

Guide: Implement tracking system for MOOC learners and integrate it into provider quality assurance system

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Introduction

Over the last few years, Europe witnessed a rapid and massive expansion of e-learning courses. An increasing number of adults are following e-learning courses and MOOCs, with different motivations.

Several researches show that online learning attracts learners from medium and higher socioeconomic and education background, so a challenge is to open up e-learning and MOOCs to people not traditionally participating in lifelong learning.

The monitoring of learners has been emphasised in recent policy documents. 'New Skills Agenda for Europe' (2016) emphasised the need for EU member states to have a 'better understanding of performance of graduates'. The Council Recommendation on tracking graduates (November 2017) emphasized the need to improve the availability of qualitative and quantitative information about what graduates from different education and training settings do after they complete their education and training.

This guide was developed in the framework of the "Automatic System for Tracking E-learners (ASTRE)" project and was co-funded by the European Commission. ASTRE project proposes the development of a tracking system for adult learners that participate in MOOCs, with the aim to expand the audience of MOOCs and increase their relevance and quality. The aim of the guide is to support MOOC and E-learning providers to implement a tracking system for their graduates and integrate it into their quality assurance system.

This guide is addressed to MOOC providers and organisations that provide e-learning courses, that want to implement a tracking system with their own resources.

The specific objectives of this guide are:

- to raise awareness of MOOC providers on the relevance and usefulness of tracking their own graduates.
- to support MOOC providers in the process of establishing their own tracking system
- to support them to integrate the tracking system into their quality assurance system.
- to provide step-by-step methodological guidance.

The guide is divided into six chapters. The first chapter presents the relevance and importance of applying a graduates tracking system. The second chapter provides a step-by-step methodological guidance on how to establish a graduates tracking system. The third chapter presents the steps to integrate the tracking system into an organisations quality assurance system. The fourth chapter presents the ASTRE tracking system and its main features. The fifth chapter talks about further potential of using a graduates tracking system. The sixth chapter provides the conclusions, while the sixth and last chapter presents four case studies which describe the experience with graduate tracking. The case studies were gathered during the piloting of the ASTRE tracking system by MOOC and e-learning providers in Spain, Italy, Greece and Germany.

Relevance and importance of MOOC graduates tracking systems

The monitoring of learners has been seen as an important approach in increasing career prospect in Europe. The 'New Skills Agenda for Europe' (2016) emphasised the need for EU member states to have a 'better understanding of performance of graduates'. The Council Recommendation on tracking graduates (November 2017) stressed the need to improve the availability of qualitative and quantitative information about what graduates from different education and training settings do after they complete their education and training.

However, such a tracking system focusing on online learning environments does not exist.

What is a tracking system

A tracking system measures the benefits and the impact of attendance of a course or an e-learning course, in learners with different motivations and different degree of engagement and supports the quality assurance and strategic planning of the education providers. It can use a number of qualitative measures to track and monitor learning, teaching and/or development.

A tracking system supports and contributes to the more systematic collection of data in a more rigorous approach and with or without technology. The monitoring of learners has been emphasised in recent policy documents, such as the 'New Skills Agenda for Europe' (2016) and the Council Recommendation on tracking graduates (November 2017). The Recommendation proposed a new 'initiative on graduate tracking to improve information on how graduates progress in the labour market'. Tracking graduates is important for all sectors of education and training, however mostly in higher education, the institutions have regular tracking systems of their graduates.

ASTRE developed a tracking system for adult learners that participate in MOOCs and e-learning programmes, with the aim to expand their audience and increase their relevance and quality. The ASTRE tracking system is a tracking survey addressed to learners that have completed a specific course. The system focuses on the impact that the attendance of MOOC and the certification have had on the learner's personal and professional competences, further education, career path, professional status, earnings etc.

Advantages of tracking graduates

Research has demonstrated that when students' progress is monitored, students learn more, teacher decisions improve, and students become more aware of their own performance.

Through monitoring, different types of data are collected. These data are helpful when monitoring the progress of individual students across a range of learning areas, as well as tracking their achievement throughout the years. The data can be used to identify where a student is placed in relation to their personal learning goals, the other students in the class or other targeted benchmarks.

Additionally, another great benefit of monitoring student progress is that it allows the teacher to evaluate the effectiveness of their own teaching. If the majority of the class is finding it difficult to understand or demonstrate a specific objective, it may not be the ability of the students that is the issue. As a result, the teacher may have to assess their own instructional strategies to see if they are working and need to re-evaluate the delivery method through which the concept is being taught.

Furthermore, another benefit of monitoring student progress on a regular basis also enables the teacher to analyse a student's current performance level for a specific skill. As a result, teachers can provide students with assistance in achieving their personal academic goals. With information from assessments and samples of work, the teacher can work with the student to establish achievable learning goals and help each student to stay on track. With ongoing monitoring of the students, teachers can establish an achievable and individual rate of progress for each student, or conversely intervene when required.

Tracking graduates can contribute to career development. Career development is the process of choosing a career, improving skills, and advancing along a career path. It's a lifelong process of learning and decision-making that brings you closer to your ideal job, skillset, and lifestyle. Finally, monitoring will help individuals develop, implement, and monitor career goals and strategy through active and purposeful management.

Tracking systems approaches by country

The research conducted by the ASTRE consortium identified some very important points regarding the existence of a tracking systems for MOOC and e-learning in Europe and their approach to monitoring student and/or career progress. The research was conducted using an online survey, which revealed the lack of a detailed and well developed tracking system in Europe. According to the findings of the survey, some institutes might only track students by sending emails to ask them about positive experiences related to the courses they attended. However, all participants, noted that there are many obstacles to implement a tracking system.

When institutes attempt to track the students' progress the most popular way to do so is online surveys, emails, but also phone calls in some cases. Though these approaches are fragmented and very often incomplete.

Furthermore, regarding the use of tracking methods of learners in general, the results have shown that 67.2% of participant institutes have no tracking method at all, with 32.8% having some tracking method. Within the consortium 25% of provider have or use a tracking method while 75% do not have any. Regarding the EU countries, only 20.5% of providers are using a tracking method while 79.5% have not tracking method at all.

The next question of the survey explored the existence of career programmes for MOOC learners among the providers. The results revealed that the vast majority of providers, 74.6% do not provide any career advice programme. Within the consortium countries (Spain, Greece, Cyprus, Italy, Germany) this percentage was even greater, with 88.2% of providers not to have a career programme. The results were similar in all EU countries, with 82.5% of replies being negative while the situation seems to be better for Non-EU countries with 42.1% of providers to have some short career programme and 57.9% not to have any.

Regarding the tracking of the learners' professional development the majority of participants (65%) did not provide any answers, hinting the lack of a tracking system that monitors the graduates' professional development. Only 26,7% mentioned that they monitor the professional development of their graduates.

With respect the monitoring of the graduates' academic development the results revealed that the vast majority of the participant organizations do track the graduates' academic development, with 76.2% replying positively and only 23.8% replying negatively. The results within the consortium countries were split 50%-50% and within the EU in General 60% of providers said that they track their graduates' academic development and 40% saying that they do not. Finally, regarding the Non-EU countries, 90.9% of the participant providers do monitor their graduates' academic development while only 9.1% they do not.

The main reasons for the lack of a tracking method varied from lack of time, to lack of support, lack of resources, lack of tools etc. However, due to the COVID-19 pandemic, interest in online learning and in MOOCs have been increased considerably. Furthermore, MOOCs offered for free by the providers, and that in turn has increased the attendance. Therefore, a monitoring system will greatly benefit the institutions and the learners.

Motivation and challenges

The motivation behind the ASTRE approach was to address the gap in online learning with the lack of a monitoring system. More precisely, the motivation was to develop a tracking system for MOOC learners that will feed into the quality assurance system of the MOOC and e-learning providers in order to improve the learning and career pathways.

The approach aims at establishing a tracking mechanism and integrate it, in the MOOC and e-learning delivery processes. Furthermore, an important motivation and challenge is to support MOOC and e-learning providers to establish the tracking mechanism and integrate it into their quality assurance system.

Research has shown that online learning attracts learners from medium and higher socioeconomic and education background, so a challenge is to open up e-learning and MOOCs to people not traditionally participating in lifelong learning. Additionally, the biggest challenge will be to convince the providers to adopt the ASTRE tracking system.

Establishing a MOOC graduates tracking system, step-by-step methodological guidance

The establishment of a tracking system for graduates can be a great asset to the quality assurance system of MOOC and E-learning providers. It is a great way to provide evidence based improvements to courses and course provision. But, establishing a graduate tracking system at institution level is demanding. It requires time, commitment, resources and a development strategy.

The first step to developing a tracking system, is to define the methodology, by which the tracking system will be developed, applied and used. A key element to developing a successful tracking system is to involve and support a team of persons, who will design and administer the tracking system. Another important element is to create a feedback culture among learners and graduates. Studies (Meng et. al, 2020) have shown that the biggest obstacle in applying a tracking system, is the response rate of the target group. It is important to gather enough responses, which will lead to representative and reliable conclusions, which can then feed the quality assurance system.

At the start of developing a tracking system, it is recommended to prepare a plan, which will include and describe the processes to be applied. The steps to follow are:

- Define objectives
- Define indicators
- Establish a tracking methodology
- Analyse data
- Use results

It is recommended to keep in mind that you need to measure indicators that are important to the institution, ask the right questions, set clear targets and verify the clarity of questions before the launch of the survey.

Defining objectives

The first step to developing a tracking system is to define the objectives, which will guide your strategy and methodology of tracking graduates. Defining objectives will help in clarifying why the organisation needs a tracking system, even before designing.

The reasons why a MOOC or E-learning provider provides tracking for its graduates may be different. The main aim of your tracking system could be to improve the offering and relevance of your training programmes, or it could be to stay in contact with past graduates, or it could be even a legal requirement. Defining the objectives will lead to the next steps of the tracking system development, and help in defining the indicators and establishing a methodology. For example it will help in defining the questions, your sample population, the timing of the tracking, the resources the organisation will need etc.

If the main objective is to establish a regular tracking system to track professional development of graduates, then an annual survey is more appropriate with indicators that concentrate on career paths of graduates. If you want to establish a tracking system to feed your quality

assurance system and update your curriculum, then you need to set indicators measuring quality of programmes, their relevance, the developed skills etc. If again organising a tracking system is a legal requirement, then you will need to use predefined indicators and a predefined system.

