

Specialized and updated training on supporting advanced technologies for early childhood education and care professionals and graduates



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**Specialized and updated training on supporting advanced
technologies for early childhood education and care
professionals and graduates**

MODULE IV. 2

Observation and evaluation techniques based on the use of smart resources

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e-EarlyCare-T



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I. Introduction

This part of Module IV refers to data preparation in the qualitative research setting. It also includes information about how to prepare data for further processing. In addition, you will work specifically on think-aloud protocol analysis techniques.

II. Objectives

2.1. Prepare data and apply data processing techniques within the framework of qualitative research.

2.2. Learn and apply techniques for analysing think-aloud protocols.

III. Content specific to the topic

3.1 Before registration, recording and data extraction

Research, whether quantitative or qualitative, must be based on research questions or hypotheses that guide study. Qualitative research has to carry out a refined and rigorous description of the contextual situation of a fact, situation or behaviour to be analysed (Anguera, 1986). For this reason, this type of research must also be systematic and start from categories that are observable and measurable in order to be able to later treat these data with different techniques.

3.1.1. Direct or indirect techniques for gathering information.

Qualitative research can be based on several criteria:

a. **Hypothetico-deductive**, advantages include organisation and guidance from the beginning of the entire research process and disadvantages include the loss of flexibility.

b. **In-depth data recording**, advantages include the collection of data in context and disadvantages include difficulty in systematising the collection of information. The **categorisation of the information** plays an essential role here.

c. **Information collected from documentary sources or direct records** (videos, manuscripts, etc.). The most commonly-used observation techniques are systematic observation, which can be participant or non-participant, interviews, content analysis and case studies (Anguera, 1986; Sáiz and Escolar, 2013).

d. **Criterion of prior observational content**. Choice of the object or field of observation.

In this type of research, **direct or indirect research techniques** can be used, the former referring to interactive contextual situations and the latter to contextual observational analytics involving the use of observational techniques with previously defined indicators.

3.1.2. Categorisation of information

For good categorical analysis, it is necessary to start from a prior idea that answers the questions "What should I observe? Why observe? What interests me most in all the data I have recorded?". Contextual qualitative observation can provide the researcher with a lot of information that may not be relevant to the object of study. Therefore, the object of observation should be delimited a priori. This delimitation can shed light on the process of categorisation or taxonomy of categorisation that is most appropriate to the object of study at the time. Categorising means naming, classifying a series of data into a set of categories. In short, it means ordering the data in relation to criteria that are either previously defined or are defined from the information recorded.

3.1.3. Data reduction

Categorisation of information facilitates reduction of data recorded in a "raw" form. However, this categorised data needs to be analysed in order to be interpreted. This analysis can be quantitative or qualitative (flow charting or ranking) or a combination of both. The recording possibilities are very varied depending on the contexts.



Different events can be recorded in a successive continuum of data, or a progressive behavioural analysis of a single subject—or a set of subjects, etc.—can be recorded. This means, it is essential to delimit the object of the research and the context of action, and underscores the importance of defining the research questions. The study of all information can be done from complex sequential behavioural analyses. These can be represented in a scattergram and its representation in a polar coordinate system, i.e. vectorial. Reliability and validity indicators must also be considered. These concepts are not handled in exactly the same way as in the context of qualitative research but are specifically related to the rigour of the categorisation process. According to Anguera (1986) in qualitative research, different types of **validity** can be distinguished:

- a) *Apparent validity*, choice of answers related to the object of the study.
- b) *Instrumental validity*, analysis of the instrument used to record and collect information, similar to concurrent and predictive validity.
- c) *Theoretical validity*, which relates to the relationship between what is observed and the theory that supports it.

Triangulation

Triangulation is a technique used to analyse the degree of agreement or consistency of an observational analysis. It involves the use of different observational procedures on the same event or situation. It aims to increase the validity of conclusions about an observational fact. A study can be triangulated on:

1. The data according to variables of time, space and person.
2. The researcher, several researchers observing the same event.
3. Theory, different approaches to the same fact or situation to be observed or instruments (empirical observation with opinion instruments such as surveys).

In relation to **reliability**, according to Kirk and Miller cited by Anguera (1986) p.13, a distinction can be made between:

- a) "*Quixotic*" *reliability* refers to a single method of observation. It results in a continuously invariant measure (sentences, facts or behaviour).
- b) *Diachronic reliability*, which is the stability of an observation over time. It relates to repeated measurements for the recording of a time-invariant event.
- c) *Synchronous reliability* implies similarity of observations with respect to relevant features.

