

Using NVivo to Capture Duration of Classroom Videoed Observations

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Abstract – The purpose of this short technical paper is to present detailed step-by-step guidance on how to conduct video data analysis using NVivo11; a computer-assisted qualitative data analysis tool. NVivo11 allows the efficient, effective and reliable capture and analysis of extensive qualitative and quantitative video data, and is well-equipped therefore to provide valuable insights into the different pedagogical and non-pedagogical practices prevailing in the classroom). In this article, we document the use of NVivo11 in a particular case study to capture the duration of class-room videoed observation; namely, Transforming Pedagogy in Science, Technology, Engineering and Mathematics (TPSS) education in upper primary schools in East Africa. Using the authors' own case study, this paper aims to provide researchers with recommendations and instructions for the application of NVivo11 to quantitatively analyze classroom videoed observations. Screenshots are presented to illustrate the data analysis process.

Keywords – Nvivo Coding, Computer-Assisted Data Analysis, Systematic Classroom Observation.

I. INTRODUCTION

NVivo11 is a computer assisted qualitative and mixed methods data analysis tool that allows efficient and effective retrieval, organization and analysis of qualitative textual and non-textual data (including audio files, videos, digital photos, text, spreadsheets and web and social media data). It allows users to easily import, store, code and search vast quantities of multimedia data in order to identify research trends, cross-examine and query information, and visually present findings.

In its capacity to capture and analyze videoed observations, NVivo11 is an invaluable tool for classroom-based educational research. In particular, where classroom observational data is often characterized by its richness, complexity and density, video recording enables the rich visual, linguistic and non-linguistic elements to be captured within their authentic context and analyzed thoroughly (Gabillon and Ailincui, 2017). It allows researchers to capture a permanent replicate of the actual lesson events and grants the researcher 'direct access to complex social interactions and physical settings. It also enriches and supplements data gathered by other techniques' (Coleman and Briggs, p.174) allowing for higher reliability. Where traditionally observational studies on classroom behavior were associated with qualitative methods, advances in the field of observational methods have made it possible to generate both qualitative and quantitative data. Thematic analysis of qualitative video transcripts can corroborate and enrich quantitative educational data.

Computerized software saves time and effort, whilst facilitating more accurate, transparent, innovative and rigorous data analysis of videoed classroom observations.

Manual transcription and laborious observation schemes (such as Flanders Observation Tables) are becoming less popular or appealing to researchers, as they are slow, time-consuming and challenging (Bryman, 2008). Normally these methods require that researchers start data analysis by cleaning the data; organizing it to be broke down into manageable parts before coding (Bryman and Burgess, 1994). The key advantage of NVivo11 is that audio-video recorded data can be transcribed in synchronization with the text and recording. The researcher can pre-design an analytical framework using pre-defined 'codes' of observation (if they are testing a hypothesis) or analyze in response to the data (if they are developing a hypothesis). This process can quantify data, making it easier and faster for a researcher to observe a lesson in real-time. Furthermore, whilst there exists in manual transcription and analysis the possibility of cutting out parts of textual transcription and losing contextual information, with NVivo11 deleting, copying, moving and combining codes can be done without affecting the data.

Despite these advantages, computerized mixed methods data analysis tools are not widely used due to misconceptions regarding their complexity (Zamawe, 2015). There is a need for practical guidance and step by step support on how to use NVivo11 effectively to analyze classroom videoed observational data, and capture the duration of classroom events (Zamawe, 2015). In this article, we document the use of NVivo11 in a particular case study to capture the duration of classroom videoed observation; namely, Transforming Pedagogy in Science, Technology, Engineering and Mathematics (TPSS) education in upper primary schools in Ethiopia.

II. THE CASE STUDY FOR NVIVO

The TPSS project aimed to improve the pedagogy of physics teacher education in Ethiopia by training school teachers and lecturers to use dialogical teaching (Alexander, 2018) and scientific argumentation (Driver, Newton, & Osborne, 2000). In Ethiopia, attainment, recruitment to, and retention in STEM subjects remains a national concern (Kind et al, 2018). STEM education in Ethiopia is traditionally taught using a didactic knowledge-transfer approach based heavily on teacher talk. The theoretical rationale of the project is that student engagement in classroom dialogue with teachers and peers, where abstract scientific arguments are made explicit, helps students actively identify and replace pre- and misconceptions with scientifically correct concepts. To examine the operationalisation of dialogic theory and the effect of dialogical teaching on student engagement and learning, videoed classroom observation was used to capture and analyse relevant qualitative and quantitative data such as

speaker, duration of talk and type of talk (question, response, feedback or group work), non-verbal communication and contextual information. The findings of the project could have implications for national, regional and organisational science education policy in Ethiopia.