Defining indicators

The next step in designing a tracking system, is to define the indicators which you want to measure. The indicators must be in line with your objectives, defined in the previous step. Indicators will determine what information needs to be gathered to fulfil the objectives. For each of the indicators chosen, a set of questions needs to be developed, which will help with gathering the necessary data for measuring the specific indicator.

An important aspect to think when defining the indicators, is to keep in mind how you will use the information gathered. So try to think which indicators and information can be analysed and will help the organisation in the future.

Indicators also determine the types of data which are going to be gathered. There are two kinds of indicators: quantitative and qualitative. Quantitative indicators refer to units of measurements while qualitative refer to perceptions and are more difficult to analyse and interpret.

Indicators can also be divided into main and secondary indicators. Main indicators are the ones that we want to measure, while secondary indicators are secondary data or demographic characteristics which can help us apply relations to the main indicators.

Some examples of indicators relevant to graduates tracking are shown below. Each organisation though may include more or less indicators when designing their tracking methodology:

Main indicators:

- Educational attainment
- Employment status
- Satisfaction with teaching subjects
- The utilisation of knowledge and skills acquired
- Work position
- Employment in the field of study
- The time to find a job
- Job satisfaction
- Number of graduates or drop outs
- Graduates continuing studies
- Graduates employed
- Average monthly wage
- Sector of employment

Secondary indicators:

- Age
- Gender representation

- Socio-economic background
- Geographical region
- Education performance

Identifying relevant indicators

Choosing the most appropriate indicators may be challenging but this step will determine the success of the tracking system. So when deciding which indicator to choose, who could think of the following aspects:

- Will data be available for the indicator?
- Is the indicator defined in the same way over time?
- Is the indicator valid and meaningful?
- Is this indicator important to the organisation?
- Is the indicator statistically sound and fit for the purpose it is being applied?
- Is the indicator easily interpreted?

Establishing a tracking methodology

Establishing the tracking methodology is the most important step when designing a tracking system. During this step you must decide on how you are going to gather the data for measuring the indicators, the tools which are going to be used, the frequency of the tracking system, the targeted population and the resources which are going to be required for applying the tracking system.

Data collection methods

The process of data collection will help with the gathering of information to measure the indicators set for the tracking system and will lead to the analysis of those data and finally the use of the results. When choosing the data collection method, you need to take into account the number, the contents and the scope of the indicators you want to measure and also the types of the data you want to collect.

Types of data

There are two types of data which can be collected, qualitative and quantitative data. In most cases, these two data types are used as preferences in choosing the method or tool to be used in data collection. As a matter of fact, data collection methods are classified into two, and they are based on these types of data. Thus, we can safely say that there are two major classifications or categories of data collection methods: the quantitative data collection methods and the qualitative data collection methods.

Qualitative data are:

- non numerical
- descriptive or nominal
- capture feelings, emotions or specific perception
- can be observed and recorded
- can be grouped according to categories

Qualitative data have many advantages. Firstly, qualitative data help with in-depth analysis, since they provide a detailed analysis of subject matters. Secondly, qualitative data help to understand the mindset of the target group and their opinion. Thirdly, they are rich data, since the method to collect them involved open ended questions where respondents are free to express their opinions, leading to more information.

On the other hand, qualitative data have also disadvantages. They are time consuming to gather, so in order to gather them a smaller sample is usually included. Furthermore, they are not easy to generalise the results to the entire population. Lastly, they are very depended on the researcher's skills and experience to collect the data.

Quantitative data are:

- Numerical
- Measurable
- More reliable and objective

Since quantitative data can be statistically analysed, they allow researchers to conduct in-depth research. Moreover, they included minimum bias. When personal bias is involved, the research could lead to incorrect result, but since quantitative data have a numerical nature, the personal bias is reduced to a great extent. Lastly, quantitative data lead to accurate results since the results obtained are objective in nature.

On the other hand, since quantitative data are not descriptive and provide restricted information, it becomes difficult for researchers to make decisions solely on the collected information. Furthermore, although personal bias is at a large scale restricted, the types of questions or the narrative of questions used to collect the data may contain bias. So, the researcher's knowledge of questions and the objectives of the research are important while collecting quantitative data.

Data are also divided into primary and secondary data. Primary are the data collected directly from the collection method used (e.g. survey, interview etc.), while secondary data are data collected from primary sources. Some examples of secondary data are registration forms completed by graduates at the beginning of their studies, transcripts or certifications awarded.

Secondary data are readily available and can be used in the tracking system. Collecting secondary data often takes considerably less time than collecting primary data where you would have to gather every information from scratch. It is thus possible to gather more data this way. Furthermore, secondary data help make primary data collected by surveys more specific and provide a basis for comparison for the data collected.

Education institutions and providers already have a set of secondary data from administrative procedures, such as registrations, personal transcripts, certifications and awards which can be used in combination with the graduate tracking system, in order to obtain meaningful information and calculate indicators, related to the profile of the students and their period of studies.

Secondary administrative data can give you valuable information and data to measures indicators set. For example, potential and enrolled students on a course can provide information on the interests of students, their motivation and the attractiveness of courses. Socioeconomic indicators like age, gender etc. can give information of demographics and

inclusion strategies. Dropout rates and learner's progress can give useful information on motivation and difficulty of programmes.

Mostly used data collection methods

The most used data collections methods in research are surveys , interviews and focus groups, depending the type of data you want to collect.

If you want to collect qualitative data, then interviews or focus groups can be applied. Interviews may be structured, semi-structured or unstructured and can be conducted either face to face or by phone. Unstructured interviews have the form of a conversation and questions are unplanned, while structured and semi-structured interviews have predefined questions and so data can be standardised. The data collected through interviews are highly personalised and may contain personal bias from interviewees.

Focus groups are also a method for collecting qualitative data. Focus groups are a kind of group interviews where you can gather a bigger amount of data than interviews, more quickly. Usually focus groups are semi structured and require a skilled facilitator.

Both type of qualitative data methods have challenges. Firstly, they are both time consuming and costly, especially if you try to gather information from a large population. Secondly, the data gathered are hard to analyse and compare and lastly and most importantly, the interviewer or facilitator can bias the responses, especially if he/she hasn't any previous training.

Regarding quantitative data collection methods, the most commonly used one is surveys, which use questionnaires, either online or paper-based. Surveys are appropriate for large populations, since they allow the collection of large amounts of data quickly without additional cost. Surveys can also be structured or semi-structured, which allows the collection of both quantitative and qualitative data, while they can also ensure anonymity of respondents. Surveys may be easier to distribute and gather information, but they are difficult to design and impersonal.

Choosing a data collection method

When deciding on which data collection method to use, several parameters need to be taken into account. Firstly, is the sample population (how many graduates are going to be reached), the indicators chosen (quantitative or qualitative), the depth of tracking, the resources available (time, financial resources) and the skills of the involved staff.

For approaching the whole population of graduates, a survey based on a questionnaire would be more appropriate, while additional interviews or focus groups with a selected sample could be deployed, to provide additional qualitative data. On the other hand, qualitative data collection methods can be used if the tracking concerns only a small number of graduates, for example from a specific course.

For the purposes of this guide, we suggest to use the survey as a tracking method, since it can be easily implemented and is not demanding in terms of time and competences of staff involved. Moreover, MOOCs usually involve a lot of learners so a survey questionnaire would be more appropriate.

Survey questionnaire

The next step to design the tracking system is to develop the tool, the survey questionnaire, with which data will be collected to measure the indicators. Designing the appropriate questionnaire is essential for the success of the tracking system.

Words used in questionnaires should have the same meaning for all the respondents and at the same time correspond to the indicators which we want to measure. Language used when designing the questionnaire should remain simple so that all respondents understand what it is asked. Long or complex questions, as well as hypothetical questions should better be avoided. Additionally, questions with double negations/meanings should not be included but rather divided.

The answers should cover all possible categories of responses and correspond to the population examined. Be careful also to not include overlaps to answers categories, which will lead to false results.

Another important aspect is to provide respondents with clear instructions on how to complete the survey at the beginning of the survey. The introduction should include the scope of the survey and how the data are going to be used in the quality assurance system of the provider. An important thing is also to note conditions of confidentiality, e.g. Whether personal information is gathered, who will have access to that information and how it will be used.

The structure of the questionnaire should be appropriate and encourage respondents to answer as many questions and as accurately as possible. So, try to make the questionnaire brief and to the point as much as possible and try to make the transition from one question to the other smooth. Moreover, you should be aware that the order of questions may also influence the answers by respondents. E.g. the respondent's interpretation of a certain question may be influenced by earlier questions.

In general, questionnaires should:

- Translate the indicators to be measured into a language that respondents understand
- Be worded using simple terms
- Cover all possible responses of categories
- Provide respondents with clear instructions
- Encourage respondents to answer the questions as accurately as possible
- Indicate (briefly), the confidentiality protection measures, any record linkage plans, and any data sharing arrangements that are in place
- Be arranged into logical groups. (Questions on the same topic should be grouped in the same section)

(Brancato et. Al, 2004)

Design of questions

When creating the questions for the questionnaire, the method by which the answers are going to be evaluated should be clear, since questions should support the measurement values of the indicators.

There is no point in creating long questionnaires, with many questions, which answer types cannot be used for evaluation. Have in mind that when the survey is already up and running, you cannot go back and change the questions or the answer types.

It is very important that the questions are as clear as possible, understandable and easy to answer by all respondents. The structure of a question may influence respondents and thus have an impact on the quality of the data gathered. Furthermore, the quality of questions, has an impact on the data collection process and the data analysis procedures. For example, a quality designed questionnaire, helps with coding of data and requires minimum editing.

So, when writing the questions, try to minimise errors in data, arising from questions structure. In order to minimise the errors arising from writing questions, a set of principles should be taken into account concerning the relevance of the questions, the type of questions to be used, the logical sequence and wording of questions (Brancato et. Al, 2004).

There are five types of questions which can be used (Brancato et. Al, 2004):

1. Factual questions, where respondents have to provide fact based information rather than opinion. Example: Do you have a University degree?
2. Demographic questions, which can be used to distinguish main group of respondents when conducting the analysis of the data. Example: What is your age?
3. Behavioural questions, which ask about respondents factual circumstances. Example: Do you prefer online or face to face courses?
4. Opinion questions, which seek to measure subjective opinions rather than facts. Example: Are you in favour of....? These types of questions also have many problems. For instance, a person's attitude may not be yet developed or they haven't given it much thought. So the validity of these types of questions cannot be checked.
5. Hypothetical questions. Example: What would you do if....? Again, the validity of answers cannot be checked and it is very difficult to predict future behaviour based on these questions.

