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Exploring the Use of Tweets and Word Clouds as Strategies in Educational Research

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Abstract: This paper presents personal insights and discussions on the exploration of specific strategies which relate to data collection and analysis used to support the focus group discussion data collection and preliminary analysis of a doctoral research entitled *Undergraduate students' experiences of learning with digital multimodal texts*. The main objective of the doctoral research was to understand the different ways undergraduate students experienced learning with digital multimodal texts (DMTs) within the context of a history module included in their first-year programme of studies both as readers (consumers) and authors (producers). Data were collected through semi-structured interviews, written reflection accounts, a focus group discussion and consideration given to the DMT (a video) produced by the participants. The focus group discussion event included a hands-on task whereby participants were requested to write their views in response to a given prompt question in the form of tweets. Also, the written tweets were visualised as word clouds for the purpose of initial analysis. The findings reported in this paper, which are based on observation notes and investigation of the word clouds, suggest that the tweet-related, hands-on task acted as a good ice breaker, making the participants feel at ease and more relaxed about sharing their views amongst each other while eliciting discussions and fostering deeper thinking. Also, the word clouds were revealed to be an effective data visualisation tool allowing emerging and salient themes to stand out from the participants' written tweets and reflections.

Keywords: word clouds, tweets, educational research, multimodal texts.

Introduction

Given the highly mediated world in which we are living, the necessity for integrating technologies in teaching and learning is becoming crucial in order to meet the requirements of 21st-century students. Today, with the rise of internet technologies, students have the possibility and the flexibility to access varied multimodal texts which include print as well as non-print forms of texts that they use for multiple purposes. Similarly, educators may tap into the potential of digital learning resources which they can use as instructional aids/materials and explore new pedagogies that support acquisition of 21st-century skills and competencies. Not all educators seem to be fully conscious of this. Several researchers have claimed that it has become necessary for educators to rethink their pedagogical approaches, curriculum content and assessment strategies (Hampson, Patton & Shanks, 2013; Robinson, 2009; Scott, 2015) since students of this generation, according to Taylor and Parson (2011, p. 6), "appear to have 'different' needs, goals, and learning preferences than students in the past". Many higher education institutions (HEIs) are facing challenges to meet the demands of a student population who are very consumer-oriented and who seek quality education.

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Educators are expected to create learning conditions that lead to meaningful and quality learning experiences (Hénard & Roseveare, 2012; Poon, 2013). However, it is noted that lectures as an instructional strategy to transmit knowledge still seem to predominate in some HEIs (Achuonye, 2015; Smith & Valentine, 2012). New modes of communication are influencing our students' literacy practices and as educators, we cannot afford to ignore this and as such have the responsibility to bring in novel ways of addressing the needs of our learners so as to provide them with quality experiences. Moyle (2010, p. 5) notes that educators in the 21st century are faced with the challenge of demonstrating "fresh thinking about what is taught, how it is taught and why it is taught".

This paper discusses an exploratory aspect of a doctoral study entitled *Undergraduate students' experiences of learning with digital multimodal texts,* which was designed as a pedagogical intervention involving a group of first-year students from the University of Mauritius which is the oldest HEI of Mauritius, an upper middle-income country situated in the Indian Ocean. It explores specifically two strategies used during a focus group discussion which aimed at, i) eliciting reflections and discussions amongst the participants, and (ii) visualising the data collected. Starting with a brief background of the larger (doctoral) study, the paper continues with a description, discussions and reflective thoughts on the implementation of the two strategies used during the focus group discussion.

