Sentiment Analysis of the Academic Services of ESSU Salcedo Campus using Plutchik Model And Latent Dirichlet Allocation Algorithm

Hershey R. Alburo, Cherry Lyn C. Sta. Romana, Larmie S. Feliscuzo

Abstract: The continuous pursuit of quality education has always been a concern of higher institutions. This can be seen in the way university teachers deliver academic services to the students in terms of professionalism, commitment, knowledge of the subject matter, teaching for independent learning, and management of learning. Students as recipients of these services are significant sources of information about their course interaction that takes place in an educational system. Utilizing Latent Dirichlet Allocation (LDA) algorithm and sentiment analysis through NRC emotion lexicons based on Plutchik Model, this study aimed to decipher students’ sentiments of the academic services and reveal commonalities contained in their qualitative responses. Results revealed five latent themes in the students’ responses as: The Disparity of Teaching Assignment to Professors Field of Expertise, Professors’ Expression of Willingness to Help Students in School-Related Matters, Desirable Traits Portrayed by a Professional Teacher, Professor’s Commitment and Dedication to Classroom Instruction, and Enhancement of Teaching Practices to Improve Quality of Academic Services. The results also suggest that majority of the students have a positive sentiments (64.42%), some of were negative (34.62%), and very few were neutral (0.95%). This study aimed to give inputs to any academic interventions undertaken by institution.

Keywords: LDA, Sentiment Analysis, Plutchik, Academic Services, ESSU Salcedo, Philippines

I. INTRODUCTION

One of the pressing concerns in higher education institutions is the enormous amount of academic data and in finding ways to use them to improve the delivery of the academic programs and services and thereby enhance managerial decisions. These data are products of the interaction between the students and the university teachers contained in an educational system that could be a traditional classroom or a web-based educational system. The primary function of university faculty is to provide quality academic services to the students where Sembering, believed that faculty performance can strongly affect levels of satisfaction and dissatisfaction of students and will eventually influence their success or failure in learning. In this paper, the academic services are referred to as how professors display professionalism, how they show commitment, how they exhibit knowledge of the subject matter, how they teach students to be independent learners, and how they manage learning opportunities in the classroom. While most institutions rely on numbers and charts to analyze data, it lacks the ability to reveal hidden information. In a state-owned university, surveying students responses related to instructors performance is limited to a questionnaire distributed per semester. However, students, considered as the heart of the university, are rich sources of information about how they actually feel in their learning environment, their satisfaction of the course, the methods of instruction, and their total assessment as a student in that university. Considering the opinions of students through sentiment analysis is an important base in the decision-making of the academic institution under study. Opinions are the heart of all human activities and are key influencers of human behaviors. Opinions, sentiments, evaluations, attitudes, and emotions are subjects of study of sentiment analysis and opinion mining. Sentiment analysis analyses people’s opinions, sentiments, evaluations, appraisals, attitudes, and emotions towards entities such as products, services, organizations, individuals, issues, events, and their attributes. Sentiment analysis coupled with the applications of Latent Dirichlet Allocation in the academe has grown from understanding students’ learning practices, analyzing journals of preservice teachers, up to extracting students written responses of teacher leadership dilemma. In this research, views and opinions of college students about the academic services of a state university were collected to decipher their unified thoughts as well as the hidden meaning in their responses. The identification of semantic contents in a corpus increases people’s understanding on what it addresses, the characteristics of that corpus, and the interplay between each topics contained in that corpus. It is on this premise that this study utilized Latent Dirichlet Allocation algorithm and Plutchik wheel of emotions model to extract meaningfully various sentiments, thoughts, and written expressions from the students regarding the quality of the academic services provided by the university to serve as significant inputs in any academic intervention.

II. RESEARCH METHODS

A. Research Design

This research followed a sequential exploratory mixed methods design using a corpus of students’ responses. This is a two-phase design, quantitative and qualitative, in which in the initial phase, data were collected using qualitative analysis, followed by quantitative data generation was employed with a concluding stage of data analysis combining the results.

Manuscript received on February 16, 2021.
Revised Manuscript received on March 08, 2021.
Manuscript published on March 30, 2021.
* Correspondence Author
Hershey R. Alburo*, Eastern Samar State University, Salcedo Campus, Eastern Samar, Philippines Email: alburohershey@gmail.com
Cherry Lyn C. Sta. Romana, Cebu Institute of Technology-University, Cebu City Email: cstaromana@gmail.com
Larmie S. Feliscuzo, Cebu Institute of Technology-University, Cebu City Email: larmie.feliscuzo@gmail.com
To provide answer to the research questions, this study used content analysis using relational analysis and was strengthened by exploring the concepts preselected by the researcher. Relational analysis is also labeled as semantic analysis. This research also followed logical steps in the qualitative data collection from the student-participants, data processing, and themes development. Interpretation of hidden information in the text corpus was done through themes validation.