Furthermore, there are two question formats which can be used. Open questions, which allow respondents to answer in their own words, and closed questions, where respondents have to choose from a range of possible answers. When using open questions, it is possible to gather many possible answers and exact values, but open questions require more time to answer and process. On the other hand, when using closed questions, all possible alternatives should be given as answers and also these alternatives should be self-explanatory and mutually exclusive.

In general, closed questions are much easier to analyse and also reduce the effort required from respondents. Open questions should be used when you cannot predict all the possible alternative answers.

A classification can also be made to types of closed questions:

- Limited choice questions, where the answers are for example yes or no.
- Multiple choice questions, where respondents have to choose from the possible answers provided.
- Checklists, where the respondents can choose more than one from the possible answers provided.

- Partially closed, which have as a last possible answer “Other”, where respondents can type their answer.

Moreover, when thinking about the response options of a question, you need to take into account that the number of options may have an influence on the quality of data gathered. For example if you include too many or too few possible answers, errors may occur in the validity of data. E.g. If you provide too many answer options, respondents may be too tired to read all of them, or if you provide too few, respondents may find it difficult to choose the one that applies best to them. Studies have shown that five to nine categories are the optimum number to use as response categories.

The order of the response option can also influence quality of data. Sometimes, respondents choose the first option, which made the initial impact on them, or the last options, since it can be easily recalled. Thus, response options should be meaningfully presented. For example, an education question should present the qualifications in order from lowest to highest. Lastly, rating scales should be easy to interpret and balanced, with an equal number of favourable and unfavourable response choices

The wording of questions is also very important. When participants are asked to answer a questionnaire, you need to make sure that they understand the language used and the questions. Furthermore, try to avoid using adjectives and biased language that may influence answers. E.g. say “Do you agree that...?” instead of “Don’t you agree that....?” . Technical or difficult terms should also be avoided. E.g. say “Why did you choose this online course” instead of “why did you choose this MOOC”. And a very important thing is to not include 2 factors inside one questions. E.g. don’t say “Please rate the career guidance and counselling services” but instead divide them into two questions.

As a conclusion, when you are designing your survey questionnaire, you can use the following checklist to avoid above mentioned common mistakes which may influence the quality of your data:

- ☐ Give instructions for completion
- ☐ Keep a simple language
- ☐ Ask short and concrete questions
- ☐ Define technical terms
- ☐ Ask one thing at a time
- ☐ Avoid leading and hypothetical questions
- ☐ Balance response rates
- ☐ Cover all possible answers in response list
- ☐ Make alternatives mutually exclusive
- ☐ Use open ended questions only when necessary
- ☐ Include a do not know/does not apply response
- ☐ Think about the order of questions
- ☐ Consider the length of the questionnaire

Testing of the tracking tool

After you have the survey questionnaire ready, it is recommended that you firstly test it, to point out mistakes which need to be corrected before launch. The testing of the survey can be

done in two steps. In the first step, an expert should be called in order to read through the questionnaire and check for errors (e.g. Confusing or leading questions etc). The second step is to pilot test the survey on a small number of the population to which you will distribute the final survey.

Ethical considerations

Do not forget that ethics is a very important part of qualitative and quantitative analysis. Participants should be informed beforehand about the process of data collection and analysis, thus they can decide whether they want to participate. Other important ethical issues to adhere to when conducting a survey are to ensure anonymity and confidentiality of participants.

Population sampling

After the survey questionnaire is ready, you can now start its distribution and run the tracking survey. So, the next thing that need to be considered is to whom you will distribute the questionnaire. The most optimum choice is to distribute the survey to the whole population which is examined, which in this case means to all the graduates of MOOCs.

Another option is to apply sampling methods. Sampling is the selection of a subset (part) of the statistical population. Sampling may be useful in cases that the population you want to examine is very large. Furthermore, with sampling, it is easier to distribute the survey, requires less resources and can lead to faster data collection.

When you apply sampling, you need to make sure that the sample you have selected is representative of the population, so you can generalise the findings from your data. There are two sampling methods, which are most commonly used:

- 1) Random sampling: where all members of the population have an equal probability of being selected. When using random sampling, you need to take into account that errors may occur, because of the randomness of selecting the sample, which may lead to unreliability of results.
- 2) Quota sampling: where the population is first segmented into mutually exclusive subgroups, then subjects or units from each segment are selected based on a specified proportion (Dodge, 2003). For example, if the population of all graduates consists of 56% female and 44% male, the sample should reflect given percentages to keep the representativeness (this means that your sample should also consist of 56% female and 44% male). The same approach as in the case of gender is then applied to other population parameters, such as year of study completion, the field of education, etc.

In case of MOOC graduates tracking, evidence (ASTRE Transnational Study, 2020) has shown that the response rate is very low, that is why we recommend to distribute the survey to the whole statistic population, in order to receive more reliable results.

Tracking frequency

The last thing you need to consider when designing the tracking methodology is the frequency when the tracking is going to take place. The frequency depend on many factors, e.g. The subjects, number and duration of MOOC courses, the available resources of the institution, the

applied quality system etc. For MOOC providers, we would recommend an annual or semi-annual distribution of the tracking survey.

Administering the tracking survey

So now the tracking survey is ready and you want to start distributing the questionnaire to your graduates. Again, there are things that need to be considered.

Firstly, you need to decide on the presentation of the questionnaire. Which logos and graphics are you going to use, which colours? A nicely looking questionnaire is sure to attract more responses easily. Do not forget at this stage to write the instructions on how to complete the questionnaire.

The next decision you need to make is how is the survey going to be distributed? An online survey is recommended here, firstly because it is easier to distribute and secondly because it requires less resources from your institution. Online surveys are a great way of reaching a large number of people in little time. Furthermore, online surveys help with storing and coding data.

There are many different online survey tools which can be used. Some of them are free and simple to use. An example could be Google or MS forms. Other examples are Lime survey, Survey Monkey and EU survey. The decision on which tool to use relies on many factors, e.g. Previous experience of the person administering the tracking system, size of the population, size of the survey etc. For example, if you have a long survey with conditional branches, then a more advanced tool is required, or if your population is large, then you need a tool with the capacity to administrate responses. Lastly, if you want to secure anonymity and privacy issues, the best option is to use a tool administered and installed in the organisation's server.

A visual guide on how to set up a survey questionnaire in google forms and in EU Survey, can be found on the ASTRE webpage (<http://trackingelearners.eu/>).

Lastly, what you need to decide is how to launch the survey and gather data. If you decide to use an online survey, then the best way of reaching your target group is through emails. The email could include the link to the online survey, the introduction and the instructions on how to complete it. Emails are an easy way to reach a large number of your target group.

When you have finally sent out the survey and started gathering responses, do not forget that you need to monitor the process. This means that you need to see how many graduates have answered the questionnaire and if you have reached your target number. If not, then you may need to send follow up emails or use incentives in order for more people to answer the survey. Incentives could be tangible or intangible, for example it could be free access to a paid course or a sum of money to a randomly selected participant.

Resources

Resources concern what you will need in order to design, apply and administer a tracking methodology.

Firstly, you will need to decide on the human resources needed, meaning the people who are going to be involved in the tracking system. You will need to decide on who will be responsible

for designing the tracking methodology, who will be responsible for designing the tracking survey, who will be responsible for administrating the survey and lastly who will be responsible for analysing the data. It is recommended that people chosen to be involved in the tracking system, have previous experience or attend relevant seminars. For the purpose of the ASTRE project, two webinars are going to be organised, on how to design a tracking system. For more information, follow the ASTRE project webpage <http://trackingelearners.eu/>.

Other resources that will be needed is time, since applying a tracking system requires a considerable amount of time. Furthermore, you may also need tangible resources, e.g. a management system for data, a server to store data, stationary and other equipment.

Analysis of data

After you have gathered the data, it is time to analyse them. Data analysis is a process of inspecting, cleansing, transforming and modelling data with the goal of discovering useful information, informing conclusions and supporting decision-making.

More specifically, data analysis includes:

- Data processing, which means organising data into e.g. rows and columns for further analysis in an excel or other file
- Data cleansing means to check if data contain errors or duplications. In our case the use of online questionnaires minimises the probability of having data errors
- Data processing, which means that once the data are cleaned, it can be analysed to summarize their main characteristics, often with visual methods.
- After analysing data, it's finally time to interpret the results to draw conclusions and make better decisions

There are two ways of analysing and processing data. One way is to use descriptive statistics and the second is to use inferential statistics.

Descriptive statistics enables us to present the data in a more meaningful way, which allows a simple interpretation of the data. Descriptive statistics can provide us with simple summaries about the population. Descriptive statistics are easy to calculate and present and do not require a specific software or knowledge of statistical analysis.

On the other hand, inferential statistics can be used to make inferences about the statistical population, and draw conclusions. Statistical inference is the process of using data analysis to deduce properties of an underlying probability distribution (Upton & Cook, 2008). Inferential statistical analysis infers properties of a population, for example by testing hypotheses and deriving estimations. Inferential statistics are more reliable, especially when using a sample of the population, however they require specific software for the analysis (e.g. SPSS) and knowledge of statistical analysis methods.