Situating the Context

To better situate the context from which this paper is drawn, this section presents a brief overview of the doctoral study which was conducted out of an interest in understanding the multimodal learning practices and multiliteracies of the current generation of students, especially with the increasingly new genres of texts finding their way into the education landscape. The doctoral study used a qualitative methodology within the interpretivist paradigm known as phenomenography, a research approach aiming at "'description, analysis and understanding of experiences" (Marton, 1981, p. 180) to explore the variation in the ways a group of undergraduate students experienced learning with DMTs, within the context of a module referred to as Mauritian History (HIST1002Y), as (i) consumers and (ii) as producers. This module is a core module running over two semesters, which is included in the first-year BA (Hons) Joint Humanities, BA (Hons) History and Political Science and BA (Hons) History and Sociology programme of studies. This yearly module, HIST1002Y, has been delivered using a web-enhanced modality for a few years now. Through the web-enhanced delivery mode of the module, students are able to access the module lecture notes and presentations, assignments, and also submit their completed assignments and receive feedback from their instructor via the institutions' e-learning platform. For several years now, this module has relied on face-to-face lectures as the main instructional strategy to transmit knowledge. However, there have been some concerns raised by the module instructor, such as the difficulty for students to connect the past and present, to visualise and demonstrate imaginative reconstruction of text-intensive lecture notes and the challenges for lecturers to fully engage and create a sense of belonging for the subject especially when dealing with large cohorts of students.

In view of providing adequate e-learning content and pedagogies to students and as a way to address the concerns raised by the module instructor, the curricular content of HIST1002Y was enhanced through the provision of multimedia content in the form of interactive multimedia CDs and interactive quizzes. Some documentary films were also screened during the face-to-face lecture

sessions. Additionally, a multimodal assessment involving students as producers of their own DMT in the form of a history-related documentary video was explored.

Guided by phenomenography research methodology, the doctoral study collected data through two rounds of semi-structured interviews, written reflection accounts, and a focus group discussion to gain insight into students' experiences of learning with DMTs during two learning situations conceptualised as follows:

- Learning Situation 1 (LS1) consisted in providing the participants with a range of DMTs which they were expected to access, utilise and engage with during the first semester of the module. In LS1, the participant (student) was viewed as a consumer (user/recipient) of the DMTs. The range of DMTs included the following:
    - Several PowerPoints designed by the module instructor, which addressed the different topics of the module.
    - Two historical documentary films, identified by the module instructor as relevant and pertinent, which were screened in class.
    - A multimedia enhanced compact disc (CD) with various interactive features such as an animated digital story, an animated timeline, quizzes and an archaeology game.
    - An interactive multimedia quiz game entitled *The British treasure*, a self-assessment multimedia resource consisting of quizzes through which students learn about the British period in Mauritius and assess their knowledge by attempting a series of quizzes.
- Learning Situation 2 (LS2) required the participants to complete a multimodal work as part of the assessment of HIST1002Y which consisted in creating a history-related documentary style video. Within LS2, the participant/student took the role of a writer/author/creator/producer. Participants had a choice of two topics on which they could base their video, namely, (i) *What's in a name: Family name or family history*, and (ii) *What's in a name: Your street name*.

Given that the aim of this paper is to explore tweets and word clouds as strategies to support data collection and the analysis phase in research, the literature review limits itself to contexts, purposes and ways tweets and word clouds are used.

Literature Review

Tweets: Contexts and Purposes of Use

Nowadays, terms such as *tweets, Twitter, tweeting* are familiar to many internet and social network users. Many people from different backgrounds and geographical locations engage in tweeting, which is a mix of texting, blogging and social media. Basically a tweet is a short text-based message of less than 280 characters (at the time of the study, the limit was 140 characters) which a person shares with others via the online social networking and microblogging platform https://twitter.com/ created in March 2006. The tweets can also be sent through text messages and emails. This platform allows users to read and write brief texts on a range of topics and issues. Chisanga et al. (2014) further explain that a tweet acts as "a lightweight, easy form of communication that enables users to broadcast and share information about their activities, opinions and status" (p. 27). Through Twitter, people are able to not only share information but also receive information from others which can be commented on and reposted (Bristol, 2010). The fact that a tweet is written within a limited number of characters requires

the writer of the message to be focused and concise in expressing the message he/she wants to communicate and share with others.