B. Research Process and Data Analysis

This study utilized the web mining processes to provide answers to the research questions:

![Diagram of Research Process]

**Fig. 1.** The Research Process.

**Data Collection Procedure.** This is the first process done in this research wherein a 4-page interview guide was distributed to college students with at least 2 years residency in a state university in Eastern Samar, Philippines. The said criteria is set to increase reliability and validity of the responses. Before distribution, the said questionnaire which contained open-ended questions, was edited and evaluated by a senior qualitative researcher in the university.

After which, a group interview was conducted to validate their responses. The students are from the three (3) colleges of the state university namely: College of Information and Communication Technology (CICT), College of Education (COED), and College of Agriculture and Allied Sciences (CAAS). A total of 130 student responses were collected.

**Text Pre-processing and Cleaning.** Text mining is a procedure of taking out vital information from large amount of data. In text mining and Natural Language Processing, pre-processing and information retrieval is an important task and critical step since this is the stage where data preprocessing is used for extracting interesting and hidden knowledge from unstructured text also known as corpus. The pre-processing and cleaning methods performed in this research are:

**English Stopwords Removal:** This research removed English stopwords from the corpus that do not have direct relevance in the sentences. These are words that is considered as a connecting function in the sentence, such as articles, prepositions, and others. These words may also have high frequency of occurrence in the documents which are not related to a query as in those documents relevant to a query, such as “at”, “the”, “which”, “is”, and “on”. In cleaning the data, these words were removed before applying any text processing techniques affect which will not influence the final sentiment score of the sentence.

**Stemming Method:** Stemming is a procedure of replacing words with their stem or root. The dimensionality of the Text-Bag of Bag-of Words representation is reduced when a root-related words such as “profession”, “professional”, “professionalism”, are all can be stemmed to the word “profession”, which in turn will decrease the processing time of the final output. This research used N-Gram Stemmer as it is language independent and hence very useful in many applications. An N-Gram is an N-character slice of a long string.

**Term Frequency-Inverse Document Frequency (TF-IDF):** Term Frequency-Inverse Document Frequency (TF-IDF) is a numerical statistic that reveals how important a word is in a collection of documents. Dividing the term frequencies by document frequencies to lower the weight of those words common across all documents is the work of the TF-IDF. Term Frequency (TF) indicates the number of occurrence of a term in a document. In R-programming language, the result is expected to constructs a document-term matrix or a term-document matrix. Other pre-processing techniques used in this research include:

- Stripping White Spaces
- Transforming contents to lower case
- Removing of all punctuation, symbols, numbers, and other characters

**C. Topic Modeling using Unsupervised Learning**

Student satisfaction is a multifaceted process that entails more than potential identification of what they want from the university to achieve better academic services. Understanding sentiments of the students can also be enhanced by identifying or unfolding hidden topics contained in their written and verbal responses. In machine learning and natural language processing, topic modeling methods are used for automatic organization, understanding, searching, and summarizing large electronic files. It is widely used to examine thematic composition of text corpora that is difficult to interpret and adjust. Topic modeling finds human-readable structures in unstructured textual data, and one of the most extensively used technique is the Latent Dirichlet Allocation (LDA). This research utilized Latent Dirichlet Allocation (LDA) to analyze and explore topics over a document collected from a number of students talking about their professors’ delivery of the academic services. Consistent to the assumption of bag-of-words, LDA represents a document as a mixture of potential topics in which a topic has a multinomial distribution over words. Every document will have its mixing proportion of topics and its topic has its word distribution.
Based on an unsupervised Bayesian learning algorithm, LDA captures the potential topics that represents the students’ sentiments contained in their responses. With LDA, one can identify the maximum number of topics, label the topics, and analyze the differences and relative importance of the topics for different text corpus. LDA is a three-layer Bayesian probability model and a complete generative model of a document. A graphical model representation (Figure 2) is adopted from Blei, Ng, and Jordan where the basic idea states that a document represents a random concoctions over possible topics, where categorization of each topic is represented by a distribution of words. Figure 3 represents plane notation, the dependencies among many variables bagged concisely. The boxes are “plates” representing duplicates. The external plate represents the collective choice of topics and words in a document. M denotes the number of documents and N the number of words in the document. Thus:

\[
\begin{align*}
\alpha & \text{ is the parameter of the Dirichlet prior on the per-document topic distributions} \\
\beta & \text{ is the parameter of the Dirichlet prior on the per-topic word distribution} \\
\theta_m & \text{ is the topic distribution for document } m \\
\phi_k & \text{ is the word distribution for topic } k \\
\gamma & \text{ is the specific word} \\
\end{align*}
\]

The \(wij\) are the only observable variables and the other variables are latent variables. In most cases, the basic LDA model is extended to a smoothed version to gain better results. The plane notation is shown in Figure 3 where \(K\) denotes the number of topics considered in the model and is a \(K * V\) (\(V\) is the dimension of the vocabulary) Markov matrix (transition matrix) and each row of denotes the word distribution.

