Reforming banking pedagogy with online simulation

Final Report

Monash University

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www.fms247.com.au/BankSimulator/login.jsp

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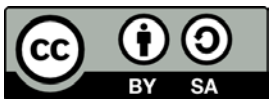

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Executive summary

The aims of the seed project were to: (i) pilot a 'bank lending environment' online simulation software programme; (ii) measure the student engagement with the online 'bank lending environment' simulation; (iii) evaluate the impact of the online 'bank lending environment' on student learning outcomes; and (iv) disseminate the module to the higher education sector.

The project was successful in rolling out the simulation in semester 2, 2013 to students at Monash University, Caulfield Campus with a cohort of 230 students. A dataset publically available on the internet generating the loan requests was used. The first weeks of the semester were taken up by providing the necessary theoretical framework to sound lending practices. Equipped with the essential guidance to evaluate loan applications, students were then granted access to the web based on-line bank simulator to put into practise what they have learnt. Weeks 1 and 2 of the simulation were spent evaluating loan application requests. Each student received more than 30 applications over the two weeks and each request had 20 personal attributes like income, employment history etc. to be used as a basis for assessing credit quality.

The student's role was to assess the credit quality of each of the applicants whilst attempting to build at least a loan portfolio of $1.25m. The subsequent week (week 3) then took them to being branch managers where they had to assess delinquent accounts that resulted as a consequence of other students incorrectly granting loans to applicants that defaulted on their loans. At this stage they needed to determine whether to call the loan in or roll it over for another term. Finally, the student played the role of a state manager where he/she needed to holistically evaluate the loan portfolio, on a risk/return basis.

The overall accuracy of the student cohort recorded was 71 per cent, slightly lower than industry standards. Based on gender, the female cohort was more accurate in their decision making processes, opening up the discussion whether there is a gender issue in critically assessing information and executing decisions as a result of such information. The overall total assessment mark for the bank lending unit in semester 2 was compared with the previous semester (where the bank simulator was not offered) and it was found that the overall mark in the semester 2 was 13 per cent higher than semester 1. While such an increase cannot be wholly and directly attributed to the simulator, the team considers that on-line tools facilitate students' learning.

The blended learning approach of a sound theoretical framework followed by a hands-on task is an effective way to reform banking pedagogy in Australia. The classical text book approach has its merits; however, innovation to deliver high quality teaching aides to the students within the context of today's dynamic world of information technology is important. Sound lending practices could be learnt through simulation. This has pedagogical implications for banking and finance undergraduate and postgraduate studies. A hands-on approach via a web-based module allows students to relate, understand and interpret the theoretical lending framework more affectively. From a conceptual perspective, it emulates what happens in industry providing them with a more realistic scenario of the lending environment. The current module is a proof of concept and positions the work for further development. The challenge ahead lies with fully operationalising the credit scoring process within qualitative and quantitative parameters. Corporate sector applicants would also need to be included to fully represent a bank's loan portfolio. Once the retail and corporate modules are fully operational, the modules could easily be offered to all authorised universities to be embedded within their bank lending curriculum. The benefit of web-based simulation allows accessibility to all authorised users via their laptops and phones and at their own convenience, providing them with the necessary flexibility to learn effectively in their own time. Finally, with the right approach there is an opportunity to and be a leader in teaching sound banking practices within the Asian-Pacific region across tertiary institutions.

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Chapter 1: Objective of Seed Grant