For the purposes of this guide, we are going to present the most commonly used measures for presenting data, which can be applied by all MOOC providers, without the need to have knowledge on statistical analysis methods:

- **Mean:** Average of the data
- **Median:** middle of the set of numbers, when sorted from smallest to largest

- **Mode:** the most common number in a data set
- **Frequency:** the number of times a number appears
- **Relative frequency:** the ratio of the number of times a value occurs to the total number of values

The most frequent used charts in descriptive statistics, which help present data in a visual way are:

- **Pie charts:** shows you how categories in your data relate to the whole set.
- **Bar graphs:** Display relationships between data categories

Example:

Lets say you have a question with the following possible answers:

- Strongly agree
- Agree
- Disagree
- Strongly Disagree

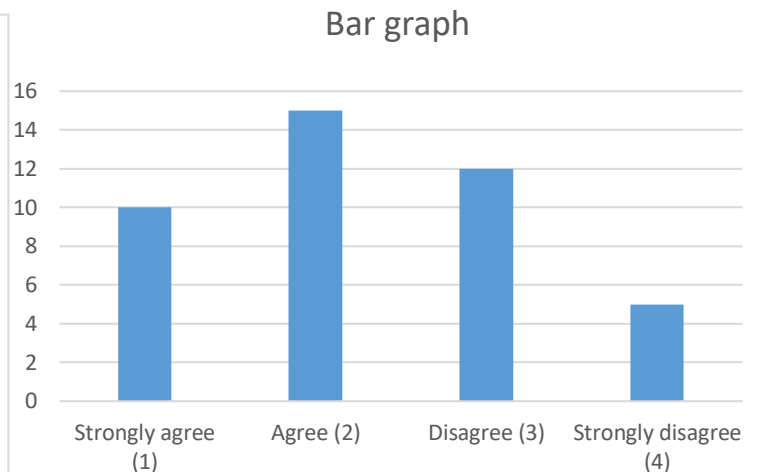
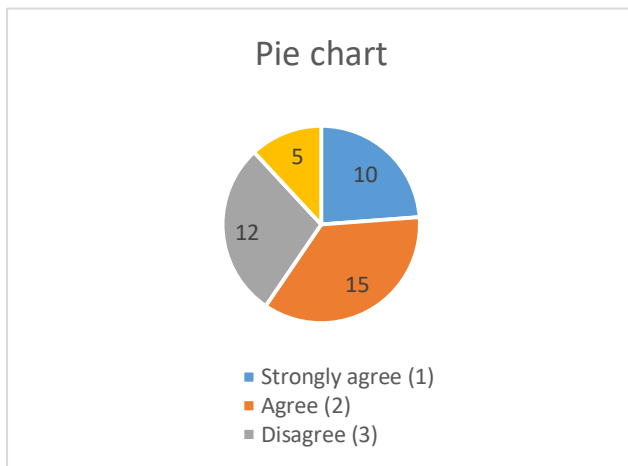
After applying the tracking system, 42 graduates answered this question. Below is a table with the answers you got:

Answer categories:	Frequency	Relative frequency
Strongly agree	10	23.80952
Agree	15	35.71429
Disagree	12	28.57143
Strongly Disagree	5	11.90476
Sum	42	100

Mean: 2.285714

Median: 2

Mode: 2



Use of results

After processing, analysing and presenting data, it is time to draw conclusions and make decisions. Data from tracking systems should be used for continuous improvement and development planning.

This is why a permanent tracking system should be put in place, which gathers data on a regular basis. Analysis of data after having implemented changes, will show whether our changes were successful or whether we need to apply new changes. Having a tracking system, which produces regular data help organisations to keep track of tendencies and thus regularly updates their courses.

Integration of MOOC graduates tracking system with organisation quality assurance system

The continuous multiplication of MOOCs and e-learning courses, as well as their methodological variation, has made it necessary to establish qualitative evaluation criteria for their contents and didactic proposals.

Establishing quality scales and providing, based on the analysis of the results obtained, propositions for achieving better learning results, accessibility and the pedagogical methodology required in each situation, can be an essential qualitative leap for MOOC and e-learning providers. Therefore, in order to ensure the quality and suitability of the training supply, the MOOC and e-learning provider must have implemented a management system.

Quality Management System - Quality of the Training Action

A Quality Management System is the group of coordinated activities whose aim is to manage and to control an organisation with respect to quality. Understanding quality as the degree of compliance with the defined objectives for a specific product or service.

The main objective of a quality management system is to stimulate and support the continuous improvement of the quality of the services and products provided.

The structure of a quality management system is based on the identification of the necessary organisational processes to ensure that the system contains all the work necessary to complete the planned activities successfully. Usually, the processes of a management system can be grouped in:

I. Quality management processes

These processes are necessary for the application of the standards and tools of quality planning, monitoring, analysis and improvement.

- Control of Documentation and management of results.
- Quality Planning, Analysis and System Review.
- Improvement Management.
- Internal audits.
- Customer satisfaction.
- Monitoring and measuring processes.

II. Supporting processes

Supporting processes for the operation of the management system, which are for common functions throughout the organisation.

- Training management and human resources.
- Facilities, Equipment and Software Management.
- Purchasing management and recruitment.
- Communications management.

III. Specific Processes to the type of activity

These processes are necessary for the planned and controlled development of the activities included in the scope of the management system of the activity of the organisation, in compliance with applicable legal requirements.

The quality of a training activity is linked to the processes followed by the organisation itself. In the different processes of the management system, the most critical requirements related to the quality of the training activity are:

- *Control of documentation:* It is necessary to have implemented a documentation management and record keeping system. Clear and unequivocal procedures for each specific task in the organisation are essential to reach the quality objectives. This documentation should include procedures describing how the monitoring system will be carried out, which monitoring tool will be used, how to evaluate the data obtained and how to make decisions, among others.
- *Resource management:* The management of the organisation must establish and provide the necessary resources to implement, maintain and improve the management system, in order to increase customer satisfaction with the training activity. The staff involved in the development, design, content management, tutoring of the training actions must be competent. Also, they must have the appropriate training, skills and experience. The organisation must also have defined the IT requirements (software, hardware and technical resources) necessary to be able to offer MOOCs and e-learning courses to learners.
- *Customer feedback:* The organisation must maintain a system to collect and manage the improvement propositions of the student, and thus be able to include them in subsequent revisions of the training actions, improving and adapting them to the requirements of the learners. A measurement system is needed to know this information, to determine if the organization is meeting its objective. This is where the ASTRE tool is integrated into the Quality Management System.
- *Maintenance and review of training activities:* Implement a system of maintenance and review of training actions to ensure that it meets the established requirements and objectives.

Evaluation procedure

One of the objectives of any quality management system is to allow an organisation to increase customer satisfaction. Through continuous and systematic evaluation, the organisation would be able to know if the product or service provided meets the requirements and expectations of its customers during its life cycle.

The organisation should monitor customer perceptions, in order to know the level to which their needs and expectations are being met.

The organisation must define the methods for tracking and reviewing the data obtained. As mentioned before, it is an essential requirement of the Quality Management System to have procedures where the different processes and/or activities of the organisation are described clearly and in detail. Therefore, a procedure should be developed detailing how to perform the evaluation and the use of the results obtained. This procedure should include:

- Aim and scope of evaluation: what and whom to evaluate and its purpose

- Evaluation methodology: tools to be used in evaluation
- Frequency and timing of evaluation: at the beginning/end of the training and frequency.
- Interpretation of results: reporting format and expression of results

Establishing a graduate tracking system can be a great value for the quality assurance system of MOOC and E-learning providers. One of the most commonly used tools to measure or evaluate customer satisfaction is surveys.

The ASTRE Project has developed an evaluation/monitoring tool based on a survey to measure the impact that the training has had on graduates. The following is a summary of the steps to follow in order to implement this evaluation tool:

1^º Select the platform: There are different platforms available to carry out the survey (Eu Survey (European platform), Google Forms, LimeSurvey,...). This guide details how to create forms using Google Forms and EU Survey platforms.

2^º Create your own survey or use the survey developed by the ASTRE Project and adapt it to the needs of your organization:

- Include the questions you consider appropriate for your analysis. First you must establish the indicators you want to measure and analyse.
- Define the type of question to be used: open-ended/multiple choice/multiple choice/decreasing/linear scale, etc.
- Define the structure of the survey (how many sections, etc.).
- Insert the necessary parameters to define the survey (only one answer per student, deadline, etc.).

3^º Establish how to contact the students to be followed up: e-mail, online survey on the institutional/course website, social networks (LinkedIn, tweeter, Facebook).

4^º Launch the survey: To increase the response rate you can motivate graduates through incentives (free courses, career counselling, benefits in the next MOOC certificate) and send reminders to students who have not answered the survey.

5^º Collect the results: the indicated applications show the results, numerically and in graphical format, and also allow exporting the data to Excel files to be able to exploit them.

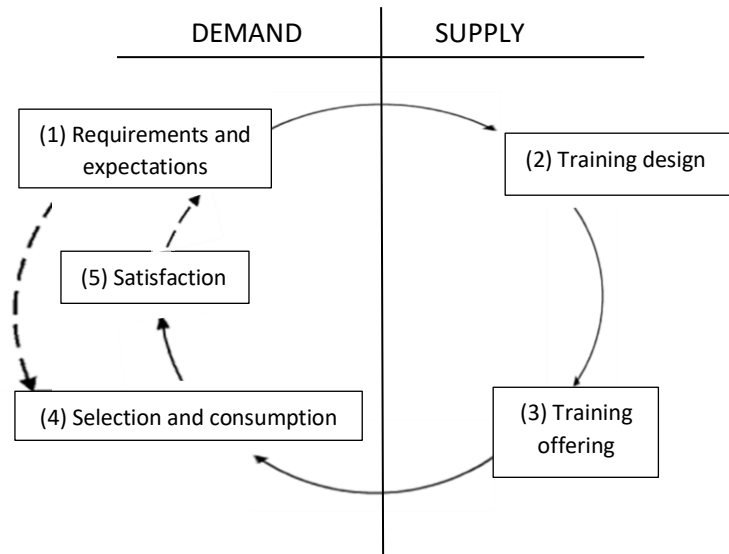
6^º Analyze the results: Based on the previously established indicators, analyze all the results and obtain feedback.

7^º Establish proposals for improvement and implementation of changes:

- Decide which changes are a priority.
- Evaluate the feasibility of implementing the changes.
- Update the MOOC/Online course.

Measuring customer satisfaction

The concept of the customer is essential in the quality management model. Customer is defined as someone who acquires a product or service to satisfy a necessity. Egressed student, as customers, have a fundamental role in the implementation of educational processes and programmes, because these processes and programmes must be aimed at satisfying their needs and demands.



The level of satisfaction of customer about the training depends on the difference, positive or negative, between their initial expectations (what they expected) and what they have received. The satisfaction of learners' needs, as direct clients of education, is one of the principles that constitute a quality management model.

Student satisfaction is associated with student expectations but, what are the expectations of the student? In order to evaluate the level of satisfaction of the egressed student, previously quality indicators (satisfaction factors) must be established. The factors identified as most critical for customer satisfaction are:

- *General information:* This is the minimum information that must be provided with the training supply, details such as the name, the aims of the training, the necessary training required or the hardware and software equipment needed to perform it.
- *Recognition of the training for employability:* How training increases the learner's ability to integrate into the labour market or to improve the current position.
- *Quality level of the learning methodology factor:* To determine whether the methodology has been adequately structured and planned, as well as the content, method, assessment tools, learning activities, teacher-student interaction, etc. Because the learning methodology and the training resources used will have a significant effect on the learner:
 - on a better assimilation of contents.
 - an increase in motivation.
 - acquisition of valid knowledge.
- *Quality level of Accessibility factor:* It tries to measure in which dimension the virtual training action can be clear, usable and feasible with efficiency and efficacy by any learner. The parameters that define accessibility are hardware accessibility, software accessibility, web accessibility and distribution of electronic documents.