The exact parameter inference of the LDA is difficult, and thus, approximate estimation methods are needed. An appropriate algorithm named Gibbs Sampling is widely used for parameter estimation in topic models due to its simplicity under Dirichlet priors.

Gibbs Sampling Method – MCMC Approach for Validation. One of the Monte Carlo Markov Chain (MCMC) technique appropriate in this research is Gibbs Sampling Method where the basic idea is to generate subsequent samples by sweeping through each variable (or block of variables) to sample from its conditional distribution with the remaining variables fixed to their current values as in Figure 2. The fundamental concept of MCMC sampling is that we can estimate any desired expectation by ergodic averages. That is, we can compute any statistic of a posterior distribution as long as we have \(N\) simulated samples from that distribution. This procedure keeps on until the sample values have the same distribution as if they were ample for the right posterior joint distribution called “convergence.”

D. Sentiment Analysis

Sentiment analysis is fundamentally a text classification problem where it identifies and extracts subjective information from a collection of materials and helped to see social and general persuasion of a particular event. In this research, discovering sentiments of the students regarding the traits of the professors when doing classroom instructions are deciphered using two distinctive sentiment algorithms such as Plutchik Wheel of Emotions and the NRC Word-Emotion Association Lexicon.

Plutchik Wheel of Emotions Model

Sentiment classification using traditional methods mainly classifies documents as positive, negative, and neutral. With Plutchik’s emotional wheel the emotion is more specifically categorized into eight fundamental emotions such as joy and sadness, anger and fear, trust and disgust, and surprise and anticipation. Moreover, Plutchik’s model shows connectivity between the ideas of an emotion circle with a color wheel (Figure 4). The eight emotions are said to be complete since any expressed emotion is related or subsumed by one of the eight emotions. Plutchik revealed that these emotions are culturally and ethnically independent, thus considered appropriate in this research since we can apply this to any given language.

NRC Word-Emotion Association Lexicon

To reinforce the idea of the Plutchik Wheel of Emotions model, this study utilized the NRC Word-Emotion Association lexicon since it encompasses a list of English words and their associations with Plutchik’s eight basic emotions added with two sentiments classified as negative and positive. It involves three variables:

1. TargetWord – this is a word for which emotion associations are provided.
2. AffectCategory – this refers to the eight emotions with the two sentiments (negative and positive).
3. AssociationFlag – has one of the two possible values: 0 or 1; where 0 indicates that the target word has no association with affect category, whereas 1 indicates association.

This list of emotion lexicons enhanced the meaning of the sentiments like in this case - the students sentiments of their professors towards the academic services.
Sentiment Analysis of the Academic Services of ESSU Salcedo Campus using Plutchik Model And Latent Dirichlet Allocation Algorithm

E. Interpretation

This is the final stage of data mining where knowledge generation based on the interpretation of the researchers is being done. The interpretation of this research is based on the theoretical and philosophical of the themes and values generated from the results. Expert reviews, observation notes, and semi-structured interview were considered to provide a triangulated perspective. In-depth articulations of the findings were also made in presenting the analysis part.

In carrying out this research, and in finding answers to the research questions, this study utilized two methods called the Latent Dirichlet Allocation (LDA) Algorithm and Sentiment Analysis using the NRC Word-Emotion Lexicon Association based on Plutchik’s Wheel of Emotion Model. LDA through Gibbs Sampling – Monte Carlo Markov Chain (MCMC) was used to reveal hidden themes and patterns contained in the students’ responses while the sentiment analysis part was applied in extracting emotions from the corpus. Following Plutchik’s Model, it aims to capture eight (8) basic emotions such as: anger, anticipation, joy, fear, trust, sadness, surprise, and disgust.

F. Tools and Software Used

This research utilized Python and R programming languages for data visualization and interpreting mathematical equations.

G. Ethical Considerations and Reflexivity

This paper adheres to all ethical mandates in conducting research. This was first presented to the institutional research committee to gather suggestions and recommendations before data gathering commenced. A researcher-made interview guide was also presented to an expert in qualitative research for his review and revision. Before conducting the interview, the participants were oriented as to what their responsibilities are and were guaranteed anonymity and confidentiality of their responses. Since the researcher is a faculty teaching in the university, her experiences may affect her interpretations of the themes, which is also biased to her knowledge, and personal observations of the learning environment.

