# Mining NZQA's External Evaluation and Review Data

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## ABSTRACT

New Zealand Qualifications Authority (NZQA) evaluates Tertiary Education Organizations (TEO's) on their educational performance and capability in self-assessment by using External Evaluation and Review (EER) report system. The EER process is managed using various tools, including the six open ended key evaluation questions (KEQ's). On the basis of these questions, summary of educational performance and capability in self-assessment, TEO is classified into one of four different categories; Highly Confident (HC), Confident (C), Not Yet Confident (NYC), and Not Confident (NC). NZQA has made these reports available publically. This paper highlights the use of data mining to analyze NZQA's EER data for finding useful information.

**Keywords**: New Zealand Qualifications Authority, External Evaluation and Review, Data Mining, Clustering

## 1. INTRODUCTION

New Zealand Qualifications Authority (NZQA) is a government agency responsible for certifying Tertiary Education Organizations (TEO) and quality assurance of qualifications. It ensures NZ qualifications are valued as credible and robust both nationally and internationally. NZQA uses a systematic process of educational review system called External Evaluation and Review (EER) to judge the performance and quality of different TEOs. These judgments are stated as statement of confidence where Educational Performance (EP) represents quality and value of learners and the wider community (employers, regions, local or national interests) and Capability in Self-Assessment (CSA) uses self-assessment information to understand performance and bring about improvement. The EER report is categorized into four levels of confidence based on TEO's EP and CSA. They are Highly Confident (HC), Confident (C), Not Yet Confident (NYO) or Not Confident (NC).

NZQA uses six Key Evaluation Questions (KEQs); high level open ended questions which focus on either the outcomes achieved or the key processes contributing to the outcomes gained in tertiary education.

This paper introduces the use of data mining techniques for the analsys of NQA's EER data, while presenting the preliminary results



**Figure 1 Poster for presentation**

## 2. BACKGROUND

NZQA Evaluative quality assurance framework was implemented by NZQA in 2009 and at the same time they began with administering the process of EER with Private Training Establishments (PTE). The periodic EER occurs at least once every four years. The thorough EER report consists of the details of TEO, scope of EER, the process of conducting EER and the summary of results after TEO is assessed on educational performance and judged on the capability in self-confidence. It also contains answers to the Key Evaluation Questions (KEQs) and the summary of educational performance (SummaryEP) and summary of capability in self-assessment (SummaryCSA). The six KEQs are as follows:

**Table 1 The Six Key Evaluation Questions**

| | |
|---|---|
| KEQ 1 | How well do learners achieve? |
| KEQ 2 | What is the value of the outcomes for key stakeholders, including learners? |
| KEQ 3 | How well do programs and activities match the needs of learners and other stakeholders? |
| KEQ 4 | How effective is the teaching? |
| KEQ 5 | How well are learners guided and supported? |
| KEQ 6 | How effective are governance and management is supporting educational achievement? |

The institutions are categorized on the basis of statement of confidence[1].

**Table 2 Categories on the basis of statement of confidence**

| | |
|---|---|
| Category 1 | Either Highly Confident in educational performance and organizational capability in self-confidence or Highly Confident in educational performance and Confident in organizational capability in self-confidence. |
| Category 2 | Both Confident in educational performance and organizational capability in self-confidence or Highly Confident in organizational capability in self-confidence and Confident in educational performance. |
| Category 3 | Not Yet Confident in educational performance and/or organizational capability in self-confidence statement. |
| Category 4 | Not Confident in educational performance and / or organizational capability in self-confidence statement. |

## 3. MINING NZQA DATA

The EER reports are stored online in .pdf format and made it available to public to download from the website[2].

Before mining NZQA data, an important step of data pre-processing was done to clean and formate the data as the
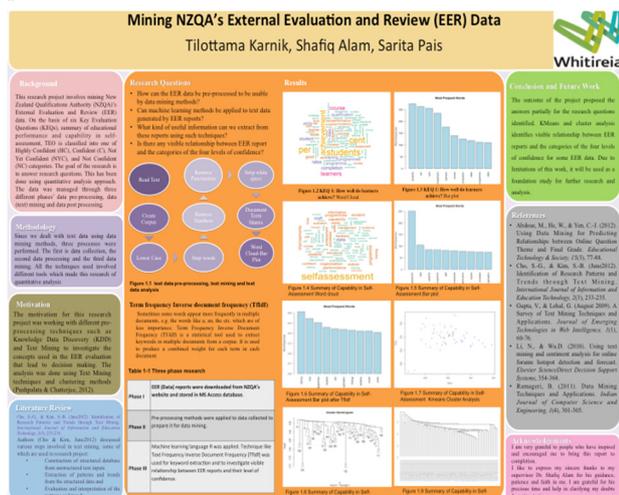
downloaded data from the websites may be incomplete, lack in certain attribute values, noisy i.e. may contain errors or outliers, and may contain irregularity in codes or names. It is stated that data pre-processing consumes about 60-80% of KDD (Han, Kamber, & Pei). Once the data is pre-processed accurately, data mining algorithms extract unknown, interesting and useful knowledge from the datasets using clustering (Pushpalata & Chatterjee, 2012), classification (Parimala & Dr Nallaswamy, 2012), and othe interesting patterns.

One of the basic pre-processing step is to find Term Frequency Inverse Document Frequency (tf /idf); finding widely used terms/keywords in the corpus. Term frequency of a document is number of times a term appears in that document.. It is calculated as; TfIdf = TF * IDF. Figure 2 shows the wordcloud of 60 different EER reports; highlighting the most important terms used in the KEQ 1.



**Figure 2 Word Cloud KEQ 1**

After the basic pre-processing, world cloud, and tfidf, we applied data mining algorithms on the data. The results for K-mean clustering method are shown in Figure 3. Different colours in the plot represent different categories of EER report, highlighting the fact that similar reports are accurately coloured using k-means clustering.



**Figure 3 Cluster plot SummaryEP**

Next we performed hierarchical clustering on the EER report. A cluster plot, a 4 cluster dendrogram and a simple dendrogram were plotted. Different level of the dendrogram shows the similarity of EER reports.



**Figure 4 Cluster dendrogram for SummaryCSA**

# 4. SUMAMRY, CONCLUSIONS, AND FUTURE WORK

This paper presents the preliminary analysis of EER reports using Data mining methods. The results for pre-processing and clustering are presented in the graphs and wordclouds showing some of the important terms that are used in different sections of EER. Data clustering has highlighted the relationship between different reports based on their similarities and dissimilarities. However, further analysis is required to find the relationship of the contents of the EER reports to the EER decision statement.

To the best of our knowledge, a research in data mining of EER reports was not done, so it was hard to compare the results against any benchmark.

As this is research in progress, we would continue with using further data mining algorithms such as classification, and sentiment analysis to furtherexplore the EER reports.

# 5. REFERENCES

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