With the implementation of a tracking system of the training of the egressed student, the aim is to know the impact that the training has had on students with different motivations and different degrees of engagement in terms of:

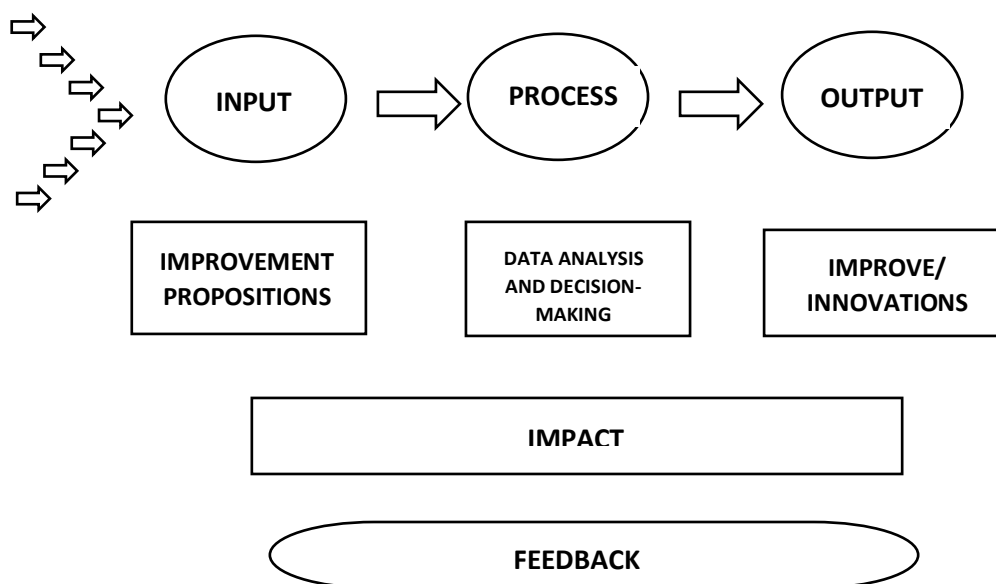
- access, maintenance or improvement of graduates' employment.

- improving the skills of graduates and, consequently, improving the competitiveness of enterprises.
- the adequacy of the training actions to the needs of the labour market and the efficiency of the economic resources and means used.

Data Analysis and Improvement Measures

As defined before, evaluation is the process of identifying and gathering data about specific services or activities, establishing criteria for assessing their success and how the service or activity meets its outcomes and goals.

Measuring customer/student satisfaction can obtain valuable and necessary information to feed the Continuous Improvement of the Quality. Continuous Improvement is an important component to ensure that the Quality Management System works properly.



Data helps develop, guide and sustain organizational change that leads to improvements in learning. By exploring data, MOOC providers can identify existing problems and make informed decisions about what to change and how to change it.

Therefore, evaluation is a decision-making tool, as it helps to detect opportunities for improvement and implementation of relevant corrective actions in the teaching and learning process, benefiting graduates, teachers and the organisation.

The results obtained from the tracking system should be processed and analysed to allow the identification of strengths and weaknesses of the training activity. On the weaknesses detected, the MOOC or e-learning course provider should define determine the causes of the problem and implement any necessary actions to ensure and achieve the attainment of the needs and, therefore, the satisfaction of the graduate.

The possibilities for improvement may be diverse. It is possible to act on the sequencing of contents and structuring of the course, the pedagogical improvements and even the revision

of the contents, materials and exercises proposed. All this, to increase the satisfaction of egressed student who need to improve their competences, knowledge and skills; that is, an updating and professional training that allows them to adapt and respond to the new demands of the labour market and society.

Presentation of the tracking system (O1) and its main features

ASTRE context

The job market and the education system are moving fast to online learning in the majority of developed countries. In the last decade, the European Union, grasping the importance of life-long learning and knowledge sharing, has promoted several initiatives in order to support and assess digital learning and teaching activities. Online Learning technology, which is now a fundamental need of modern civilization, is also becoming an affordable, handy information provider and even a provider of professional courses and educational degrees instead of attending physical classes in the traditional institution of learning.

The ongoing COVID-19 pandemic has increased interest in online education. MOOC providers, in particular, have all seen drastic growth in response to the pandemic and isolation measures put in place in most countries. Among the many issues at stake, the coronavirus is refocusing attention on e-learning, and the strategic importance of quality, open-access multimedia learning. Online readiness via quality open-access resources is proving to be a key factor in countries' response to the coronavirus emergency. There is some scepticism that MOOCs can provide a satisfactory learning experience, no matter what technologies are used. Online learning carries a stigma of being of lower quality than face-to-face learning, despite research showing otherwise. This is why providers should keep a high focus on quality control of the courses they offer. Quality control is a crucial node to give visibility and affirm the reliability of training offer.

According to these premises, even if the ASTRE project was designed before the pandemic its primary objective is more relevant than ever. It is focused on improving the quality of online learning opportunities for adults which is directly related – especially in this particular period - with the requirements from the pandemic, increasing the perception that this type of learning has several advantages.

This fundamental premise is the base for the definition of the ASTRE Project objectives that focus on the following points:

- graduate tracking systems are becoming an emerging priority in many Member States and in Europe
- tracking systems are important for understanding employability problems as well as possible success factors
- there is no agreed definition of tracking at European level and the comparison of data related to tracking systems between the Member States is rarely possible

Accordingly, there is a need to measure the benefit and the impact of MOOC and E-learning courses in learners with different personal characteristics, motivation and degree of engagement. Furthermore, investigating learners experience and results, will help providers

to improve the quality of their courses, by providing information to MOOC providers about what motivates learners to follow and complete a MOOC.

In view of the above being said, ASTRE objective is to improve the quality of the courses offered, by providing information to MOOC and E-Learning providers about what motivates learners to attend and complete courses.

Thus, the main objectives of the tracking methodology are identified as follows:

- Development of the tracking system to know the impact of courses on learners;
- Development of the tracking system to improve the impact of courses on learners;
- Analyse the impact of self-adapting in lifelong learning and lifelong skills;
- Increase the quality of MOOCs and E-Learning.

Other secondary objectives are:

- Help MOOC and E-Learning providers to improve the quality of their courses;
- Improvement of image and reputation of providers;
- Identify weakness and strength;
- Provide a tool that, integrating the tracking of learners, will improve the overall quality system of providers.

The ASTRE tracking system and its main features

The first intellectual output of the ASTRE project has been a tracking system for learners participating in MOOCs and E-Learning courses. For this purpose, a tracking survey has been designed to investigate results and opinions of MOOC students and E-learners that have completed an online course.

The content of the survey is defined on the basis of the desk research phase (O1/A5 and O1/A6) already completed. The results of the desk research are mainly the following:

- MOOC and E-Learning providers offer a wide variety of topics,
- The majority of courses have a duration between 2-10 weeks,
- Providers have not a typical accreditation system: they are offering both certificate of attendance or knowledge accreditation,
- Less than 20% MOOC students finish the course, which implies a lack of motivation; results are better when it comes to university E-learners,
- Usually students attend more than one online course: it means they really trust the system and get some interesting knowledge, otherwise they would not repeat the experience,
- One of the main reasons for having interest in online learning is professional development: CV improvement and working skills development
- There is no career advice program, probably due to the lack of tracking system to give reliable information,
- MOOC providers admitted they don't use information gathered from the tracking system to improve their offer.

According to the previous points, the tracking system focuses on the impact that the attendance of MOOC and E-Learning courses have had on learners' personal and professional competences, further education, career path, professional status, earnings etc. It is based on qualitative and quantitative data that measure specific indicators.

Quantitative data include personal and socio-economic information, learning path, qualifications and certifications, aspects related to the specific MOOC attended (field of study, number of hours, certification, etc), transition to employment or further education and training, earnings, type of contract, employment status, occupation, professional status and/or activity, geographical and/or sectoral mobility.

Qualitative data include motivation for attending the specific course, relevance of the specific course with expectations, competences acquired, competences needed, personal perception of benefit.

The tracking survey is developed using the open source online survey tool EU_Survey, created and managed by European Commission. EUSurvey provides a wide variety of features, for survey management, analysis of results, sharing and publishing. Furthermore, it is built on an open and sharing philosophy and it gives the possibility for sharing the survey with other potential interested MOOC and E-Learning providers that want to replicate. Regarding the implementation of the survey it is suggested to use any open source for surveys.

Apart from the tracking survey, the tracking system includes methodologies and mechanisms for preparing, managing and administrating the survey, analysis and presentation of the results and use of results.

The tracking methodology and tool have been tested and evaluated, through the pilot runs and finalised after feedback from the pilots.

ASTRE methodology and indicators

The objective of the methodology is to get a tracking system which is useful even when the project has finished. Moreover, it must be able to offer information despite the provider is not a big organisation and has limited resources.

Before defining the methodology, the following points have been considered:

- How often the tracking will take place?
- How comprehensive it will be?
- What methodology will be followed?
- Sample survey or population survey?
- What resources to put in place?
- How the results of the tracking system will be used?

Taking into account the approach strategy, the basic steps to implement the tracking system methodology are:

1. Define the relevant cognitive objectives and indicators necessary to start from the benchmarking of similar experiences and the cognitive needs

The cognitive objectives must be consistent with indicators and questions contained in the questionnaire.

Cognitive objectives => Indicators => questionnaire

As shown above, the indicators must meet information needs and they should therefore be selected on the basis of what data can be collected in a realistic and efficient way. The indicators will provide information that will have to be used in some way. It is ineffective to collect information that will not then be relevant in terms of use.

By way of examples, some relevant indicators are as follows:

Main indicators

- Educational attainment
- Employment status
- Sector of employment
- Position within the employment
- Earning income
- Satisfaction with studies

Secondary indicators

- Gender
- Age
- Socio-economic background
- Geographical situation
- Education performance
- Civic activities

Partners developed the following 24 indicators according to which the survey (O1/A8) should be implemented. All the following indicators will be measured after 1 and 2 years since the end of the online course and clustered according to age, gender, country of origin and level of education.