The study used a large quasi-experimental design to examine and compare the effect of a dialogical teaching training intervention on the physics teaching practice of both pre-service and in-service teachers. The intervention was implemented in 60 schools allied to six colleges of teacher education (CTEs) in northern, middle and southern Ethiopia. The effect on teaching practice and student learning was investigated using mixed methods, combining classroom videoed observations with pre- and post-tests, interview data and questionnaires (Kind et al, 2018). The study was later extended to train 60 female STEM teachers in rural and deprived areas of Addis Ababa to explore mediating social, economic and cultural barriers to the intervention.

130 video-recorded physics lessons from Ethiopia were transcribed, coded and analysed using NVivo11. Lessons lasted on average 53 minutes. All lessons were video-recorded with two cameras showing the whole class (camera at the front) and the teacher (camera at the back), to capture contextual information such as the seating arrangement, teacher/student facial and body gestures, classroom environment, resources and facilities. The teacher camera had a fly microphone placed on the teacher to increase transcription precision. No coding was undertaken in the classroom to minimise the influence on teaching practice. Teaching was a combination of Amharic and English, but all transcripts were made in English.

NVivo11 was particularly applicable and effective for the research design, questions, aims and practical considerations of the TPSS project. First, NVivo11 facilitated the capture and analysis of both quantitative and qualitative measures of dialogical teaching, such as duration of talk, action of an observed object, speaker and type of talk (question, response, feedback or group work). It also allowed the measurement and analysis of contextual, non-verbal indicators of student engagement alongside quantitative indicators of student attainment, to develop reliable evidence for researchers, practitioners and policy-makers in Ethiopia. Second, NVivo's capacity to cross-examine themes across different data sets assisted the comparison of CPD teacher training interventions, and the comparative analysis of the socio-cultural factors impacting on female teachers from deprived rural areas. Third, NVivo's coding report function and visual presentation of data may enable effective dissemination, engagement and involvement of the Ethiopian educational research and practice community to contribute to sustainable changes in attitude toward STEM education. Fourth, NVivo was efficient for synthesizing, storing and sharing vast amounts of data from a large and diverse sample across geographically distant locations. It has built-in facilities that allow people from different geographical spaces to work on the same data files at the same time through a network.

III. OVERVIEW OF OBSERVATIONAL DATA ANALYSIS SOFTWARE

Whilst there are a few software tools that help researcher in the process of data collection, coding, analysis and management, for this project NVivo11 was considered the most efficient and effective. The list below is selective and not exhaustive.

The Observer XT

Developed by Noldus, Observer XT is mainly used for behavioral coding and analysis. Researchers can choose to collect, code and analyze observational data live using the software, or video-record the data for subsequent data analysis. Noldus Observer XT helps the researcher with developing the coding scheme, data entry and management, analyzing data and checking interrater reliability analysis. Coded data can be visualized to check the trend of behaviours. Coders can use variables to label the intervention or control group, assign ID to subjects, name the coder or observer and note other important variables (Snell, 2011; Ducharme & Arcand, 2009). A powerful feature of the Observer XT is the ability to extract parts of each videoed lesson at any time.

Observational Data Coding System (ODCS)

Developed by Maclin and Maclin's (2005), this software is adopted for collecting and coding data from classroom settings. It is flexible, customizable, free, user-friendly, efficient, and Windows-based. ODCS can read a variety of media files such as audio and video recorded data, and can also be used in real time while collecting data on field observations. ODCS offers much potential in terms of observational research and as teacher professional development and analysis tool. The program consists of a control panel that trained observers can code with a variety of variables and factors via buttons on the screen.