Numerous studies have explored and analysed the usage or content of tweets in domains such as politics (Diakopoulos & Shamma, 2010; Tumasjan et al., 2010; Yulan et al., 2012), teaching and learning (Boumediene et al., 2018; Bristol, 2010; Hull & Dodd, 2017; Risser, 2013; Soluk & Buddle, 2015), healthcare and clinical practice (Pershad et al., 2018). For instance, Hull and Dodd (2017) surveyed educators from colleges and higher education institutions in the USA identified as using Twitter in their classrooms. The objective was to find out how they were using Twitter, their views/reactions and that of their students regarding its use, how they evaluate its pedagogical effectiveness and impact on students' learning. The findings revealed that students reacted positively towards the use of Twitter in the classrooms and that Twitter represents a valuable platform for educators to support students' learning and foster good pedagogical practices. Similarly, the case study by Boumediene et al. (2018) explored Master's and Doctoral students' use of Twitter in an English Foreign Language (EFL) writing class in an Algerian HEI. In this study, the teacher posted a topic tweet related to an EFL writing syllabus which students needed to re-tweet using links, their own written comments and in this way engage in discussions with others in the class. The findings showed that while there was an initial apprehension regarding the use of Twitter as a tool for learning at the beginning of the course, students gradually became more receptive and recognised its benefits. They found that engaging in the Twitter activity as proposed by the teacher was helpful in enhancing interaction and communication between students. However, the study also showed that albeit the general positive views about Twitter, the Doctoral students seemed to be more in favor as opposed to Master students who had a preference for more conventional approaches to teacher-student interaction. The researchers associated this finding with the level of maturity and confidence of Doctoral students as opposed to Master-level students who they believe are less independent as learners.

Some researchers have made use of tweets in conjunction with poem writing as a research strategy (Chisanga et al., 2014.; Pithouse-Morgan et al., 2015). For instance Chisanga et al.'s (2014) self-study research reported how a group of university researchers (staff-students and supervisors) who formed part of the "Transformative Education/al studies (TES) project", which is a National Research Foundation (NRF)-funded project led by researchers from three universities in South Africa…" (p. 22) became involved in a "tweet poem activity" (p. 23) during a two-day workshop entitled *Preparing new paradigms to transform educational landscapes,* held in Durban in November, 2013. Through this activity, these researchers wrote anonymous tweets to reflect on their experiences of the TES project and on what it meant to them to be participants in the project. The writing of the tweets was guided by the question: "What have you learned about yourself during self-study research?" (p. 23). Different groups were formed, and the tweets were shuffled and shared amongst them. After being assigned to a tweet randomly, the researchers within each group worked collaboratively to identify words and sentences which were meaningful to them. These were then rearranged to create a found poem, which was then presented in a creative manner to the other participants of the workshop. A similar approach was undertaken by Pithouse-Morgan et al. (2015), where a group of self-study research supervisors engaged in creating poems based on tweets they wrote and word clouds they generated from these tweets to reflect on the concept of co-reflexivity. In both these studies, the strategies of using tweets

and word clouds were used as a means to facilitate the poetry-making tasks and were found to be a helpful strategy for the researchers to express their thoughts in a concise but conversational manner.

Using Word Clouds as an Education and Research Tool

Word clouds are also referred to as "tag clouds" or "term clouds," (Brooks et al., 2014, p. 192). It is a text visualisation tool which generates a visual display of texts where words that are used more frequently appear bigger or have "more prominence in the representation" (McNaught & Lam, 2010, p. 630). Numerous software applications found on the web may be used to generate word clouds such as TagCrowd, ToCloud, MakeCloud, WordItOut, Tagxedo and Wordle to name a few. McNaught & Lam (2010) are of the opinion that amongst those applications, Wordle developed by Jonathan Feinberg (2009), an IBM developer, stands out for its versatility and its ease of use.