III. RESULTS AND DISCUSSION

A. Latent Themes about the Academic Service

The data collected from students responses were transcribed using LDA algorithm. As in Table 1, each document was given a particular topic that LDA found. Same topic number indicates common stories or underlying themes such as document (CAAS-101 & CAAS-69) were auto assigned to topic one (1). Very common documents appeared as topic seven (7), like CAAS-56, CAAS-57, CAAS-60 to CAAS-65.

| CAAS-101.txt | 2 |
| CAAS-102.txt | 8 |
| CAAS-56.txt | 7 |
| CAAS-57.txt | 7 |
| CAAS-58.txt | 10 |
| CAAS-60.txt | 7 |
| CAAS-61.txt | 7 |
| CAAS-62.txt | 7 |

Table 1. Text to Topic Assignment

- **Theme 1. The Disparity of Teaching Assignment to Professors Field of Expertise**

In the context of Economics, it is commonly accepted that specialization maximizes productivity. In education, success is determined by qualification of faculty working in an institution. The quality of education is directly related to the quality of instructional services provided in the classrooms. Knowledge of the subject matter, strong academic qualifications, skills and competence of teaching and commitment of teachers has strong influence on the teaching and learning processes. Teaching within areas of specialization is also associated to students’ satisfaction. Butt and Rehman found that overall impression of the school and the quality of education, teachers’ expertise and interest of the subject matter were some of the most significant predictors of student satisfaction.

This implies that even a highly qualified teacher can become low performer when assigned to teach subject which they have no or little background. In the case of the state university under study, the students are expecting that professors will be assigned to teach subjects within their areas of specialization so they could deliver complex and complicated matter effectively, helping students attain mastery of the course contents.

| Texts | Topic1 | Topic2 | Topic3 | Topic4 | Topic5 |
|-------|--------|--------|--------|--------|--------|
| 1     | subject | students | good  | materials | Learning |
| 2     | matter  | professors | class | professors | Academic |
| 3     | knowledge | learn     | important | time | Services |
| 4     | professors | help      | approachable | class | Commitment |
| 5     | independent | understand | rise | prepared | Show |
| 6     | learning | JUMP     | happy | teach | Teach |
| 7     | suggest | well      | happy | teach | Teach |
| 8     | regularly | works | study | giving | Opportunities |
| 9     | commitment | reads | professionalism | want | Manage |
| 10    | management | schoolrelated | need | commitment | university |
| 11    | display | explain | always | however | improve |
| 12    | exhibit | subject | characteristics | instructional | teaching |
| 13    | different | willing | make | works | subject |
| 14    | school | continue | tools | dismiss | provide |
| 15    | assigned | Topics | best | test | quality |
| 16    | important | activities | instructional | others | Beyond |
| 17    | mastery | attend | clarity | work | participate |
| 18    | classes | related | using | coming | allowing |
| 19    | expertise | show | practice | period | discussing |
| 20    | satisfied | share | management | class | late |

Table II. Topic to Terms and Generation of Latent Terms

- **Theme 2: Professors’ Expression of Willingness to Help Students in School-Related Matters**

A student is more motivated to learn if he knows that teachers are ready and willing to help him go through the academic demands. A student, who has a stable connection to her teacher, constantly communicate with her, receives more constructive guidance and praise rather than criticism will show high engagement in learning, and achieve higher levels academically.
There is also a feel of belongingness in school which refers to the degree in which students feel respected, accepted, and supported by teachers and peers. When students feel they belong, they are more likely to gain confidence in seeking help from their professors when the course demands for it. He also mentioned that at-risk students should be taken with utmost consideration since they are the ones who need help the most.

The students in the study expressed satisfaction and have positive experience with their professors related to their willingness to assist them in matters concerning school even beyond official teaching hours.

**Theme 3: Desirable Traits Portrayed by a Professional Teacher**

Great teachers develop great students. One characteristic of being professional is being an appropriate role model of adulthood. Behaviors and language of university teachers are always at the forefront, and it is appropriate to speak that they are models to the students in terms of professional boundaries, ethical responsibilities and a solid work effort.

In this research, the students expressed delight about the professionalism of their teachers by attending classes regularly and on time, coming to class ready and prepared with instructional materials, and dismissing the class on time. However, a number of students related that not all of their professors display this kind of professionalism. They also want proper notification when a certain professor will be absent from their class so they can save time waiting for him/her.