ECOVE Observer, eWalk (Media_X), iObservation, Observation 360, eValu Wise, and Observe4Success

Besides the data analysis software above, there are different web-based classroom observation tools that aim at enhancing and improving teacher effectiveness. These software tools often help school management team to record their classroom observation during their classroom visits; referred to as 'walkthroughs'. The school leaders can later share the information with the observed teachers to foster their professional development. The following options are available at the market: eCOVE Observer, eWalk, MediaX, iObservation, Observation 360, eValuWise, and Observe4Success.

In the UK, there are also a few classroom observation tools such as Lessonbox, IRIS Connect, iObserve, and VUWBO App. These tools use video-technology as a powerful continuous professional development (CPD) and reflection tool. These tools are mostly teacher-led, allowing to create an online account and view their teaching in their own private space and time for self-reflection and self-criticality. These tools aim, in this way, to change the very nature of interaction between the observer and the observed as post-observation discussions become more reflective and collaborative and less invasive and defensive. The majority of these digital tools can be either used online (streamlining)

or offline (stand-alone software). However the main purpose of these tools remains formal and informal evaluation of classroom observation.

IV. NVIVO: BEYOND QUALITATIVE DATA ANALYSIS

While some writers believe that computer assisted data analysis software such as NVivo could steer researchers in a certain way, others point to the many advantages that the software could serve to the researchers, such as saving effort and time, and facilitating accurate and transparent data analysis (AlYahmady & Alabri, 2013; Richards & Richards, 1994; Welsh, 2002, Rosaen et al. 2008). Welsh (2002) argue that software like NVivo is based on approaches linked to grounded theory where ‘data speaks for itself’ and theories are born out of data. Therefore, where other software can influence the research design, the strength of NVivo lies in its compatibility with a wide range of qualitative research designs and data analysis methods, such as discourse analysis, action research, grounded theory, conversation analysis, ethnography, literature reviews and phenomenology.

V. PRACTICAL CONSIDERATIONS ON FILE ORGANISATION, NAMING AND STORING

An important and critical matter when working on a specially large project that involve tens of schools and hundreds of recordings on more than one cycle is the matters of file organisation, labeling, and storing. In the TPSS project lessons were recorded using SD cards inseted into video cameras and every recording was downloaded and labelled following this format : Educational_Local_Authority_Area_TeacherName_FullDate_Teacher/Student_Camera_Pre/Post_Group_(Intervention/control). After that, each teacher was assigned a code or number and saved under. Data was backed-up and saved on an encrypted data storage device. Whenever possible, data should be transferred to the institution secure e-cloud service. In order to capture the duration of talk/action of an observed object, the transcribers need to try to separate speakers and locate each in a separate row.

VI. HOW TO CAPTURE DURATION USING NVIVO

In the TPSS project, videos were already transcribed by Ethiopian trained coders using the NVivo transcribing feature, having imported the audio/video file from the data tab. After that, the file is turned into editing mode. From the ‘Media’ tab there are three options in the Play Mode section; ‘Normal’ which works with media and transcript as separate files, Synchronize which synchronise the media with the transcript, and Transcribe which enable transcribing the media. When opening the media file for coding, the coder might need to update the location of the media file (audio or video).

From the Media tab, untick the ‘waveform’ option. Then, you can either create nodes using a pre-agreed and designed

coding scheme or you code as you go. In the TPSS, we defined and designed the codes/nodes that we needed in advance, based on our research questions. Only one file is coded at a time and a coding scheme was entered for each unique file. To create a coding scheme, you need to choose ‘nodes’ tab from the lower-left panel. Then, you need to right-click in the node space to create the required codes. We did not create parent-and-child nodes. Every node stood on its own right.

After creating the coding scheme, the file is almost ready to be coded and duration to be captured. In order for us to keep a back-up of the transcript, we created a Word file for each transcript. This was done by right-clicking on the transcript. Then, you choose ‘export video transcript’ and in the next window of export options, you choose transcript (.doc .dox .rtf). Coding is normally carried out using the synchronize button where media and transcript are synchronized. After hearing the exchange, the coder needs to decide the type of code it is.

