integrate social media and text mining so as to meet the requirements of their future employers.

### **Methodology adopted for conducting this study**

The main research activities of the study fell into three strands: literature review, resources developed relates to social media and texting mining and case studies. An iterative approach was adopted with considerable interplay and synergy between these strands. Then we developed two sets of questions to evaluate the developed case material and get the students feedback. The study is designed to illustrate the application of social media and text mining in new product development (NPD). Students are provided with first-hand experience of the NPD cycle via role-play exercises. Learning by doing approach for teaching NPD is used.

### **Learning by doing approach for teaching NPD**

The Internet provides a new platform for collaborating with a large number of customers in product innovation and Internet-based collaboration mechanisms can benefit NPD process where customer involvement is needed or desirable (Sawhney, Verona, and Prandelli, 2005). Social media is a set of Internet-based applications that have revolutionized the ways customers expressing interests and providing feedbacks of products (Kaplan and Haenlein, 2010; Grégoire, Salle, and Tripp, 2015). Firms can benefit from social media by leveraging text mining tools to gather relevant information from social networks across various stages of NPD cycle, including but not limited to, idea generation, new product development and launch, as well as pre- and post-launch tracking (Kalypso, 2011).

Learning by doing (or experiential learning) is more effective pedagogy than traditional textbook-based learning for teaching “how to” apply text mining to analyze unstructured information social media (Schank, Berman, and Macpherson, 1999). Classic learning-by-doing cycle proposed by Kolb (1984) emphasizes learning through reflection on doing that can be realized through four learning-by-doing stages: 1) provide concrete experiences to the learner, 2) facilitate the learner to reflect on their observations and experiences, 3) enable the learner to create concepts from the new experiences, and 4) apply the concepts to make decisions and solve problems. The effectiveness of learning by doing will be maximized when the learner is interested in the domain and scenario (Schank, Berman, and Macpherson, 1999).

A learning-by-doing model for teaching NPD in the social media era was derived from Kolb’s framework, as shown in Figure 1. In our proposed model, NPD processes are used to develop real-world scenarios for the learner to acquire the skills and knowledge required for effectively applying text mining tools throughout the NPD cycle. First, these real-world scenarios form the basis for developing in-class exercises and self-learning activities to provide the concrete experiences of social media and text mining techniques in NPD (learning-by-doing stage 1). Second, class discussions provide opportunities for the learner to reflect on their learning experiences by discussing with others (learning-by-doing stage 2). Last, collaborative learning groups can facilitate the learner to integrate their learning experience to create concepts from group dynamics and then put what they have learnt into practice through project work (learning-by-doing stages 3 and 4).