Replicability and generalisability



It is clear that the argument between qualitative and quantitative research makes no sense, they are complementary methodologies. It is also clear that the replication of a study—as well as generalisation—is related to finding similar results in different samples with similar characteristics. This is an indicator of the generalisability of a study's results.

In short, first you must define what you want to study and why. These questions include the variables to be analysed. All research questions indicate dependent and independent variables. The independent variable would be the one that is hypothesised to produce some change in the dependent variable. It is important to specify all these elements, as they will be the basis for the preparation and subsequent processing of the data.

An example of a qualitative observation process is provided below by following the steps proposed by Carreras (1991), applying those steps to two research examples.

3.1.4. Example

Analysis of a research in a prototype 1

Step 1. Definition of the problem to be investigated.

Specify the object of the research by answering the questions: what to study, what for, and how.

Example: To find out the type of cognitive and metacognitive strategies that children aged 3-6 years use when solving problems in natural environments (family, school, etc.).

Step 2. Behavioural parameters to address the formulated problem.

Next, the parameters must be specified, i.e. the observable behaviours that will make the variables defined in the research objectives explicit. Once they have been specified, the procedure for measuring them must be developed. They may be primary measures, analysing frequency, duration, latency, or intensity, with frequency and duration being the most-commonly used. Secondary measures involve the categorical operationalisation of results found in primary measures, where frequency can be analysed, and the order of occurrence will be applied either to the complete recording or to the recording intervals produced after random sampling.



Example: analysis of interactive behaviours in children with suspected Autism Spectrum Disorder (ASD) in the academic context. The categories in this example would be the different types of interactive behaviours in 2-3 year olds (eye contact, following instructions, proto-imperative and proto-declarative behaviours).

Category recording can analyse frequency (number of occurrences of the behaviour and the categories associated with it), duration measured in time units of the category (time unit), latency—the time from one behavioural category to another, and intensity—which is analysed when using Rating Scales. Scales may include ordinal, nominal, interval or ratio scales.

Example: Rating Scales of intervals or ratios, a Likert-type scale (see Table 1).

Table 1. An example of rating scales.

Strategies to be observed	1				5
Planning processes					
Performs actions without a goal that cannot be regulated by the adult's voice					
Performs brief functional actions regulated by the adult's voice					
Performs autonomous long process activities without pre-planning					
Performs long process actions without an antecedent-consequent hierarchical structure					
Performs complex, time-consuming actions with a structured pre-planning process					

Once results have been collected, they are analysed. Whenever closed measurement instruments are used, quantified data are produced (e.g. Likert-type scale from 1 to 5). Data can also be obtained from open-ended responses (i.e. in which the subject states their opinion, or describes the behaviour of others). These results can then be quantified and statistical techniques (parametric or non-parametric) used for analysis.

Step 3. Sampling strategy for the parameters to be studied.

As the examples above show, many parameters and variables can be studied on the same observation. What to analyse is determined by the research question.

Example: task solving behaviours in symbolic play activities. These behaviours will be observed in therapeutic intervention sessions.

Likewise, from this possibilities approach, it will be possible to carry out random sampling of different timepoints in order to specify the timing of the observation. For example, on Monday at the beginning of the symbolic play session, on Tuesday in the middle of the symbolic play session, on Wednesday at the end of the symbolic play session, on Thursday at the beginning of the symbolic play session and on Friday at the end of the symbolic play session.



Step 4. Method of data recording and practice in the selected field

Observation may include video, audio, observational recording by the observer on paper records, or all of these.

Example: Video observation, a paper-based observation by a non-participant observer, and a paper-based observation by a participant observer will be chosen. With these three recording methods, triangulation can then be carried out.

Step 5. Most appropriate statistical tests to analyse the data.

The choice of techniques for analysing the data recorded in the observational process will depend partly on the type of records and partly on the design chosen by the researcher.

Example: In the case of this analysis, parametric, non-parametric and strictly qualitative statistical analysis techniques such as frequency analysis could be used.

Analysis of a study in a prototype 2

Step 1. Defining the problem to be investigated

To analyse the opinion of early care professionals about the use of the Flipped Classroom methodology in content updating training processes.