**Theme 4: Professor’s Commitment and Dedication to Classroom Instruction**

A competent and committed teacher is one indicator of success in any educational system. A truly committed teacher puts students’ learning and interests above everything else. When a teacher is passionate and dedicated they create an effective learning environment and increase learning potential of students. Kushman (1992) and Rosenholtz (1989) in their studies speaks on the relationship between teacher commitment and student achievement. In support with this idea, Fried (2001) stated that there is high correlation between passionate teaching and the quality of student learning.

Another factor that contributes to teachers’ commitment and dedication is in the implementation of administrative policies and support. Compatible administrative implementation strengthens teachers’ commitment. The desire of teachers to spend more time at school, make more effort for school achievement, and approve compatibility of administration are among contributing causes of commitment and dedication to school.

In line with this assumption, students desire for passionate and dedicated teachers who strive to establish learning environment where they can have opportunities to learn from their mistakes, an environment where they will not be scared of asking questions, and an environment where they are inspired and motivated to learn.

**Theme 5: Enhancement of Teaching Practices to Improve Quality of Academic Services**

Research claims that quality teaching should always be student-centered because it aims to help most students in their learning development. Teachers might change their teaching practices when they reflect upon the students and engage themselves in examining their own theories of teaching practices in the classroom. However, the truth is that they do not have time to reflect on their daily teaching practices that may lead to improvement, or they are not aware of this process. Most teachers believe that delivering the planned lessons on that specific day and time is the necessity, neglecting the fact and being least bothered about knowing if the student learned the lesson or about evaluating if the student grasp the even the basic concept of the lesson. There are five variables of teacher’s effectiveness—variability, clarity, task-oriented, enthusiasm, and the students’ opportunity to learn school materials. However, personal and professional traits of teachers are also known to be effective criteria. Being reflective, showing empathy, respecting students, being a good communicator, his own passion for learning, as well as his instructional delivery makes a teacher effective.

With the passage of time, research has been centered on the enhancement of teaching practices in which students also expect from the educators. As mature learners, students of the state university, long for teachers who will not only tell their personal stories not related to the subject, but should also enhance their logical and analytical thinking through proper instructional materials, and educate them to be life-long learners.

![Plutchik Wheel of Emotions Model](image)

**Figure 4. Plutchik Wheel of Emotions Model**

**B. Students’ Sentiments on the Academic Services**

It is interesting to note that the greatest number of sentiment scores of the students’ responses (Figure 5) towards the demonstration of the academic services of their professors is positive sentiments. It garnered 64.42% where happy, good, approachable, important, prepared, and teach were the most noticeable terms. In contrast, 34.62% were negative sentiments with late, sad, dismiss, use, teaching terms were depicted. Other terms where considered neutral by the algorithm. To further understand the sentiments, students’ sentiments portraying different emotions were processed utilizing Plutchik’s wheel of emotions. Trust accounts the around 1,800 words, followed by Anticipation with 900 words, then Joy with 700 words, followed by Surprise with 300 words, then Fear and Anger with around 200 words, and disgust with 100 words.
The word cloud in figure 7 portrays the emotions of the students towards their professors. The bag-of-words are divided into 8 based on Plutchik wheel of emotions with a concluding negative and positive emotions. It can be gleaned that joy contains the word ‘love’, ‘friend’, ‘glad’, and ‘kind’; fear has words ‘avoid’, ‘afraid’, and ‘difficult’; some words in disgust are ‘angry’, ‘unfair’, and ‘feeling’; anticipation comprises emotions such as ‘prepared’, ‘long’, and ‘continue’; anger take emotions like ‘fear’, ‘dismay’, and ‘bully’; trust has words like ‘show’, ‘coach’, ‘manage’, ‘guide’ and ‘suggest’; surprise comprise emotions ‘chance’, ‘excited’, ‘hope’, and ‘favorable’; while sadness contains emotions like ‘leave’, ‘dull’, ‘absent’, ‘lonely’, and ‘fall’.

The results from the sentiment analysis imply that the professors are approachable, prepared and ready in coming to their classes. They are doing the best as professional teachers worthy in a university. However, many are expecting that the university faculty should be on time to their classes, and should give emphasis on teaching for independent learning. They are doing the best as professional teachers in the corpus. It is obvious that the students are talking abouttheir professors and their subjects as both have the most number of occurrence.

Figure 5. Students’ Sentiments on the Academic Services

Figure 6 shows top 16 of the most frequently appearing words in the corpus. It is obvious that the students are talking about their professors and their subjects as both have the most number of occurrence.