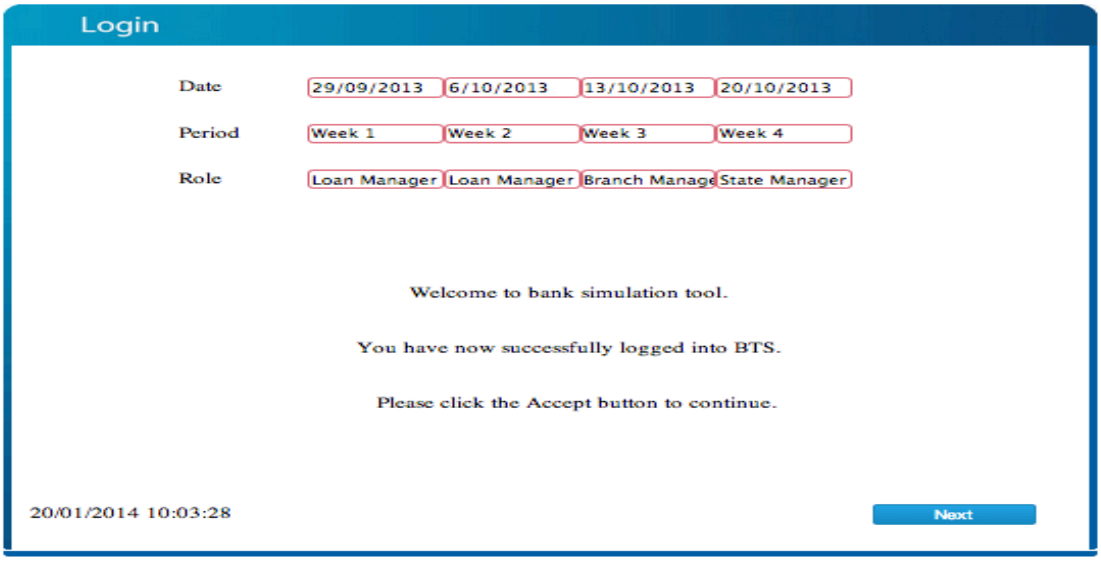
The specific aims of the seed grant were to:

1. Pilot a bank lending online simulation module
2. Assess the students' engagement
3. Evaluate the simulation module on their learning outcomes
4. Disseminate the module to the higher education sector.

The team set out to develop a web based loan bank simulation module, teaching the students the necessary skills to maintain a loan portfolio, emulating the industry in terms of: granting/declining new loan applications; handling of problematic accounts; and reporting the overall loan position performance to the Asset/Liability committee, mainly highlighting the accuracy levels of the credit scoring models, the overall risk and return of the loan portfolio.

The portal login is demonstrated in Figure 1, where the student is advised when he/she will be taking up different roles throughout the simulation period. Students were allocated with loan targets of a maximum of $1.25 million and were required to meet such target.

Figure 1: Portal login



The students' engagement with respect to their decision making process based on 20 customer attributes discussed further in Figure 3 was measured and assessed. The dataset was downloaded from the following site which represents real life credit outcomes made available by a German bank:
http://archive.ics.uci.edu/ml/datasets/Statlog+(German+Credit+Data)

Therefore from the outset of the project the team knew which loans would not default and which ones defaulted. Furthermore, in terms of evaluating students' understanding of the simulation module on their learning outcomes, a maximum of 10 per cent assessment mark for students' participation and performance was allocated. Students that engaged in this simulation would be enrolled in AFF3841: Lending Analysis and Credit Management. This is a third year unit and is part of the Banking and Finance undergraduate degree offered at Caulfield Campus. In addition, the students that scored well in the simulation module and performed well overall in AFF3841, were monitored. There is a high correlation between simulation performance and overall performance, suggesting that students performing poorly in this simulation may be identified as high risk students. Therefore, it is the intention

to develop strategies with students that perform poorly in the simulation that assist them in their subsequent assessments.

Finally, after software enhancements to make this module more effective have been implemented, the tool will be disseminated to the wider higher education community for the benefit of tertiary educated students.

Chapter 2: Specified outcomes and deliverables

1. Develop an online simulation:
The simulation is a web-based tool, where students are granted access to engage in a four week exercise programme. Each student is granted access to a randomised loan portfolio through an algorithm which arbitrarily allocates loan applications selected from a dataset. After successfully accessing the following site: www.fms247.com.au/BankSimulator/login.jsp students taken on various roles ranging from loan manager to state manager within the bank's internal hierarchy.