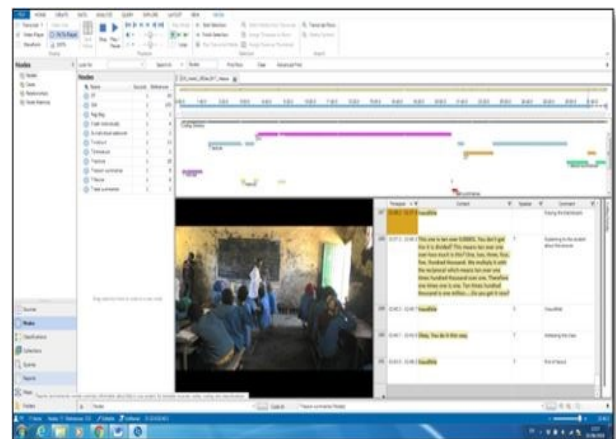


Fig. 1. Duration captured and visualised in NVivo timeline.

In the TPSS project, we categorised audio data into the speaker and type of talk (question, response, feedback, group work, etc.) as shown in Figure 1. To code, you drag the selection to the pre-defined code and drop it. In order to be able to view what has been coded, you need to go to ‘view’ bar and choose ‘highlight>coding for all nodes’ and also go to ‘coding stripes > all nodes coding’. Coding the selected text of transcript only does not capture the duration. In the TPSS project, duration of speech was an important indicator of the operationalisation of dialogical teaching. To record duration, go to waveform ruler and select timespan by left-clicking on the ruler and then dragging and dropping the selected timespan in the corresponding code. By coding the transcript, a highlight- -ted stripe appears on the waveform that corresponds to the timespan of the selected transcript. Ideally, each transcript will correspond and synchronise to the speaker. However, if more than one speaker is transcribed within the same row/box, the coder can insert a row and copy the timestamps and manually change them to separate the different speakers and code them correctly. For the NVivo project, no transcript box was left empty. Words such as ‘inaudible’ or ‘silence’ were inserted in to the transcript box in order to make coding and analysis more precise.

VII. CREATING CODING REPORT

While coding, NVivo is normally set to save changes every 15 minutes. However, whenever you click on ‘save’ button coding stops and you have to click on ‘play’ to resume coding. Having finished coding, a node summary report can be produced showing the duration of each move/code within the media file. To produce the report, you need to go to ‘reports’ section in the lower left-hand corner of NVivo and double click ‘node summary report’. You can either filter the results or leave the option unticked (which we did for TPSS project). After that, NVivo will produce the report in a separate link next to the transcript. The report gives the number of the following: sources, references, words codes, and paragraphs. Most importantly, it gives the duration coded for each move. Now, you can export the result of the report by right-clicking on the report and choosing the option ‘export report results’. Then you can choose what format you want the report to be in i.e. Word or Excel. In our project, every coded file was saved twice one in Excel and one in Word. Duration data from the exported files can be then transported to either an Excel spreadsheet or direct to SPSS for further analysis as seen in Figure 2 below.

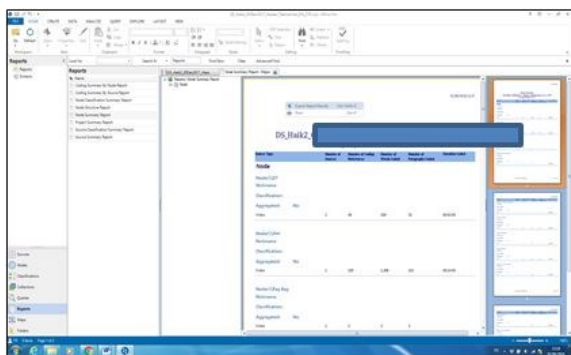


Fig. 2. Creating coding report on NVivo.

VIII. CONCLUSION

NVivo enabled reliable analysis of TPSS video recordings, allowing the researchers to quantitatively measure and analyse non-verbal contextual indicators of student engagement and, in doing so, test dialogic theory (i.e. one of the projects main objectives). The software enables clear visual presentation of data analysis. This was useful for TPSS because 1.) The ‘potential to scale up to a national level’ will require the presentation of reliable and accessible evidence for MOE policy makers & 2.) It will enable the dissemination, engagement and involvement of the Ethiopian research community to contribute to long-term change in attitude to STEM education (i.e. one of the projects main objectives). Practically, the software was useful to efficiently synthesise, store and share huge amounts of data across geographically distant locations. Through TPSS, it was possible to develop NVivo’s capacity to cross-examine themes across different data sets. This feature was useful to this project where we had several subsets of data.

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