Word clouds have been used as an education tool to encourage critical thinking, discussions and to support meaningful interaction in online discussion forums (Joyner, 2012), to evaluate the impact of instruction on students' learning (Huisman et al., 2011). Word clouds have been incorporated in language classrooms to help students develop skills such as reading, writing, speaking and listening (Baralt et al., 2011; Tafazoli, 2013). As a tool or strategy to support data analysis, word clouds have been used by a few researchers who have reported benefits and challenges or limitations associated with the use of such a tool for research (McNaught & Lam, 2010; Clement et al., 2009; Pithouse-Morgan et al., 2015; Ramlo, 2011; Williams et al., 2013). For instance, Clement et al. (2009) used word clouds to compare and analyse the literary writing style of novels written by different authors and they were able to identify words that were frequently used and thus derived their own interpretation and meanings with respect to the novels. McNaught and Lam (2010) explored word cloud analysis in two educational research projects. In one project, the researchers used the transcripts of six focus group meetings which they fed to the Wordle application to generate six word clouds in order to have a quick overview of the data. The second project was aimed at gaining an insight into students' experiences of e-book reading. The student participants spent 12 weeks reading an e-book and, in parallel, had to comment on their likes and dislikes in their respective online journals. The text entries in the journals were then fed into Wordle to generate word clouds. The researchers described the nuances in the interpretation of the word clouds. Even though, McNaught and Lam (2010) found that as a research tool, a word cloud to some extent may be useful to have a rapid view of the data, they also highlighted aspects of ambiguity that may arise depending on how the system displays the words, as some words may be misinterpreted. Moreover, since word clouds take out the words from their context, it may be difficult for researchers to get a true picture of the data. Thus, the researchers noted that word clouds should be used in conjunction with other strategies to enhance their effectiveness as a research analysis tool. Word clouds, as noted by Cidell (2010), may be an interesting tool for exploratory textual analysis by identifying words that frequently appear in a set of interviews, documents, or other texts.

Methods

As pointed out above, the main doctoral study used a qualitative methodology within the interpretivist paradigm known as phenomenography, a research approach aiming at "description, analysis and understanding of experiences" (Marton, 1981, p. 180). In phenomenography, the main data collection method used is interviewing (Marton, 1988). Other than interviewing, Collier-Reed and

Ingerman (2013) point to other methods such as written accounts of respondents and reviews of video recordings. Drawings and focus groups have also been used as data collection methods as noted by Edwards (2007).

For this paper, consideration is given to the focus group discussion data collection phase, which was carried out to consolidate the interview data collected during the two rounds of semi-structured interviews which had already been carried out for LS1 and LS2, respectively. Ethical clearance to conduct the study was granted from relevant authorities and gatekeepers.

Purposes of the Focus Group Discussion

In phenomenography the researcher focuses on the variations in experiences rather than the singular essence of experience, and on collective meaning rather than individual experience. Thus, the focus group discussion served the purpose of gaining collective insights on what participants had to say about their experiences as consumers and producers of DMTs. Furthermore, it was a platform which enabled discussions between the participants on a similar phenomenon, namely, the use of DMTs for learning, so as to look for divergent and similar views.

Procedures

The focus group discussion was conducted on the HEI premises and, as far as possible, at the convenience of the participants and after the participants had experienced both learning situations (LS1 and LS2). A focus group discussion guide was prepared in advance. Out of the nine targeted participants for the focus group discussion, only eight participants were present. All participants were seated around a table but they were regrouped, as per their programme of studies, in three teams to facilitate interaction amongst them and also for moderation purposes. Each team was assigned identification codes (e.g., JH for participants from the Joint Humanities programme). Table 1 shows how the teams were organised. For ethical considerations, pseudonyms were used to identify the participants and to preserve anonymity and confidentiality.

Table 1: Participants regrouped as teams for focus group discussion

Teams	Participant Pseudonyms and Identification Codes
JH-BA (Hons) Joint Humanities	Poonam - JH1 Mustafa - JH2 Romika - JH3
HS-BA (Hons) History and Sociology	Farida- HS1 Heshani- HS2 Khajifah- HS3
HPS-BA (Hons) History and Political Science	Alvin - HPS1 Urmila- HPS2

The focus group discussion was a collective event with the researcher acting as the moderator and facilitating the discussion amongst the participants. Four assistant moderators helped in the conduct of the focus group discussion.