Table III. Text to Topic Probabilities of Latent Themes

| Text | Topic1 | Topic2 | Topic3 | Topic4 | Topic5 |
|------|--------|--------|--------|--------|--------|
| 1    | 0.1299 | 0.0960 | 0.1921 | 0.0847 | 0.0791 |
| 2    | 0.6166 | 0.0822 | 0.0959 | 0.0890 | 0.6160 |
| 3    | 0.4771 | 0.0805 | 0.0872 | 0.0537 | 0.1812 |
| 4    | 0.1563 | 0.5081 | 0.0820 | 0.1445 | 0.1328 |
| 5    | 0.2037 | 0.5786 | 0.7414 | 0.1358 | 0.1173 |
| 6    | 0.1058 | 0.0288 | 0.1314 | 0.1699 | 0.1058 |
| 7    | 0.1185 | 0.6064 | 0.1185 | 0.0948 | 0.1848 |
| 8    | 0.1667 | 0.0965 | 0.0746 | 0.0921 | 0.1404 |
| 9    | 0.2381 | 0.0476 | 0.1286 | 0.1238 | 0.1238 |
| 10   | 0.1963 | 0.0731 | 0.0913 | 0.0861 | 0.0320 |
| 11   | 0.1754 | 0.0643 | 0.0994 | 0.1520 | 0.0956 |
| 12   | 0.6532 | 0.0785 | 0.4960 | 0.1322 | 0.1240 |
| 13   | 0.1553 | 0.0680 | 0.0437 | 0.7870 | 0.0922 |
| 14   | 0.1182 | 0.0887 | 0.0542 | 0.1322 | 0.6281 |
| 15   | 0.1519 | 0.5060 | 0.0591 | 0.2996 | 0.5910 |
| 16   | 0.6372 | 0.0643 | 0.6435 | 0.1053 | 0.1696 |
| 17   | 0.1372 | 0.0663 | 0.0969 | 0.1713 | 0.1122 |
| 18   | 0.0951 | 0.0951 | 0.1445 | 0.0760 | 0.1179 |
| 19   | 0.2094 | 0.1152 | 0.0471 | 0.6284 | 0.1309 |
| 20   | 0.1818 | 0.0455 | 0.7950 | 0.0682 | 0.1534 |

Figure 7. Wordcloud of the Students’ Corpus

IV. CONCLUSIONS

This study confirms that Latent Dirichlet Allocation algorithm and sentiment analysis using Plutchik wheel of emotions can reveal hidden meaning contained in documents articulating similar contents. This research used the qualitative responses of the students on the academic services provided by the university to decipher themes such as: The Disparity of Teaching Assignment to Professors Field of Expertise, Professors’ Expression of Willingness to Help Students in School-Related Matters, Desirable Traits Portrayed by a Professional Teacher, Professor’s Commitment and Dedication to Classroom Instruction, and Enhancement of Teaching Practices to Improve Quality of Academic Services. In general students feel satisfied and happy with the professionalism, commitment, knowledge of the subject matter, teaching for independent learning, and management of learning that their professors exhibit however there are still negative sentiments depicted by the algorithm which suggest rooms for improvement in the delivery of the academic services. Frequent sentiments like professors should have mastery in the subject matter, should report to classes on time and dismiss it on time, and should teach complex topics with ease and clarity are some of the things that might be taken consideration by the faculty and university officials. Further application of other machine learning algorithms and collecting large set of data would be also be an important concern to improve the results. Lastly, the procedures undertaken in this study on sentiment analysis and topic modelling are helpful to future researchers who wish to tackle similar studies.
ACKNOWLEDGMENT

The authors wish to acknowledge and praise the Lord for guiding them in developing and writing this research study. This could not be possible without His wisdom and infinite resources. They also wish to extend their gratitude to both ESSU Saldedo Campus and CIT-University for the authority provided to them in conducting this research.