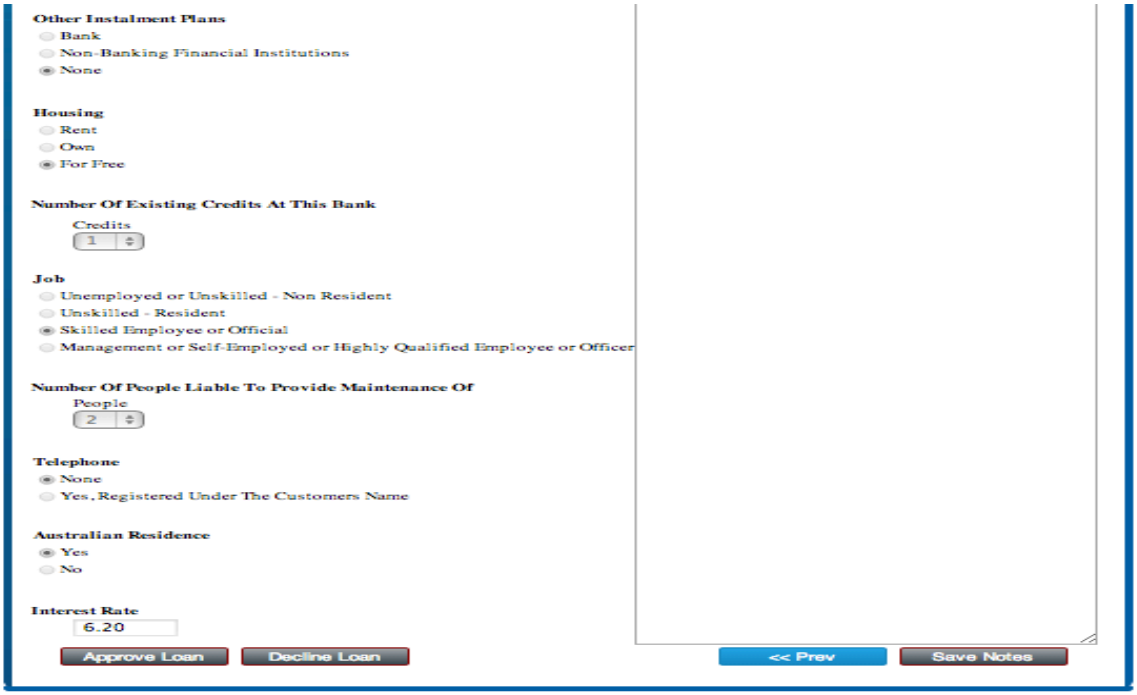
Weeks 1 to 2 – Loan managers: Throughout this period, students receive loan requests from new applicants. Based on the 20 personal attributes demonstrated in Figure 3, students are required to assess which loans to grant or decline. Students are given a limit of $1.25m and they are required to allocate such funds to match loan requests they deem appropriate.

Figure 2: List of approved and declined loans

Week 3 – Branch managers: At this stage the student moves on from a loan manager to a higher level, i.e. branch manager, where he/she would overview a number of loan portfolios valued at least $1.25m each and the student now needs to address the problematic

accounts which defaulted as a result of the loan manager's decision. So the simulation randomly collates three or four loan portfolios created by other students in Weeks 1 and 2 and the student in Week 3 needs to decide what course of action is required to address the problematic customers. Delinquent customers may occur for a number of reasons, loss of job, health issues preventing the customer to repay the outstanding loans, death etc. So the student is now a branch manager and needs to decide how to tackle problematic loan accounts. The branch manager has a number of choices available which mainly range from rolling over the loan to calling the loan in and realising the collateral.

Figure 3: List of attributes



Week 4: State manager: This is where the student plays the more senior, head office/centralised role of state manager. The focus shifts from an individual loan to a loan portfolio, where the importance is not on individual loan outcomes but on loan portfolio management. The student is provided with statistics and analysis that is automatically generated based on a number of branch manager loan portfolios and based on such results, the state manager needs to submit a report to the Asset-Liability Committee, i.e. to the bank's executive committee overseeing the bank's loan performance. This is one of the crucial reports a bank looks at very carefully on a monthly basis as it determines the performance of their largest asset – i.e. their loan portfolio.

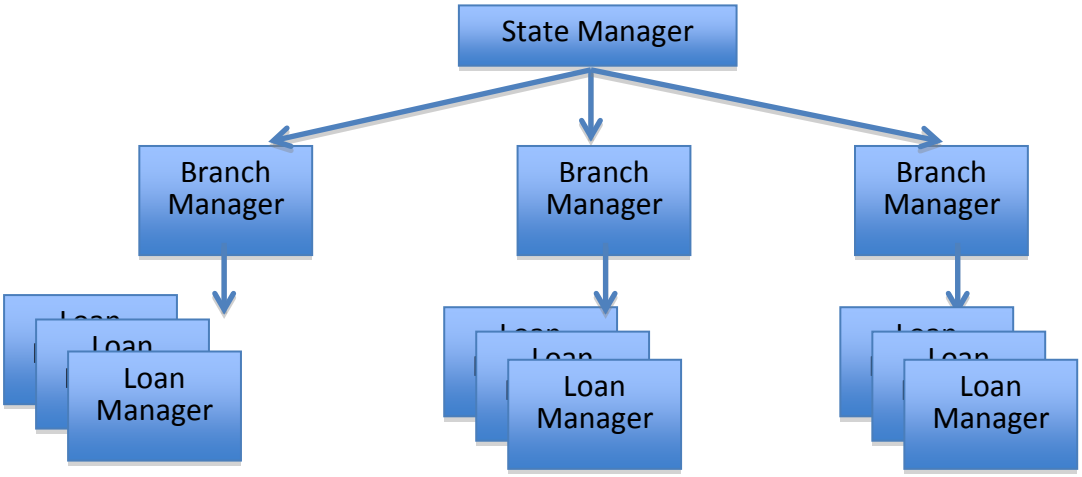
2. Development of an online frequently asked questions resource and trouble-shooting manual:

A list of FAQs with an operations manual consisting of screen dumps has been drawn up and made available to students participating in the simulation. This is sourced from both the website generating the simulation and also from Monash's teaching platform known as 'Moodle'.

3. Development of a preliminary evaluation and summary document

To the best of our knowledge this is the first loan simulation of this type in Australia within the banking and finance education field, providing students with a real life simulation of the banking industry at various stages of the bank's internal hierarchy. It is divided into three different roles, each one adding more responsibility and all part of the decision making process both at a micro and macro level. At every stage of the process, the team has allowed students to write notes within the simulator explaining their decision making processes. This provides educators with direct feedback as regards their train of thoughts leading up to their decision making. With this level of information, there is an audit trail where high risk students could be identified and provided with the necessary guidance and support to enhance their learning experience.

Figure 4: Overall architecture of the bank simulator



Overall, the total accuracy rate of the student cohort from Semester 2, 2013 was 71 per cent, which although is slightly below industry standards is still a satisfactory result. The female cohort scored higher, i.e. 77 per cent, whilst the male cohort recorded 68 per cent. The team is currently reviewing the notes recorded by the whole cohort to see if there were any trends or inconsistencies in their decision-making processes. The student's overall AFF3841 unit assessment mark was compared between two consecutive semesters and a 13 per cent improvement was noted. Results of prior semesters were also compared and students' unit assessment mark consistently outperformed all semesters. While the improvement cannot be directly attributed to the simulator, the initial results are very promising.

The team was also able to identify students with low accuracy rates on their Weeks 1 and 2 outputs and asked them to attend consultation sessions to rectify any issues or misconceptions. A similar scenario with students that had unsatisfactorily completed Weeks 3 and 4 was undertaken.

4. Dissemination via a mailing list, newsletter, conference presentation and journal publication

In December 2013, the project and research findings were presented at the Higher Education Research & the Student Learning Experience in Business (HERSLEB) conference at The University of Melbourne. The project was well received and the feedback was positive. It is intended that project findings will be published in educational journals after the software enhancements are completed. The paper would discuss the decision-making processes that students utilise in building their loan portfolio.

Chapter 3: Conclusion

The main objective of this simulation was to assist educators in their endeavour to facilitate the process of credit scoring within the banking pedagogical environment. The traditional approach of using text books and case studies has its merits; however, as educators there is

a need to innovate the teaching practices for the benefit of the entire student cohort. A web-based teaching tool is one way to stimulate students and engage them further in achieving their learning outcomes. The team believes that this 'proof of concept' in terms of online simulation is beneficial towards the students' learning processes. It is dynamic, hands on and emulates a banking environment. It also provides students with rapid feedback in terms of their decision making processes. The total accuracy rate was 71 per cent, a reasonably good return on a loan portfolio worth millions of dollars; however, further changes are required to enhance the total learning experience:

1. Fully operationalise the credit scoring process with the use of linear and non-linear models. This will minimise subjectivity with respect to the granting of loans and ensure that decisions are determined on both qualitative and quantitative parameters.
2. The management of the delinquent accounts and the risk/return profile of loan portfolios is another important tool within this module that needs further enhancements in order to meet the ever changing industry needs our students will be working in. The concept of "procyclical" events needs to be incorporated within the module as banks enter and exit different stages of business cycles.

Finally, the team is extremely grateful to be the recipient of this seed grant. It has been an excellent opportunity to innovative and deliver a web-based module for the students. The initial feedback received from students was positive; however, the team would like to further develop other relevant concepts. The team intends to continue innovating banking pedagogy in Australia with a view to being leaders in this area within the Asian-Pacific region.