Step 2. Behavioural parameters to address the formulated problem.

The variables that are significant in addressing the research problem posed are isolated. In this case they would measure early care professionals' opinions about professional updating through the Flipped Classroom methodology.

Step 3. Sampling strategy for the parameters to be studied.

Professionals' satisfaction with their Flipped Classroom experiences will be analysed in various subjects, in various years, and in various degrees. In this case—and depending on the availability of work—random or convenience samples could be applied. The use of one or the other will guide generalisation of the results.

Step 4. Method of recording the data and practice in the selected field.

Observation consists of recording the occurrence or non-occurrence of a fact or event. However, qualitative research also allows for categorical recording. Therefore, the responses to the open-ended response can be quantified and categorised. The categories will be established according to the theory underpinning the research, in this case it refers to aspects that have been most useful for learning, aspects that have not been useful, and aspects that should be introduced.



Another factor to take into consideration is the frequency of observation, in this case the number of times the scale of satisfaction with the Flipped Classroom activity is applied, which for this study will be each time the professionals watch one of the *ad hoc* prepared videos. This will allow an analysis of the satisfaction rate in each analysis group, and subsequently an inter-group comparison, as well as an individual analysis of satisfaction in each of the videos for each of the groups.

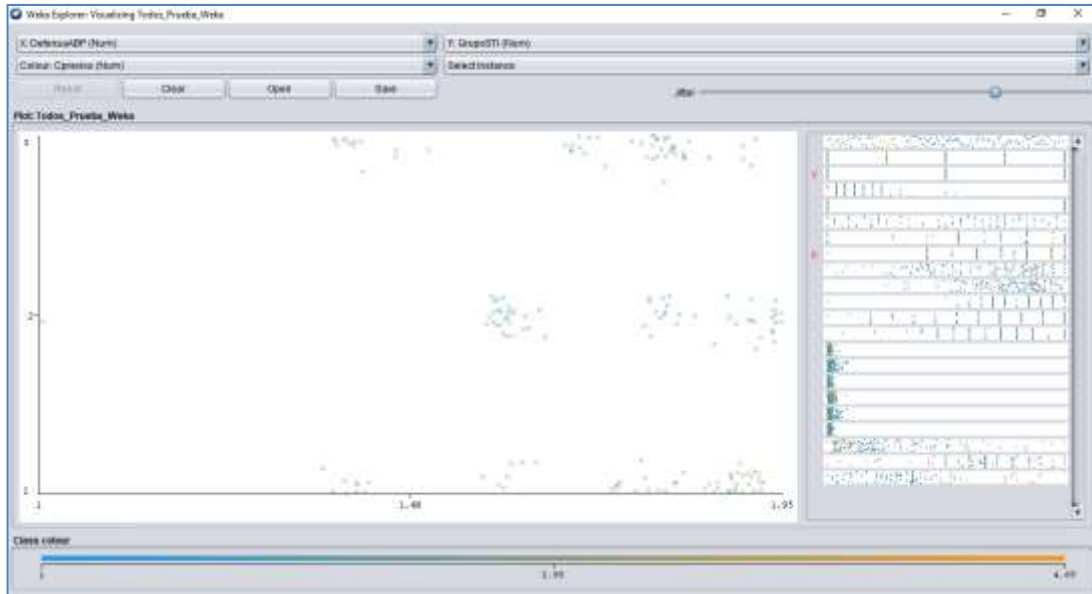


Figure 1. Example of a dispersion analysis of variables performed with Weka.

Step 5. Most appropriate statistical tests to analyse the data.

In this example, we are going to analyse the satisfaction of early childhood professionals who follow a refresher training activity. To that end, a scale with 10 closed Likert-type questions has been created, which also includes three open questions analysing aspects to be increased in, eliminated from, or added to the training activity. The independent variable in this case would be the instructional action through training videos and the dependent variables would be the professionals' satisfaction with different elements that could be aligned in evaluation clusters, for example: materials, evaluation procedures, and attention of the teacher towards the participant(s). After this analysis of the study variables, the research hypotheses can be defined. These hypotheses include the relationship between the dependent and independent variables.