REFERENCES

1. Agaoglu M. 2016. Predicting Instructor Performance Using Data Mining Techniques in Higher Education. IEEE, Vol. 4. 2016.
2. Sembiring P, Sembiring S, Tarigan G, Sembiring OD. 2017. Analysis of Student Satisfaction in the Process of Teaching and Learning Using Importance Performance Analysis. International Conference on Information and Communication Technology.
3. Apilado, M. 2012. Students’ Satisfaction of Instruction and Non-Instructional Services of ESSU Saldedo”, Faculty Research, ESSU Saldedo Campus
4. Suroto, S., Purba, H., & Sudiandi, A., 2017. Students Satisfaction on Academic Services in Higher Education using Importance – Performance Analysis, ComTechJournal. 8.37-43. 10.21512/ comtech.v8i1.3776
5. Liu, B. 2012. Sentiment Analysis and Opinion Mining Synthesis Lectures on Human Language Technologies. https://doi.org/10.2200/S00782ED1V11Y201203LREC014
6. Balsevina, L. Koekk D. Patil M. 2017. Analysis of Students Opinions on Social Networking Site for Understanding Students Learning Practices. International Journal of Engineering Development and Research. Vol. 5 (3)
7. Chen, Y., Yu, B., Zhang, X., & Yu, Y., 2016. Topic Modeling for Evaluating Students’ Reflective Writing. A Case Study of Pre-Service Teachers’ Journals. Proceedings of the 6th International Conference on Learning Analytics and Knowledge. ACM.
8. Xu Y. Reynolds N. 2012. Using Text Mining Techniques to Analyze Students’Responses to a Teacher Leadership Dilemma. International Journal of Computer Theory and Engineering. Vol. 4.
9. Lin, Y.Y., Chung, SF. 2016. A Corpus-Based Study on the Semantic Predisorder of Challenges. Taiwan Journal of TESOL., Vol.13. 2, 99-146
10. Creswell JW, Clark VL. 2017. Designing and conducting mixed methods research. 2nd ed. Thousand Oaks, CA:SAGE Publications; 2017. p. 1-520.
11. Berman, E. 2017. An Explanatory Sequential Mixed Methods Approach to Understanding Researchers’ Management Practices at UVM™ Integrated Findings to Develop Research Data Services. Journal of Science and Librarianship 6 (1): 1-24. https://doi.org/10.2191/jjslib.2017.1104
12. Palmquist, ME., Karley, KM., & Dale TA. 1997. Applications of Computer-Aided Text Analysis Analyzing Literary and Nonliterary Texts. Text Analysis for the Social Sciences: Methods for Drawing Statistical Inferences from Texts and Transcripts. 1997. P. 131-145
13. Caluza LI. 2018 Deciphering West Philippine Sea: A Plutchik and VADER Algorithm Sentiment Analysis. Indian Journal of Science and Technology, Vol 11(47), DOI:10.17485/ijst/2018/v11i47/130980.
14. Niyogi M, Pal, AK. 2017. Discovering Conversational Topics and Emotions Associated with Demonetization Tweets in India. arXiv:1711.04115v4[cs.CL]
15. Jivani AG. 201. A Comparative Study of stemming algorithms. International Journal of Computer Technology Applications. 2(6):1930-8
16. Feinerer I, Hornik K, Feinerer MI. 2008. Text Mining Infrastructure in R. Journal of Statistical Software. 25:1-54 https://doi.org/10.18637/jss.v025.i05
17. Tong Z, Zhang H. 2016. A Text Mining Research Based on LDA Topic Modelling. DOI: 10.5121/ijcst.
18. Wang W, Feng Y, Dai W. 2018. Topic Analysis of Online Reviews for Two Competitive Products using Latent Dirichlet Allocation. Electronic Commerce Research and Applications. https://doi.org/10.1016/j.elerap.2018.04.003
19. Caluza LJ. Deciphering Published Articles on Cyberterrorism: A Latent Dirichlet Allocation Algorithm Application. International Journal of Data Mining, Modelling and Management Vol. 11, No.1, 2019
20. Blei DM, Ng AY, Jordan MI. 2003. Latent Dirichlet Allocation. Journal of Machine Learning Research.3,993-1022
21. Veldirm, I. (2012). Bayesian inference: Gibbs sampling. Technical Note, University of Rochester.
22. Verecito R. 2017. Applications of Latent Dirichlet Allocation Algorithm of Published Articles on Cyberbullying. International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 21.
23. Turney P, Mohammad S. 2013. Crowdsourcing: A Word-Emotion Association Lexicon.arXiv:1308.6297v2[cs.CL]
24. Tromp E. Pechenizkijy M. 2014. Rule-based emotion detection on social media.putting tweets on Plutchik’s wheel.arXiv preprint arXiv
25. Opara JA. 2014. Implications of Mismatch Between Training and Placement in Teacher Training Colleges: A Case of Mosoriot Teachers Training College, Kenya. MIER Journal of Educational Studies, Trends & Practices, Vol 4(1). pp.88-100
26. Burt B.Z., Rehman, K. 2010. A Study Examining Students Satisfaction in Higher Education, Procedia Social and Behavioral Sciences,2 (2010) 5446-5450
27. Kaufman SL, Sandilos L. 2019. Improving Students’ Relationships with Teachers Provide Essential Supports for Learning. American Psychological Association.apa.org.
28. Pedler M. 2018. Teachers play a key role in helping students feel they ‘belong at’ school. Southere Cross University. The conversation.com
29. Olson J, Carter J. 2014. Caring and the College Professor. Focus on Colleges, Universities and Schools. vol. 8, No. 1
30. Sawney N. 2015. Professional Commitment among Secondary School teachers in relation to location of their school. global Journal for Research Analysis. vol4.p13-14
31. Mart C.T., 2013:A Passionate Teacher: Teacher Commitment and Dedication to Student Learning”, International Journal of Academic Research in Progressive Education and Development. January 2013, Vol. 1, ISSN: 2226-6348.
32. Jalbani LN. 2014. The Impact of Effective Teaching Strategies on the Students’ Academic Performance and Learning Outcomes. German National Library. http://dub.dub.de.
33. Rosenshine, B., & Furst, W., Research on Teacher Performance Criteria: In B.O Smith(ed) Research in Teacher Education: Englewood Cliffs. Prentice Hall.
34. Putri R, Kusumanigrum.2016. Latent Dirichlet Allocation for Sentiment Analysis Towards Tourism Review in Indonesia. J. Phys.Conf.Ser. 805012073
35. Syed S., Weber CT. 2018. Using Machine Learning to Uncover Latent Research Topics in Fishery Models. Reviews in Fisheries Science & Agriculture 26:3, 319-336. 
36. Roman, CV., Delgado, HF., Cordero, SS., 2019. Topic Modelling Applied to Business Research: A Latent Dirichlet Allocation (LDA)-Based Classification for Organization Studies, Springer
37. Chafale, D., Fimpalkar, A. 2014. A Review on Developing Corpora for Sentiment Analysis Using Plutchik’s Wheel of Emotions with Fuzzy Logic. International Journal of Computer Science and Engineering. 2014 2(10):14-18
38. Colace, F., De Santo, M., Greco, L., Moscato, V., Picariello,A. 2016. Probabilistic Approaches for Sentiment Analysis: Latent Dirichlet Allocation for Ontology Building and Sentiment Extraction. Springer
39. Jackers, ML. 2015. “Syuzhet: Extract Sentiments & Plot Arcs from Text. https://github.com/mjockers/syuzhet
40. Abassi, MM.,Beltiukov, A., 2019. Summarizing Emotions from Text Using Plutchik’s Wheel of Emotions. Advances in Intelligent System Research Vol. 166
41. Sanstosh, DT., Babu, KS., Pracaa, SPV., Vivekanda, A. 2016. Opinion Mining of Online Product Reviews from Traditional LDA topic Clusters using Feature Ontology Tree and Sentiwordnet. Springer International Journal of Computer Science and Technology, 2016, 6, 34-44 DOI. 10.5815/ijeme.2016/06.04
42. Ye, J., Jing, X., Li., J., 2018. Sentiment Analysis Using Modified LDA. Springer Nature Singapore Pte. Ltd. Signal and Information Processing, Networking and Computers, Lecture Notes in Electrical Engineering 473
Sentiment Analysis of the Academic Services of ESSU Salcedo Campus using Plutchik Model And Latent Dirichlet Allocation Algorithm