- 1) NUMBER OF STUDENTS WHO OBTAIN THE TITLE/TOTAL RESPONDENTS
- 2) NUMBER OF STUDENTS WHO DECLARE THE COURSE HAVE ENRICHED THEIR PROFESSIONAL PROFILE/TOTAL RESPONDENTS
- 3) NUMBER OF STUDENTS WHO ENROLLED THE COURSE TO FURTHER PROFESSIONAL CAREER OR TO FIND A NEW JOB/TOTAL RESPONDENTS
- 4) NUMBER OF STUDENTS ENROLLED IN ANOTHER ONLINE COURSE/TOTAL RESPONDENTS
- 5) NUMBER OF STUDENTS ENROLLED IN AN ADVANCED LEVEL COURSE/TOTAL STUDENTS ENROLLED IN ANOTHER ONLINE COURSE
- 6) NUMBER OF STUDENTS ENROLLED IN AN EQUAL LEVEL COURSE/TOTAL STUDENTS ENROLLED IN ANOTHER ONLINE COURSE

- 7) NUMBER OF STUDENTS ENROLLED IN ANOTHER ONLINE COURSE PROVIDED BY THE SAME INSTITUTION/TOTAL STUDENTS ENROLLED IN ANOTHER ONLINE COURSE
- 8) NUMBER OF STUDENTS WHO, GOING BACK, WOULD REPEAT THE SAME COURSE/TOTAL RESPONDENTS
- 9) NUMBER OF STUDENTS WHO ARE INTERESTED TO ENROLE IN A NEW ONLINE COURSE/TOTAL RESPONDENTS
- 10) NUMBER OF STUDENTS WHO ATTENDED THE COURSE BECAUSE IT WAS MANDATORY TO HAVE A PROFESSIONAL CAREER DEVELOPMENT/TOTAL RESPONDENTS
- 11) NUMBER OF STUDENTS WHO GAINED A POSITIVE CHANGE IN THE JOB POSITION AFTER THE COURSE/TOTAL RESPONDENTS
- 12) NUMBER OF STUDENTS WHO GAINED A POSITIVE CHANGE IN SALARY AFTER THE COURSE/TOTAL RESPONDENTS
- 13) NUMBER OF STUDENTS WHO CHANGED THE WORKING SECTOR (FROM PUBLIC TO PRIVATE) AFTER THE COURSE/TOTAL RESPONDENTS
- 14) NUMBER OF STUDENTS WHO CHANGED THE WORKING INDUSTRY AFTER THE COURSE/TOTAL RESPONDENTS
- 15) NUMBER OF STUDENTS WHO FOUND A NEW JOB AFTER THE COURSE/TOTAL RESPONDENTS
- 16) NUMBER OF STUDENTS WHO CHANGED THEIR JOB AFTER THE COURSE/TOTAL RESPONDENTS
- 17) NUMBER OF STUDENTS WHO HAD A PROMOTION AFTER THE COURSE/TOTAL RESPONDENTS
- 18) AVERAGE LEVEL OF SATISFACTION IN RELATION TO THE KNOWLEDGE LEARNED
- 19) AVERAGE LEVEL OF SATISFACTION IN RELATION TO CRITICAL THINKING
- 20) AVERAGE LEVEL OF SATISFACTION IN RELATION TO STUDY METHODS
- 21) AVERAGE LEVEL OF SATISFACTION IN RELATION TO THE COURSE ORGANIZATION
- 22) AVERAGE LEVEL OF SATISFACTION IN RELATION TO THE LEARNING MATERIAL
- 23) AVERAGE LEVEL OF SATISFACTION IN RELATION TO THE PRACTICAL APPLICATION OF KNOWLEDGE IN THEIR JOB
- 24) AVERAGE LEVEL OF USEFULNESS OF ONLINE LEARNING IN STUDENTS SECTOR

2. Prepare the questionnaire taking care to formulate questions that are consistent with the selected indicators

The development of the questionnaire takes into account the following steps:

Link	Link questions with indicators
Formulate	Formulate the questions clearly
Avoid	Avoid complex and combined questions
Make	Make sure your respondents can and want to answer your questions
Use	Use clear and balance rating scales
Gather	Gather only the necessary demographic data

The completeness of the questionnaire has its trade off in the response rate, so as completeness increases, the response rate is generally reduced. In this respect, a complete questionnaire could be envisaged, but it is extremely important that it has to be easy to answer (in a maximum of 5 minutes). In terms of methodology, it is assumed to carry out a questionnaire and, if necessary, to implement also in-depth interviews to deepen certain results.

3. Structure a stratified sample taking into account the significance of the expected results for each degree course

Stratified sampling is a type of sampling method in which the total population is divided into smaller groups or strata to complete the sampling process. The strata is formed based on some common characteristics in the population data and it ensures each subgroup within the population receives proper representation within the sample. As a result, stratified random sampling provides better coverage of the population since the researchers have control over the subgroups to ensure all of them are represented in the sampling.

4. Define a data setting and data analysis procedure

These important points have to be considered:

- what information could be collected from existing databases or sources on hand
- determine a file storing and naming system ahead of time to help all tasked team members collaborate: this process saves time and prevents team members from collecting the same information twice

- in case to gather data via observation or interviews, an interview template has to be developed ahead of time to ensure consistency and save time

5. Define an incentive mechanism for respondents

As regards the definition of an incentive mechanism for respondents, the following reflections could be taken into account:

- Offer benefits on the next MOOC certificate
- Create a CV portfolio for the student regarding the MOOCs coursed
- Offer one free course
- Offer career advice (Especially Universities with career offices might be able to offer that option)

6. Define the way to reach the sample

As regards the way to reach the sample, and which considerations must be taken into account, below some of the most extended ways to access students nowadays are shown (according to a previous survey conducted under ASTRE project):

- E-mail Must consider:
 - previous consent to contact the addressee
 - use of email providers that avoid spam
- Online survey Must consider:
 - use of friendly tools to be uploaded on the single institution website
 - include the link to the survey
- Social net Must consider:
 - LinkedIn is a way of tracking students even when they abandon their student-mail
 - Facebook: can create a page for each MOOC
 - UPVx or similar platform can be another way of keeping the contact safe with the person despite they change the phone number or e-mail.
 - Tweet has not got a great deal of media attention among young people yet

7. Select a tool to launch the survey

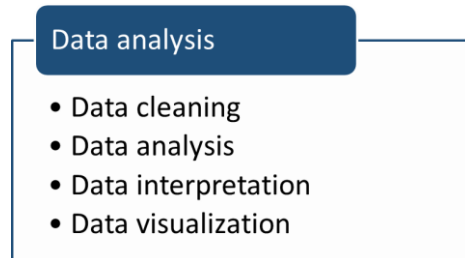
As regards the tools to create the survey and collect the results, it is evident that most survey platforms have an export format that let export a survey to a file. Since the generated file can be imported later, the aim is to create an export file for each of the most used survey platforms: consequently, a web page on ASTRE website will be created with links to each export file and the instructions on how to use them. The most common platforms are:

- EU Survey
- Google tools

- Lime Survey,

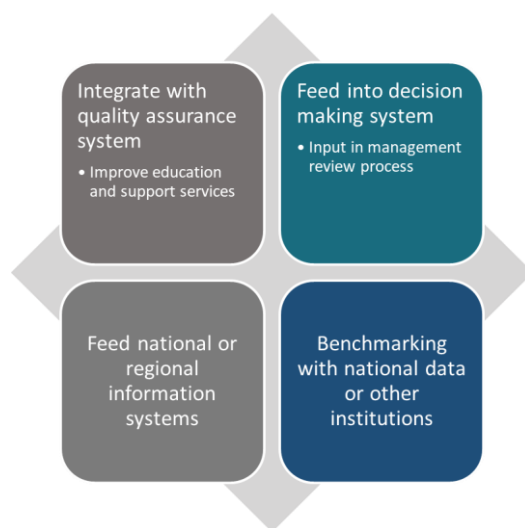
8. Define adequate reporting to disclose internally and externally the results achieved

The final stage will consist primarily of analysing the results, step by step as follows:



Secondly, it will be necessary to define outputs (reporting and illustrative meetings):

Then the results can be used as shown in the following picture:



9. Define resources to be employed in the process

With regard to the resources used, it is necessary to define the working group that in the first instance has to involve:

- Team leader
- Administrator
- Technician
- Analyst

10. Define time measurement

Regarding the tracking methodology, a multiple measurement methodology foresees two measurement points: one within the first year of MOOC attendance (i.e. after six months) and a second one after 2 years. This way, it will be possible to see the impact of MOOC attendance and certification in the short term and in the medium term.

EUSurvey tool

EUSurvey is the Europeans Commission's official survey management tool. Its main purpose is for creating and publishing forms available to the public, e.g. user satisfaction surveys and public consultations.

EUSurvey provides a wide variety of elements used in forms, ranging from the simple (e.g. text questions and multiple-choice questions) to the advanced (e.g. editable spreadsheets and multimedia elements), to meet varying survey needs.

The application, hosted at the European Commission Department for digital services (DG DIGIT), is available free of charge to all EU citizens. EUSurvey can be accessed from:

(<https://ec.europa.eu/eusurvey>)

➤ **Log In or Create a New Account**

In order to use the tool, the users will need to download the survey file and visit the EUSurvey webpage. There you will have to "log-in" in the website and create a new survey at:

(<https://ec.europa.eu/eusurvey/auth/login>)

However, If the users do not have already an EU login account they can register and create a new account at:

(<https://webgate.ec.europa.eu/cas/eim/external/register.cgi>)

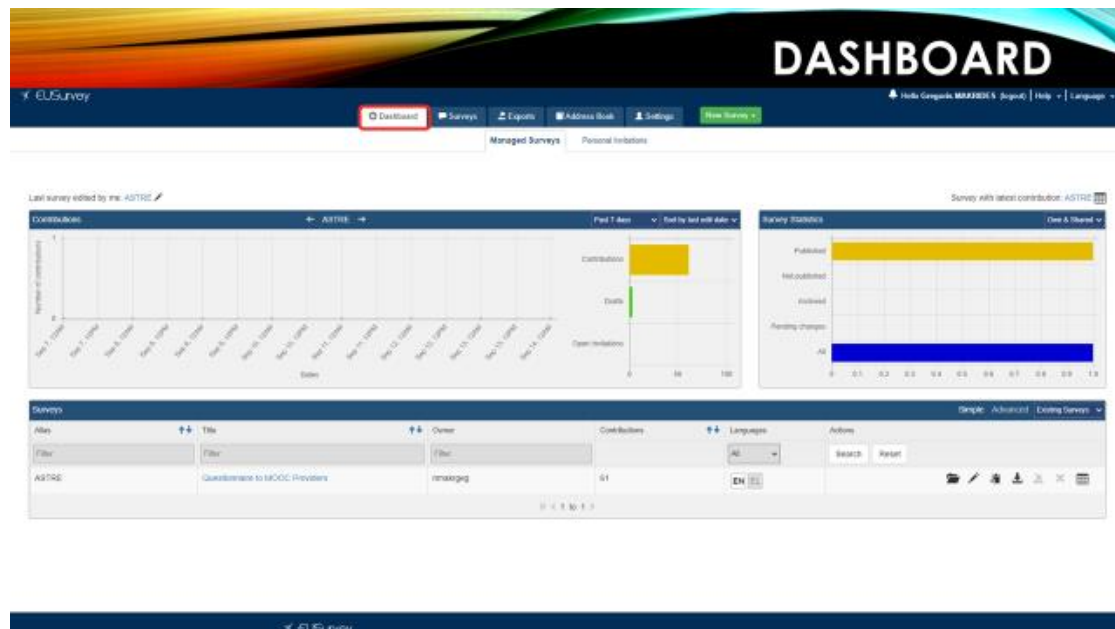
In the home page before the log in, the user should choose one of the two options:

1. I don't work for EU Institutions
2. I work for EU Institutions

After choosing the appropriate option, the users need to click connect and complete the required fields (email address, password and telephone number) and click sign in. The user will receive a code to its phone which the user must write in the empty box and click sign in.