Analysis and Findings

Strategy 1: The Tweet Hands-On Activity

Along with verbal discussions between the participants and the focus group discussion moderator (the researcher), part of the focus group required the participants to engage in a hands-on activity, which aimed at encouraging individual as well as collaborative discussions. The participants had to write down their reflections in the form of a tweet in response of the following prompt:

> *Learning Mauritian history with digital multimodal texts: As a first year undergraduate, what does it mean to you?*

The process of moving from individual thinking to collaborative discussion is described diagrammatically in Figure 1.

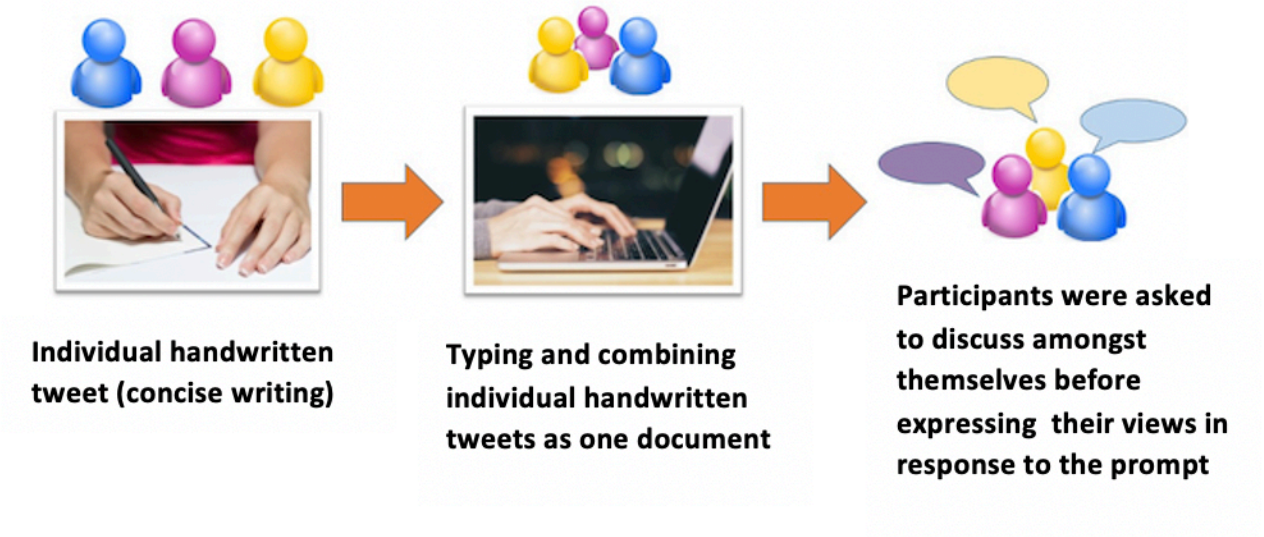

Figure 1: Process of moving from individual thinking to collective discussion

It is to be noted that for practical reasons, the tweet activity was not carried out using the online Twitter platform. Instead, it focused on the act of writing tweets (short messages of not more than 140 characters each) on a sheet of paper similar to the approach used in self-studies of Chisanga et al. (2014) and Pithouse-Morgan et al. (2015). Participants were given approximately 15 minutes to write their individual tweets. Figure 2 shows examples of participants' written tweets.