AUTHORS PROFILE

Hershey R. Alburo is a Doctor in Information Technology graduate of Cebu Institute of Technology University, Cebu City last March 2020. She obtained her Master in Information Technology degree at Asian Development Foundation College, Tacloban City, and his baccalaureate degree in Computer Science at Eastern Samar State University, Salcedo Campus, Salcedo, Eastern Samar, where she is currently teaching as Assistant Professor I. Her research interests are in Educational Technology, Sentiment Analysis, Data Science, E-learning, Phenomenology, Case Studies, and Appreciative Inquiry. She is a member of various reputable organizations both local and national such as Philippine Society of IT Educators, Computing Society of the Philippines, and Bataan Research International Organization. In 2019, she presented 2 research papers in Daejeon City, South Korea and in Kuala Lumpur, Malaysia.

Cherry Lyn C. Sta. Romana, finished BS Computer Science and MS Computer Science at the University of the Philippines at Los Baños (UPLB). For 11, years, she served as a Computer Science faculty member and coordinator at the University of the Philippines Cebu. She also served as faculty member of the University of the Philippines Open University and affiliate faculty of the University of the Philippines at Los Baños. She has been a member of the Technical Committee for Computer Science of the Commission on Higher Education for the past 8 years, served as national officer of the Philippine Society of IT Educators for 12 years, and board member of the Cebu Educational Development for IT. During the past 16 years, she has served as Dean of the College of Computer Studies of Cebu Institute of Technology – University, where she also completed her Doctor in Information Technology.

Larmie S. Feliscuzo is currently the Head of the Information Technology Program of the College of Computer Studies of Cebu Institute of Technology – University, where she teaches both undergraduate and graduate courses. She obtained Doctor of Philosophy in Technology Management at Cebu Technological University-Cebu City. Her research interests include Artificial Intelligence, Natural Language Processing, Human Computer Interaction, and Data Analytics. Dr. Feliscuzo is an active member and officer of the Philippine Society of Information Technology Educators and the Computing Society of the Philippines.