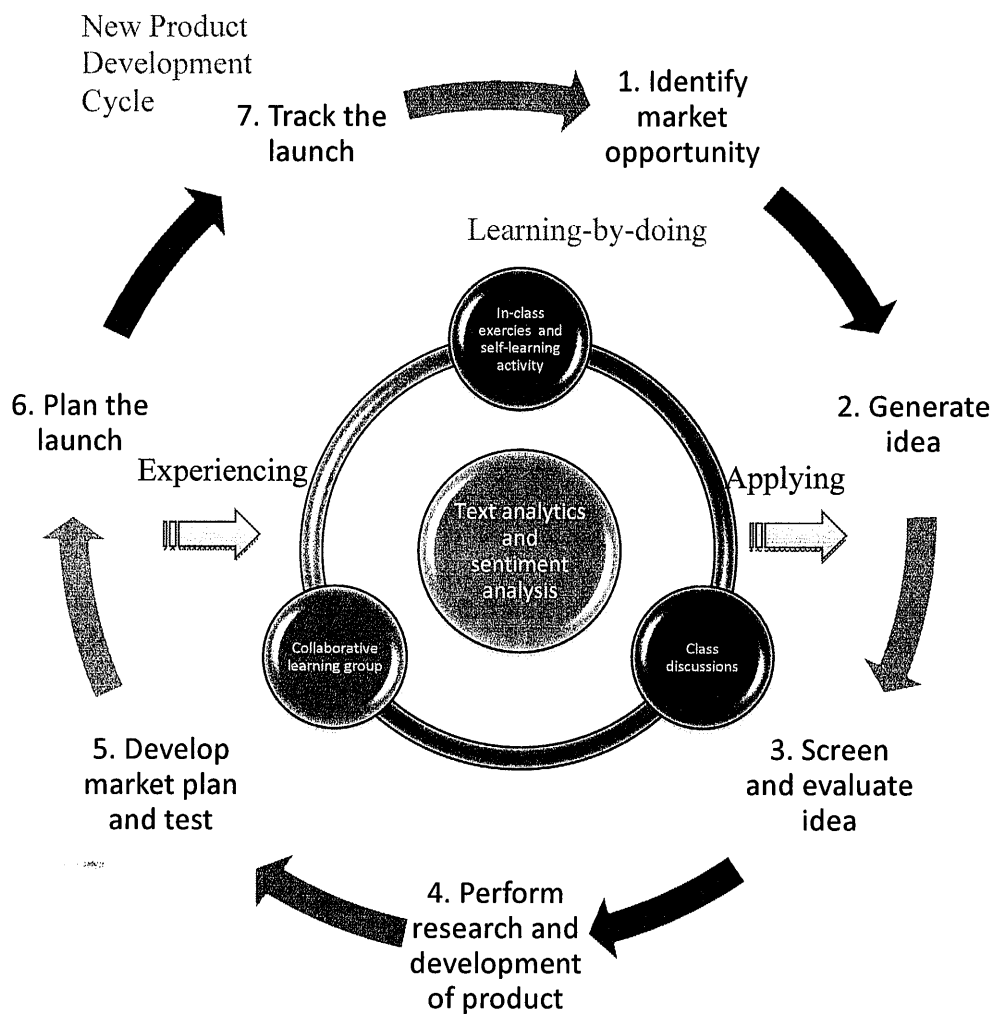


Figure 1 NPD Learning-by-doing model

## Conclusions and Implications

The survey suggests that students taking the course and completing the exercises using learning by doing approach in NPD find that the simulation exercises valuable for improving their understanding of the NPP learning objectives.

Our result showed that students have positive feedback towards this learning activity. First, the study confirmed that students have improved the basic knowledge of the social media and text mining after the learning activity. Second, the study confirmed that students achieved most of the learning objectives of the exercises. Third, the study also showed that students were highly involved and satisfied with respect to the activity. Fourth, the study also showed the positive impression towards the exercises. Therefore, the result proved that the learning activity is effective in achieving the intended learning outcomes which related to the understanding the voice of customers over the social media platform, text analytic knowledge and techniques.

The results of the comparison between the pre and post-questionnaire show that the perceived knowledge of students towards the concepts of text mining and social media have improved after the exercises. The independent t-test was conducted to indicate whether the change in mean score was significant with respect to students' knowledge before and after the exercise. The result showed that all mean scores of perceived knowledge towards the concepts of text mining and social media in the post-questionnaire were all found to be significantly higher than those in the pre-questionnaire at the  $p \leq 0.05$  level (Appendix). An increase in the mean score indicates that the respondents agreed more strongly with the items after experiencing the learning activity, they are familiar with the application of social media after the exercise, they found that they are more familiar with the importance of the word-of-mouth marketing (mean = 5.55, t-value = 6.269)

Beyond the analysis about the effect of learning activity on students' knowledge, analysis on whether the learning objectives, students' involvement & satisfaction and Overall impression are also conducted. In general, result demonstrated the learning objectives have been achieved. It is because most of the items which measure learning objectives are higher than the neutral value 4 and the differences are significant. There are three items with the highest mean Likert score are those that students agreed with most strongly. For instances, students strongly agreed that using text mining to analyze the voice of customers helps them critically evaluate consumer behavior for themselves and others (mean = 5.76, t-value =11.644), understand the marketing solutions of services (mean = 5.45, t-value =11.75) and identify where shortcomings may occur in the service experience (mean = 5.7, t-value =11.506). The results also showed that the text mining tools aids in producing a high level of involvement in the course (mean = 5.09, t-value =4.476) and helping students to achieve overall satisfaction within the course (mean= 5.12, t-value = 5.796)

Overall, the result indicated that students found completing the learning activity is enjoyable (mean= 4.7, t-value = 2.582), worthwhile (mean= 5.52, t-value = 7.089) and challenging. Students found this learning activities help them learn the concept of social media and text mining well (mean= 5.58, t-value = 7.386), and it can represent well the reality of new product development process (mean= 5.3, t-value = 6.051).