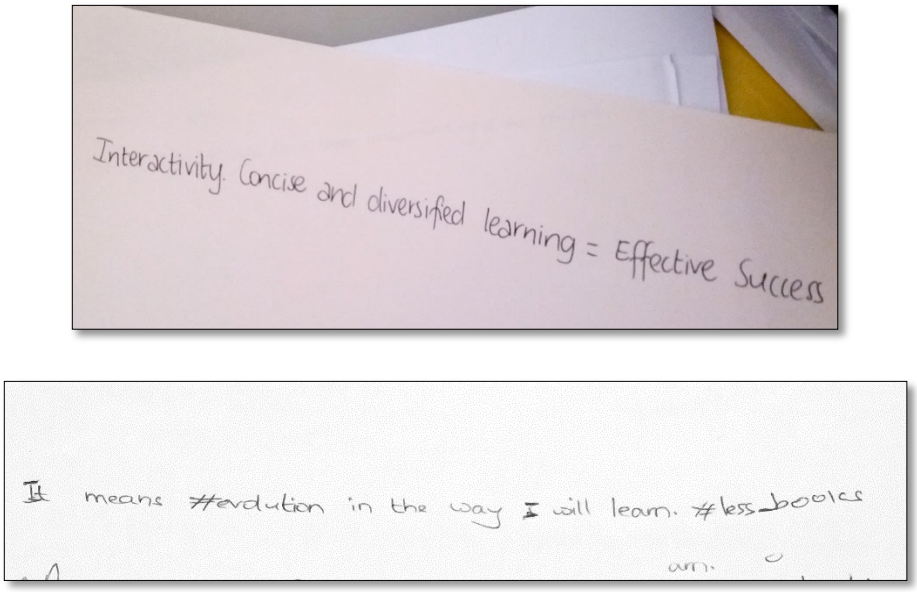

Figure 2: Examples of participants' handwritten tweets

Once the individual tweets were completed, each team typed the individual tweets as a single document using a laptop which was made available. This allowed each member in the team to have an overview of the responses within their respective teams. Each team was then invited to discuss amongst themselves before verbally summarising what the combined tweets reflected. Following this, they were asked to voice their views to everybody present during the event. This hands-on activity gave the participants the opportunity to think deeper about the prompt before voicing their views to everyone.

Strategy 2: Generating the Word Clouds to Visualise the Data

Additionally, following Pithouse-Morgan et al. (2015), the data collected were brought into the software application Wordle to generate visual representations in the form of word clouds. These were created immediately after the focus group discussion to gain a collective sense of the thoughts shared across the panel of participants. The process used to create the word clouds for each team is illustrated in Figure 3.

Figure 3: Using word clouds to visualise the responses from the tweets

Firstly, each team combined tweets which participants had initially typed using the laptop and fed them into the Wordle application (www.wordle.net/) as shown in Figure 3. This step helped generate word clouds for each team. Figure 4 displays an example of the word cloud created using the combined tweets written by participants from the BA (Hons) Joint Humanities programme.

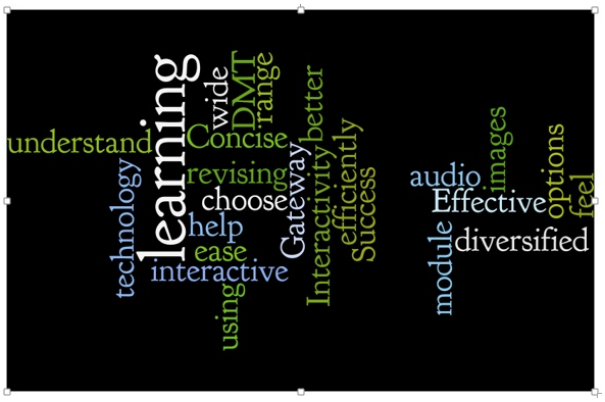

Figure 4: Word cloud generated using the combined tweets of participants from the BA (Hons) Joint Humanities programme of studies

To gain a collective picture of the data responses, a second strategy to visualise the data was explored. A word cloud was generated using the combined tweets from all three teams. This resulted in the word cloud displayed in Figure 5.

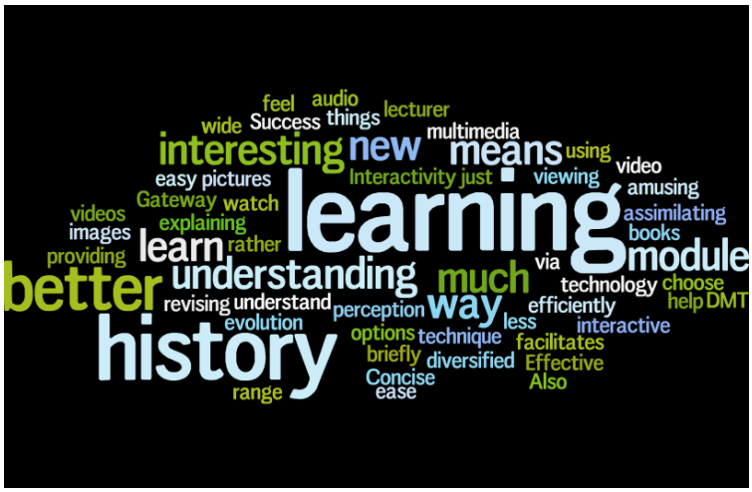

Figure 5: Word Cloud generated from all participants' combined tweets on a given prompt during the focus group session