3.2 Data Preparation in Qualitative Research: Recording Information

As outlined above, the possibilities for recording guide the collection of information. Most qualitative studies work with information that is collected using the transcription method, either from audio or video material. Nowadays there are many resources that make it easier to record and transcribe information, these include:

Audio records



Google Docs

To use Google Docs for free, all you need is a Google account associated with an email address. Once logged in from any browser, e.g. Chrome, open a new document and in the "Tools" menu, select the "Voice typing" option. Immediately a microphone icon will appear and you can click on it to start dictating.

One of the strong points of Google Docs is that once the text has been transcribed, it is also possible to edit it without using the keyboard, by means of numerous voice commands. Although for the moment, as the company itself indicates, these functions are only available in English..

[Link](#)



Dictation

Created by Amit Agarwal, a technology columnist, this is one of the most popular dictation tools available today. It allows you to save the result in a .txt file from which you can then copy and paste text into another document.

[Link](#)



Speechnotes

Speechnotes can be added as a Chrome extension, and can also be downloaded as an App for Android devices.

It has a very clean, intuitive design with a central part in which the text is transcribed flanked by two columns that are of great help: to the right are the commands and shortcuts that can be used to facilitate dictation and on the left are all the actions that



can be performed with the final text: save, send by email, upload to Google Drive, and print, among others.

[Link](#)



Personal Speechlogger

This is very similar to **Speechnotes** as they share the same developers, Speechlogger Personal, and it also has an *app* version for Android devices. Its creators present it with two competitive advantages over similar tools: automatic punctuation and the possibility of translating transcribed texts into several languages. Thanks to the latter function, Speechlogger Personal can be used for translation and communication in other languages.

[Link](#)

Video registration



Camtasia

This is an easy-to-use tool that includes many options. It has video editing features, such as cutting and pasting shots or adding different kinds of transitions. In addition, it can export to all formats AVI, SWF, MP3, MP4, GIF, etc.

[Link](#)



Jing

This is a very simple tool that only allows basic *screencasts* (screen capture and audio) and has no video editing functions. However, it is a quality product with an interface that, in addition to being intuitive, has an attractive design for the user. However, it can only work in SWF format.

[Link](#)



Adobe Captivate

This software allows you to create high quality, complex videos with effects. It uses its own peculiar capture method, since it does not capture screenshots as such, but



combines static backgrounds with vector movements, for example of the mouse. The results are of impeccable technical quality and look very appealing.

[Link](#)



Camstudio

This is *open source* software that allows you to record your screen in AVI format and add audio to it. It does not allow you to edit the resulting videos, so they have to be recorded from video.

[Link](#)



Screencast-O-Matic

This is a free online tool that allows you to create simple video tutorials. It supports three of the most commonly used formats: MP4, AVI, FLV movie.

[Link](#)



Debut Video Capture

This is very comprehensive free software that provides many editing options, such as adding our own images or others taken with the computer camera, editing shots, inserting transitions and other effects, etc. However, it has a steep learning curve to use all of its functionality.

[Link](#)



Active Presenter

This is a screencasting and eLearning program for Microsoft Windows that can be used to create software demonstrations, software simulations, and tests. It allows the export of image series, HTML slideshows, documents (PDF, Microsoft Word, Excel), Microsoft PowerPoint presentations, videos (AVI, MP4, WMV, WebM), Flash videos and interactive simulations (AJAX, Adobe Flash). For e-learning or m-learning, Active Presenter can package the contents in SCORM compatible files. For software simulations you can use mouse movements, right or left clicks or keystrokes.



It can also be used to convert Microsoft PowerPoint presentations to any of its output formats with the loss of some effects and animations and conversion between quite a few video formats indirectly.

[Link](#)



Movie Maker

Software that allows editing of videos, facilitates personalisation of recordings that have been made with the programmes described above.

[Link](#)



ScreenFlow

An editor and *screen recorder* for Mac.

[Link](#)



iMovie

A video editing programme available for the Mac.

[Link](#)



Filmora

An easy-to-use video editor programme

[Link](#)

In short, there are currently many tools available to users that make it easy to record the information they wish to study. These programmes also allow this information to be transferred to different types of records (Word, Excel, MP4, etc.).