This approach offers and excellent example for applying text mining and social media in NPD for knowledge transfer to companies by engaging them in student project. It also demonstrates that the social media and text mining technologies can meet actual business needs in NPD. Our findings also have implications for learning-by-doing approach that can be used to students in learning NPD.

## Appendix

Pre and Post						
<b>Part 1. Knowledge</b>		<b>Pre</b>		<b>Post</b>		<b>Significance level</b>
		<b>Mean</b>	<b>S.D.</b>	<b>Mean</b>	<b>S.D.</b>	
<b>1.1</b>	How familiar are you with the concept of social media.	4.81	1.029	5.3600	0.8950	<b>.013</b>
<b>1.2</b>	How familiar are you with the application of social media other than the purpose of social networking.	4.44	1.04	5.0600	1.1160	<b>.011</b>
<b>1.3</b>	How familiar are you with the importance of the word-of-mouth marketing.	4.47	1.339	5.5500	1.4160	<b>.001</b>
<b>1.4</b>	How familiar are you with the concept of text mining.	3.89	1.239	4.8800	1.3640	<b>.001</b>
<b>1.5</b>	How familiar are you with the process of text mining?	3.7	1.28	4.9100	1.5880	<b>.000</b>
<b>1.6</b>	How familiar are you with the application of text mining tools?	3.39	1.309	4.1800	1.5700	<b>.013</b>
POST						
<b>Part 2. Learning Objective</b>				<b>Mean</b>	<b>S.D</b>	<b>t-value</b>
<b>2.1</b>	Using text mining to analyze the voice of customers helps me to critically evaluate consumer behavior for myself and others.			5.76	.867	11.644
<b>2.2</b>	Using text mining to analyze the voice of customers helps me understand the interactions between cognition, affect, and behavior.			5.48	.906	9.419
<b>2.3</b>	Using text mining to analyze the voice of customers helps me to predict market conditions that contribute to consumption decisions.			5.70	.984	9.909

2.4	Using text mining to analyze the voice of customers helps me explain how marketing interacts with cultural norms.	5.21	.960	7.250
2.5	Using text mining to analyze the voice of customers helps me assess ethical implications of marketing strategy.	4.82	.917	5.125
2.6	Using text mining to analyze the voice of customers helps me understand the marketing solutions of services.	5.45	.711	11.750
2.7	Using text mining to analyze the voice of customers helps me identify how services target consumer segments.	5.52	1.093	7.962
2.8	Using text mining to analyze the voice of customers helps me understand how services segment in a global economy.	4.97	1.045	5.329
2.9	Using text mining to analyze the voice of customers helps me identify where shortcomings may occur in the service experience.	5.70	.847	11.506
2.10	There has been at least one time that I have read the voice of customers from forum that caused me to think more in depth about consumer behavior.	5.88	1.219	8.857
<b>Part 3. Involvement &amp; satisfaction</b>		<b>Mean</b>	<b>S.D</b>	<b>t-value</b>
3.1	Text mining tools aids in producing a high level of involvement in the course.	5.09	1.400	4.476
3.2	Text mining tools aids in achieving overall satisfaction with the course.	5.12	1.111	5.796
<b>Part 4. Overall impression</b>		<b>Mean</b>	<b>S.D</b>	<b>t-value</b>
4.1	I found completing this exercise is enjoyable.	4.70	1.551	2.582
4.2	I found it is difficult to complete this exercise.	4.21	1.386	0.879
4.3	I found this exercise was a worthwhile learning experience.	5.52	1.228	7.089
4.4	I found this exercise helps me learn the concept of social media and text mining well.	5.58	1.226	7.386
4.5	I found the stroller exercise challenging and it represents fairly well the reality of new product development process.	5.30	1.237	6.051

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