The effectiveness of the word clouds as visualisation tool was further explored. As noted earlier in this paper, when creating a word cloud from a text, the more frequently a word appears, the bigger it is displayed in the word cloud making it more prominent in the visual presentation. To understand and give some interpretation to the word cloud which was generated using all participants' combined tweets (see Figure 5), the words that appear to be prominent in the word cloud were identified, while words such as *learning* and *history* were excluded, as these two words were already in the prompt given and the tweets showed that some participants used these words often when formulating their tweet responses. Key words such as *interesting, understanding, new, better, means*, and *way*, as highlighted in Figure 6, appeared to be more prominent.

Figure 6: Salient words with potential meaning in relation to the given prompt

Since in phenomenography the focus is on conceptual meanings to categorise people's description of their experiences, these salient words were associated with possible themes for further investigation.

For instance, the word *new* was associated with the concept of novelty, the word *better* could be linked to positive aspects of learning while at the same time linking to words such as *effective, success* and *efficient,* which also appeared in the word cloud but were less prominent. Reflecting on the word cloud representation, it is noted that when using the raw text and generating the word cloud, the meaning of certain words get lost. Therefore, as suggested by Ramlo (2011), hyphenating phrases so as to remain closer to the context and to enhance the process of interpretation/meaning making was considered. For instance, from the raw text of one of the tweets, a sentence which was formulated as: It *means #evolution in the way I will learn. #less_books,* the word cloud as shown in Figure 6 displays the term *books* and *less* as two distinct terms. By putting a hyphen between the word *less* and *books* in the raw texts and generating another version of the word cloud (see Figure 7), it was possible to retain the meaning. Likewise, this approach was used for those sentences which lost their meanings in the first version of the word cloud.