➤ **Create a New Survey**

After successfully logged in the user will see the EUSurvey Dashboard as it appears below:



You can create a new survey by clicking the green button “**New Survey**” and a dialogue box will open. Once you have entered all mandatory information,(title, type of survey etc.) click 'Create'. The tool will load your new survey into the system and open the 'Editor' automatically so you can start adding more information.

The main/full list of available features is given below:-

Form Features:

- Customizable Forms
- **Dependent questions***
- **Scheduled publishing**
- **Modify your form after publication**
- **Available in the 23 EU Official Languages**
- Security
- Sending out invitations directly from the application
- Advanced privacy
- **Customise the look and feel**
- Save a contribution as draft
- Offline answering
- **Automatic numbering**
- Enhanced contrast
- Uploading supporting files

Form Management:

- Publishing a Survey
- Working Together

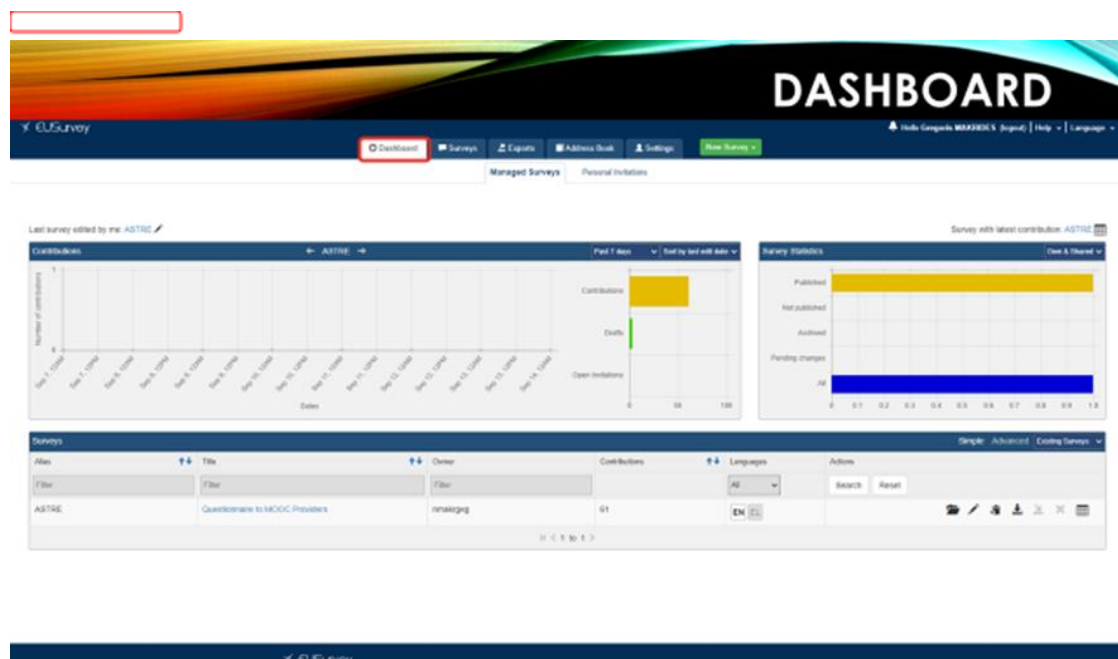
Result Management:

- Analysing your results
- Publishing your results
- Editing submitted conditions

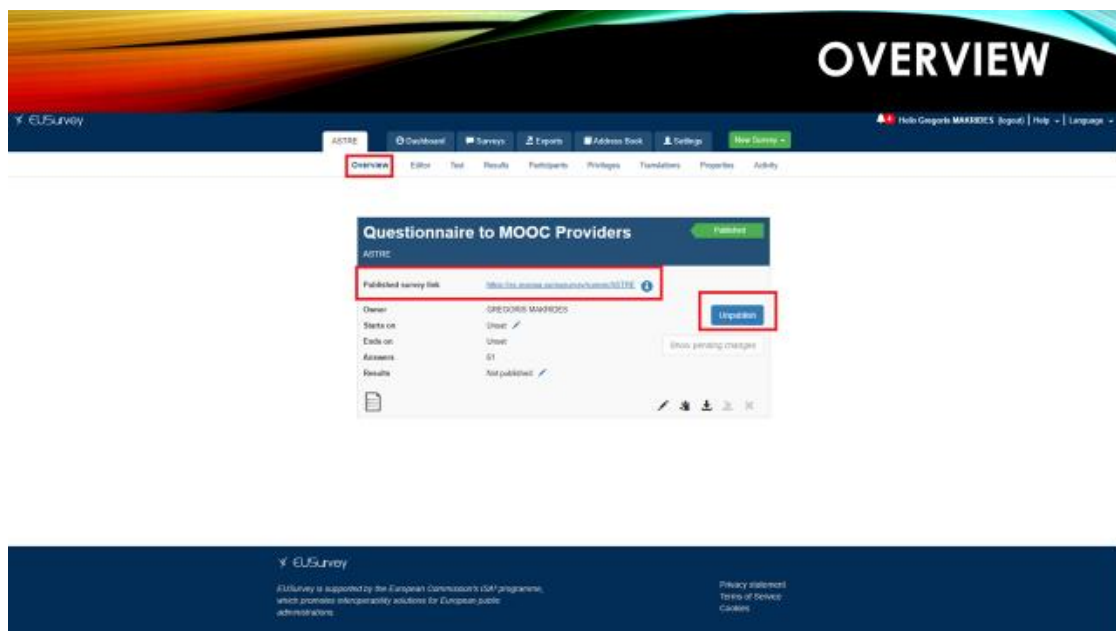
*The bold ones are the Features used for the ASTRE Survey Questionnaire

➤ **Edit Existing Survey**

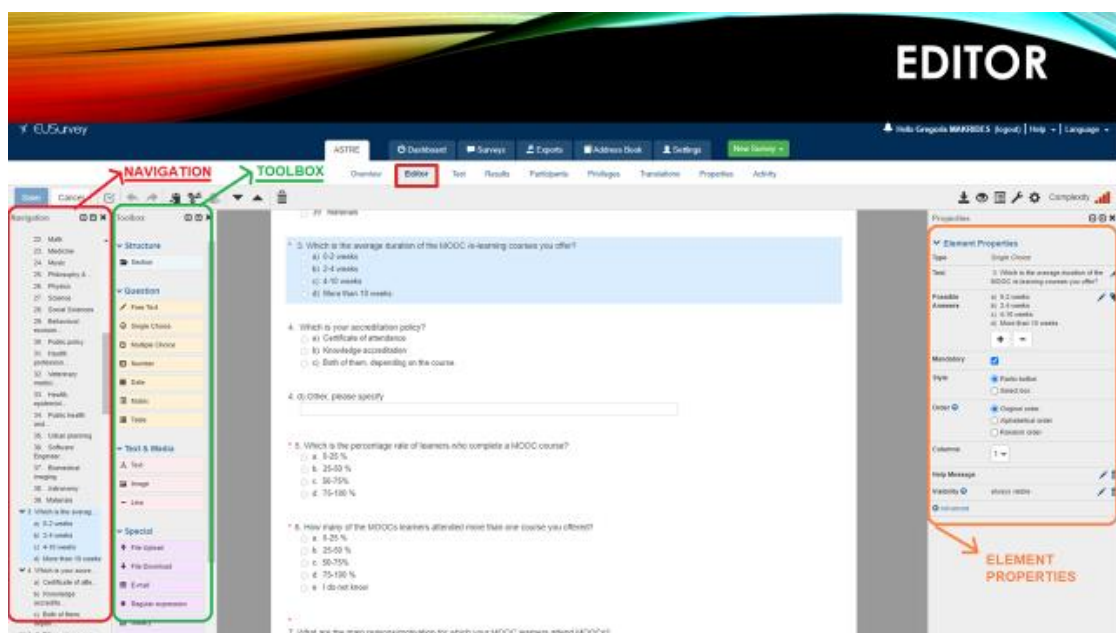
In addition, the user can also see/check how many surveys has created so far, how many are published and the number of responses received. If the user wishes to manage/edit an existing survey, can click in **the title of an existing survey**, on the bottom of the dashboard, as shown for the example of “ASTRE: Questionnaire to MOOC providers” in the image below:



After clicking on the title of the existing survey a new tap opens titled “**Overview**”. Here the user can find the link of the survey, set a starting and an ending date for the survey to be published and unpublished or do it manually by clicking on the blue button “**Unpublish**” as shown in the image below:



Also the user can edit the survey through the tap “Editor”, as shown in the example.



In this tap the first column is “**Navigation**” (see the red box above) which provides a detailed overview of the structure of your questionnaire. This is very useful in locating a section faster in extended/big surveys. The second column is the “**Toolbox**” area (see the green box above) which contains all the element types that can be added to the questionnaire. For example, it has various types of questions, and the user can add text, images, etc. Each element has its own properties, as shown in the orange box above. “**Element properties**” area. It displays the settings for selected elements. You can edit the elements here, e.g., by changing all relevant settings to adapt the question to your needs.