3.3 Data preparation in qualitative research: data processing

Transcription of information

Most qualitative research works with data that has been recorded through audio or video recordings, records of opinion through open-ended *online* questionnaires that can be the subject of conversation recording. A few decades ago, this type of recording involved time-consuming data collection, transcription and categorisation. Nowadays, certain software (ATLAS.ti, NVivo; MAXQDA, etc.) allow this process to be carried



out more quickly. However, the researcher must check the results in order to clean up the records. In other words, the information relevant to the object of the research must be selected from among all the information recorded. In addition, the confidentiality of the recorded and transcribed data must be ensured at all times. To this end, the real names of the participants should be omitted (Gibbs, 2012).

Examples of transcriptions of information are presented below.

Example 1

Transcription of information through audio recording, a technique used in the task analysis procedure. Taken from Sáiz (2000) p. 60.

Transcript of an interaction between a therapist and a student in the resolution of a task:

Therapist: "I am going to explain the task to be done. First I do it and you listen to it, then you do it and I help you a little bit and then you do it on your own, okay? do you understand?"

Girl: "The girl nods".

Teacher: "Look at today's homework, we have to put a yellow sticker, a green sticker and then a red sticker, what is the homework we have to do today? We have to stick a yellow, a green and a red sticker.

Girl: "yes".

Therapist: "How are we going to do it? We have to think it through. First we put the yellow, now the green and then the red. How am I doing, am I following our plan? Well I've followed the plan. I'm going to do it again, first I put the yellow, then the green and then the red. How did I do it? Very good.

Therapist: "Now you have to do it by yourself. Come on, I'll help you. What do you have to do today? Do you have to put the...? "

Girl: "Yellow".

Therapist: "Then the..."

Girl: "The green one".

Therapist: "You have to put them next to each other (the girl has put them in a row), just like the model, it's OK, we take it off and start again".

Therapist: "Now which one do you have to put".

Girl: "red".

Therapist: "Now what do you need to do, you need to put..."

Girl: "The yellow one".

Therapist: "Then the..."

Girl: "green

Therapist: "All right, you have to always look at the model and now you have to put the..."

Therapist: "The red one is very good. And now which one do you have to put, the..."

Girl: "Yellow, I know all the colours, orange and everything".

Therapist: "How are we doing?"



Girl: "good".

Therapist: "After the yellow one, which one goes?"

Girl: puts green without verbalising

Therapist: "All right and now".

Girl: "puts red without verbalising".

Therapist: "How did we do?"

Girl: "Good".

Therapist: "So far I have helped you a little bit, but now you have to do it by yourself, okay?"

Girl: "Yes" (she is doing it by herself)

Girl: "Look how well I'm doing".

Girl: "I dropped it, it's a bit crooked, but it doesn't matter".

Therapist: "Very good, you've finished, you've done very well".

Transcripts should always include the name of the evaluator, the date, time and duration of the recording. In this way it is possible to compare and collate recordings of the same subject in different observations.

Example 2

Information can also be collected from online surveys with open-ended questions. This collection of information is automatic and can be carried out with free tools such as Google Survey [Link](#) or linesurvey [Link](#). You can also use the Microsoft Forms tool within the Office 365 package. These systems allow you to download data in different formats such as .csv, .xlsx, .xls, .ods and others.

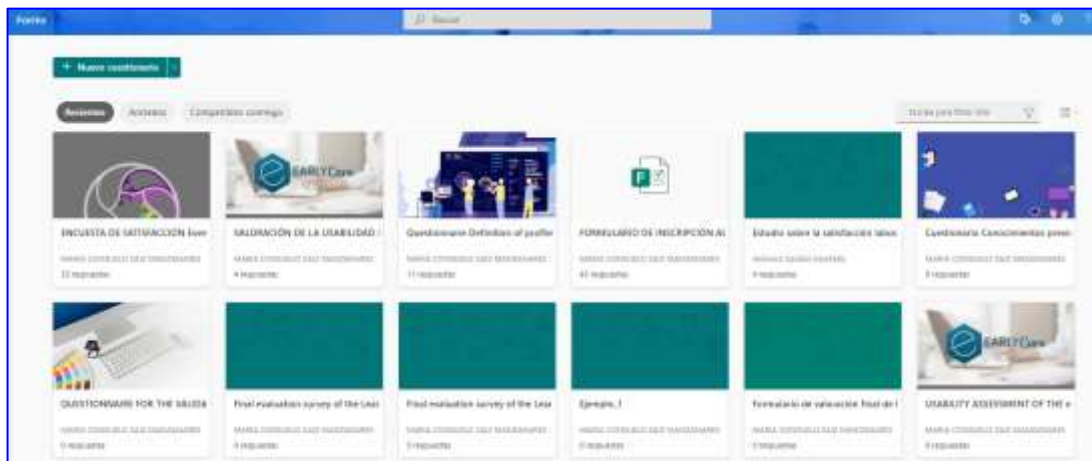
Next, we present the steps for creating a survey in Microsoft Forms, data collection, data learning analytics and qualitative data collection.