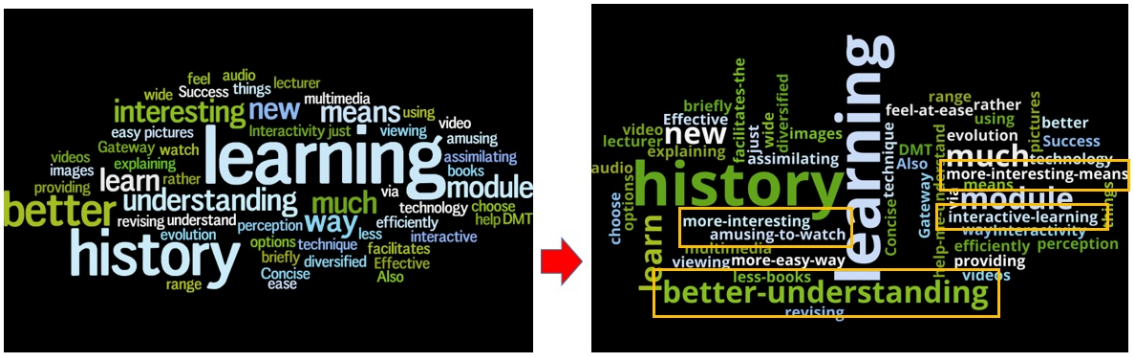

Figure 7: Exploring hyphenation of phrases to preserve meaning

Discussion

Strategy 1: The Use of Tweets

The exploration of the above two strategies used during the focus group discussion led to some pertinent reflections on their effectiveness in research methods. As far as Strategy 1 is concerned, that is, the use of tweets, the aim was to engage the participants in deeper thinking and to facilitate discussion. Following its implementation with the eight participants, the hands-on tweet activity revealed itself to be a good ice-breaker, making the participants feel at ease and more relaxed about sharing their views amongst each other. The focus group regrouped participants from the three different programmes of studies and the participants, though they were students following a common module (HIST1002Y) were not necessarily acquainted with or accustomed to each other. A focus group discussion setting, especially where the participants are students and the researcher an academic, may appear to some participants as a space similar to that of a classroom, where the tensions of teacher-student power relations still may be felt. As noted by Kvale (2006), it is important not to overlook such asymmetries of power and to ensure that participants are involved in the process of meaning-making. The hands-on activity was carried out in an informal manner and made the environment appear less intimidating for the participants, since they were not expected to provide an instant reply to the prompt statement given. Furthermore, the tweet activity gave more time for participants to think and critically reflect on their experiences. It gave them time to think deeper about what it meant to them to learn Mauritian history through and with DMTs and express their thoughts

in concise yet meaningful words before elaborating their voiced opinions to the whole group. This is in line with the findings of Boumediene et al. (2018) where the use of tweets were found to foster interaction and communication amongst students and also to support reflection as noted by Chisanga et al. (2014) and Pithouse-Morgan et al. (2015). Since the hands-on activity involving the tweet writing was introduced at the start of the focus group discussion, it contributed to making the whole event less daunting and was a good way to get the participants into discussions for the rest of the focus group event.

Strategy 2: The Use of Word Clouds

The implementation of the word cloud was mainly chosen as a way to visually represent and synthesise important ideas from the responses of the participants, to get a bigger picture of their learning experiences with DMTs and what these meant to them. From the perspective of a researcher, the use of a word cloud application to create and explore different word clouds appear to have the potential to support data analysis and findings depending on how the strategy is implemented. In the case of the current exploration presented in this paper, word clouds were found to provide a spontaneous and instant way to view emerging ideas from the data. This supports the findings of other researchers who have explored the use of word clouds to support data analysis (McNaught & Lam, 2010; Pithouse-Morgan et al., 2015; Viégas & Wattenberg, 2008).

Moreover, the exploration of the data collected, tools and the strategies carried out showed that there are some caveats that should not be disregarded. It is important to note that word clouds as a tool to support data analysis should not be considered in isolation or as a standalone tool research tool as suggested by McNaught and Lam (2010). Moreover, the word clouds generated using the raw texts of the tweets did not consider the context and distorted some sentences thus losing their meaning as noted by some researchers (Ramlo, 2011, McNaught & Lam, 2010, Williams et al., 2013). Using the approach adopted by Ramlo (2011), it was possible to bring out the meaning of the words as expressed by the participants in the tweets. However, the exploration exposed in this paper was limited to the use of a specific word cloud application software and would require further research to determine whether other word cloud applications allow for more flexibility as opposed to the Wordle application.

Another issue observed regarding the structure of word clouds, which is in line with the observation made by Cidell (2010), Halvey and Keane (2007), is that it could bias the researcher's interpretation, especially in relation to font sizes. Similarly, it was noted in the case of this exploration that there were some words that could potentially have importance in the interpretation of the data and for meaning making but did not stand out since they were perhaps not used as frequently as some other words.

Conclusion

This paper has presented some insights and reflections about the exploration of two specific strategies implemented during the focus group discussion conducted in the context of a doctoral study, which sought to understand the different ways undergraduate students doing a history module experienced learning with DMTs. Asking students to write their thoughts about their experiences of learning in the form of tweets was one of the strategies used. This strategy was found to be a good ice-breaker especially in a focus group setting regrouping participants who may feel intimidated. Tweets were also helpful in eliciting discussions amongst the participants and thus enriching the responses

emerging from the focus group discussion. Visualising participants' tweets through word clouds was another strategy which was used. Despite some challenges and limitations observed during the exploration of word clouds as a research tool, it was possible to identify some preliminary findings in an instant manner, which served as a helpful starting point for further detailed analysis which used phenomenography to categorise participants' ways of experiencing learning with DMTs. The exploration related to these two strategies was limited to one specific type of data set, namely focus group discussion responses. Further research could be carried out to establish their relevance and pertinence for other data sets.

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