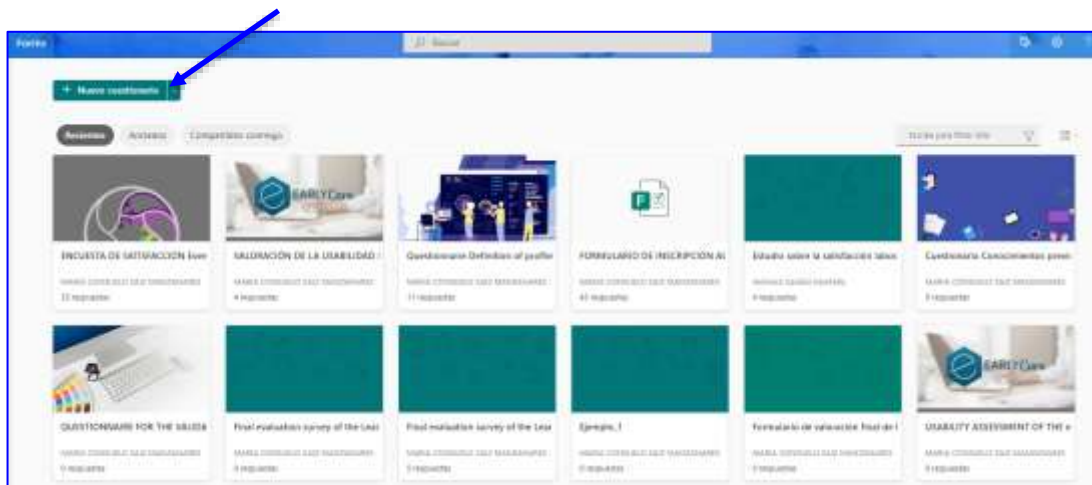
Microsoft Forms

Step 1





Step 2



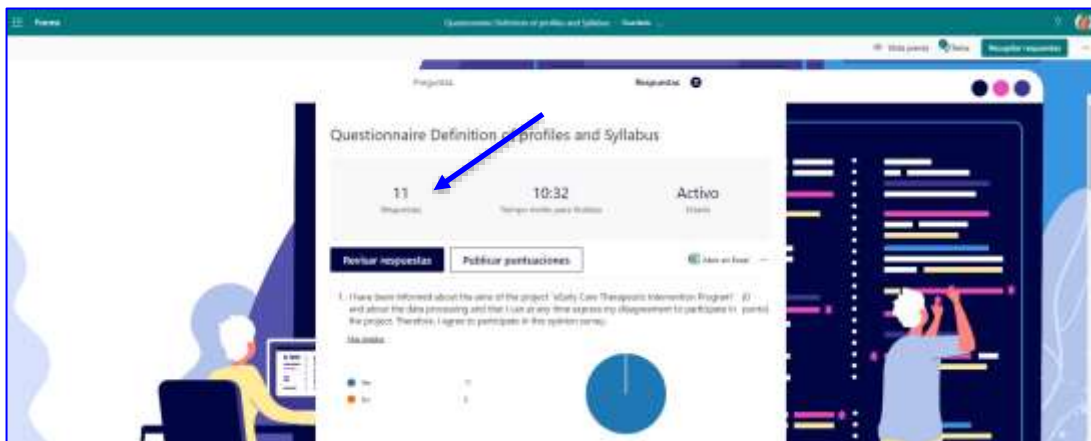
Step 3



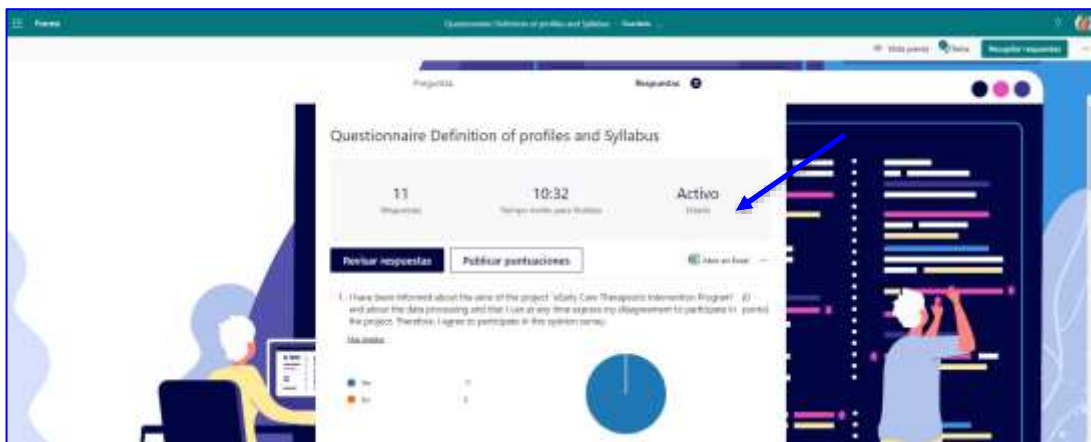
Step 4



Step 5



Step 6



Step 7



ID	Name	Age	Gender	Education/Occupation	Other Info
4	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Early Care, Early Care, 15-20 years, 17/18/19
5	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Psychology, University, 20-25 years, 18/19
6	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, University, 20-25 years, 18/19
7	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, Other, 20-25 years, 18/19
8	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Psychology, Early Care, 15-20 years, 17/18/19
9	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, University, 20-25 years, 18/19
10	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Computer Science, University, 20-25 years, 18/19
11	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Psychology, University, 20-25 years, 18/19
12	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Psychology, University, 20-25 years, 18/19
13	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, University, 20-25 years, 18/19
14	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, Other, 20-25 years, 18/19

Step 8

ID	Name	Age	Gender	Education/Occupation	Other Info
15	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Early Care, Early Care, 15-20 years, 17/18/19
16	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Psychology, University, 20-25 years, 18/19
17	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, University, 20-25 years, 18/19
18	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, Other, 20-25 years, 18/19
19	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Psychology, Early Care, 15-20 years, 17/18/19
20	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, University, 20-25 years, 18/19
21	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Computer Science, University, 20-25 years, 18/19
22	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Psychology, University, 20-25 years, 18/19
23	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, University, 20-25 years, 18/19
24	1/12/11 21-00-18	3/12/11 19-01-21	Female	Yes	40-45 years, Special Education, Other, 20-25 years, 18/19

Summary

Data preparation is an essential aspect of both qualitative and quantitative research. In particular, the researcher has to make a prior research design including the research question(s), which must be precise and clearly include the variables to be studied. These must be measurable. Likewise, it has to be specified which of them are going to be dependent and which will be independent variables. Specifically, in qualitative research, elements for the collection of systematic information have to be used, supported by different sources such as audio, video, etc. This module presented various techniques that can be used as a guideline. Next, the information collected must be categorised using categorisation processes that are directly related to the previously defined variables. Categorisation will allow frequency analysis of the elements under study, and at this stage the data collected must be cleaned and specified. The qualitative evaluation instruments are also subject to finding the reliability and validity indicators of these instruments. In the field of qualitative research, the use of triangulation is essential. The ultimate goal is to ensure the generalisability of the research results.

In addition, this module particularly emphasised the presentation of the think-aloud protocol analysis methodology, which consists of the collection of interaction dialogues between the user and the child in order to record these interactions. The protocol analysis techniques are based on categorisation, from the analysis of the use



of metacognitive strategies at different levels of complexity. In addition, examples have been provided for the creation of surveys through different *online* methods, such as Microsoft Forms, that allow surveys to be created in an open-response format.

Glossary

Scattergram: A scatter diagram or scatter plot that uses Cartesian coordinates to show the values of two variables for a set of data.

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Resources

Web

Google Docs	Link
Dictation	Link
Speechnotes	Link
Personal Speechlogger	Link
Camtasia	Link
Jing	Link
Adobe Captivate	Link
Camstudio	Link
Screencast-O-Matic	Link
Debut Video Capture	Link
Active Presenter	Link
Movie Maker	Link
ScreenFlow	Link
iMovie	Link
Filmora	Link
Microsoft Forms	Link
linesurvey	Link