Some types of questions the user can use are:

- Free Text Questions
- Multiple Choice questions
- Single Choice Question

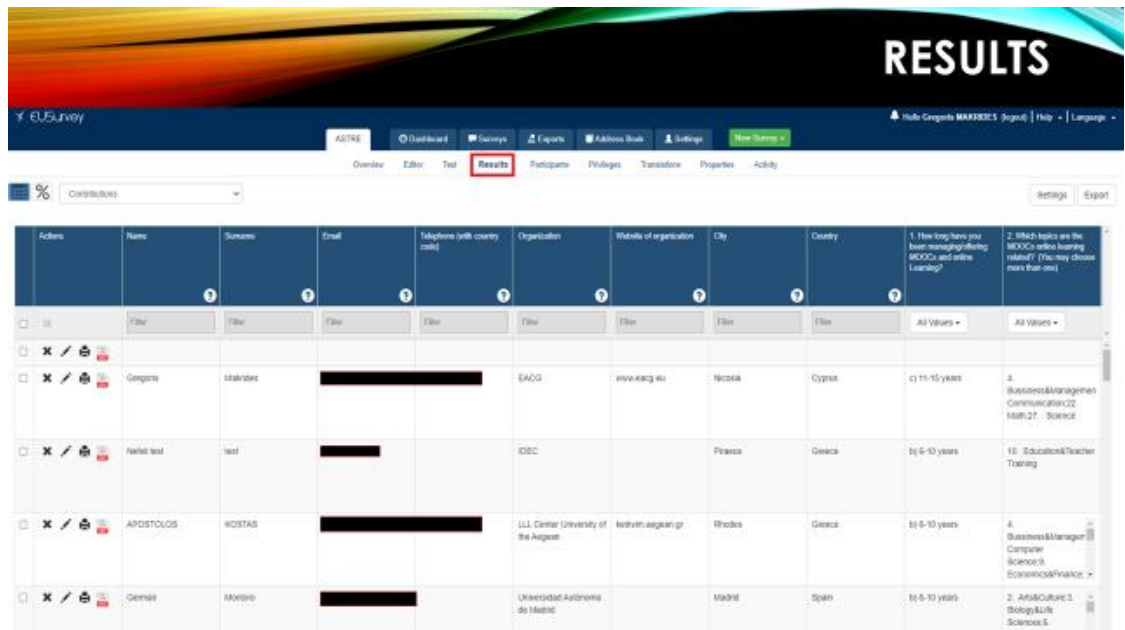
➤ **Test the Survey**

The third tap is the “**Test**”, from this tap the user can see the survey as it will appear to the participants.



➤ **Overview of Survey Results**

The fourth tap is the “**Results**”, where the user can see the questions used in the survey and the answers received, as shown in the example of “ASTRE online Questionnaire to MOOC providers” below:



Actions	Name	Surname	Email	Telephone (with country code)	Organization	Website of organization	City	Country	1. How long have you been managing/offering MOOCs and online Learning?	2. Which topics are the MOOCs online learning related? (You may choose more than one)
<input type="checkbox"/>	Georgios	Stalides	[REDACTED]		EAOS	www.eaog.eu	Nicosia	Cyprus	c) 11-15 years	4. Business/Management Communication/2 Math/27 Science
<input type="checkbox"/>	Pavlos	Test	[REDACTED]		IDEC		Piraeus	Greece	b) 6-10 years	10. Education/Teacher Training
<input type="checkbox"/>	APOSTOLOS	MOSTAS	[REDACTED]		ULL Center University of the Aegean	kevlm.uagran.gr	Rhodes	Greece	b) 6-10 years	4. Business/Management Computer Science/9 Economics/Finance
<input type="checkbox"/>	Germa	Montero	[REDACTED]		Universidad Autónoma de Madrid		Madrid	Spain	b) 6-10 years	2. Agriculture/3 Biology/4 Life Sciences/5 Computer

➤ Invite Participants and Add Editors

The fifth and sixth taps respectively are the “**Participants**”, where the user can create a mailing list with the participants who will invite to participate in the survey and the “**Privileges**” that allows the user to invite other users to become editors.

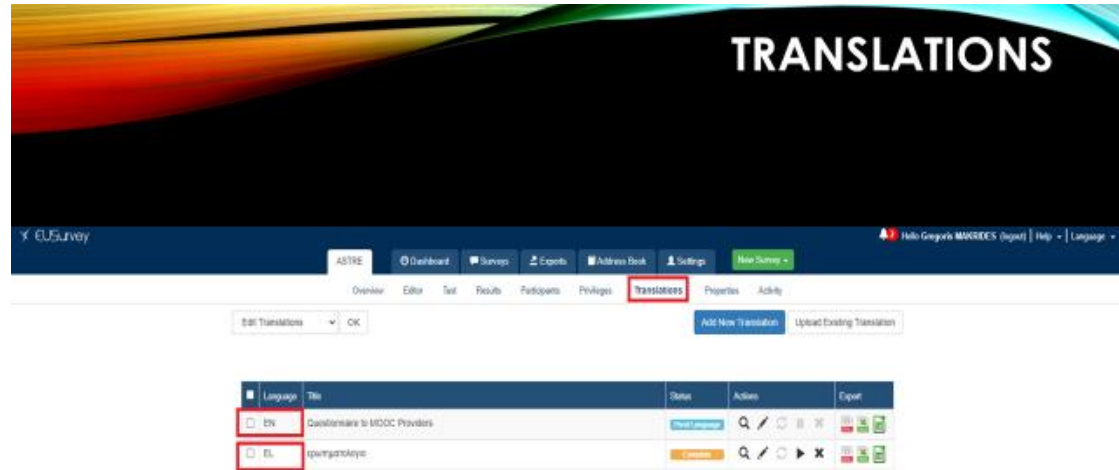


Name	Created	Participants	Invited	Actions
My list	14/05/2020 10:44:08	1	0	

➤ Add Translations in other languages

Another important function of the EUSurvey is the “**Translation Tap**”, from here the user can add translation to its Survey. For example, in the “ASTRE online Questionnaire to MOOC

providers" the original questionnaire was created in English, so that was the default language. However, before publishing the Survey we added the translation in other languages, like Greek.



Google Forms

Google Forms is a survey administration software which is part of web-based Google Docs Editors suite offered by Google.

Google Forms is a free online software for creating surveys, quizzes and questionnaires. It can be customized with question types, a color theme and a header image.

The application can be accessed from:

<https://www.google.com/forms/about/>

➤ ***Log In or Create a New Account***

In order to make a Google Form the user need a Google account. However it's not necessary to have an account to access the Google Form.

To create a Google account the user must follow the following steps:

1. Go to the [Google account Sign In page](#).
2. Click Create account.
3. Enter your name.
4. In the "Username" field, enter a username.
5. Enter and confirm your password.
6. Click Next.
 - Optional: Add and verify a phone number for your account.
7. Click Next.

➤ **Use an existing email address**

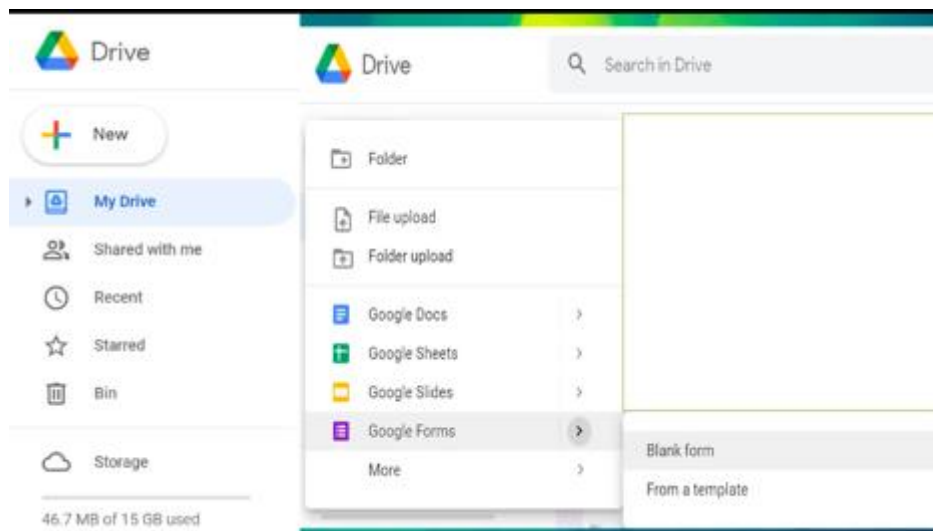
1. Go to the [Google Account Sign In page](#).
2. Click Create account.
3. Enter your name.
4. Click Use my current email address instead.
5. Enter your current email address.
6. Click Next.
7. Verify your email address with the code sent to your existing email.
8. Click Verify.

After creating the Google account then go to Google Drive, accessible from:

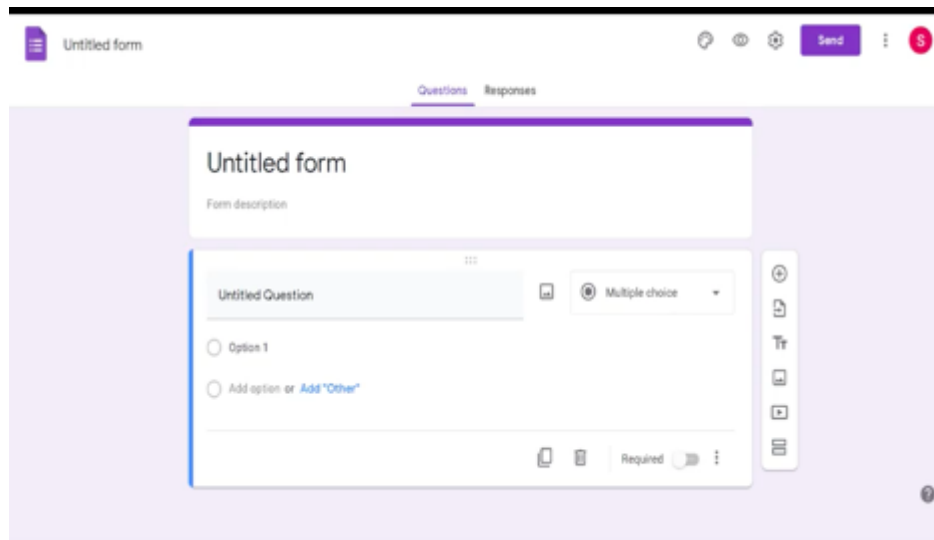
<https://drive.google.com/>

To create a Google Form, the user has to:

1. Go to the Google drive account
2. Click on the “New” button on the upper left corner
3. Choose Google Forms from the list that has appeared
4. Choose “Blank Form”



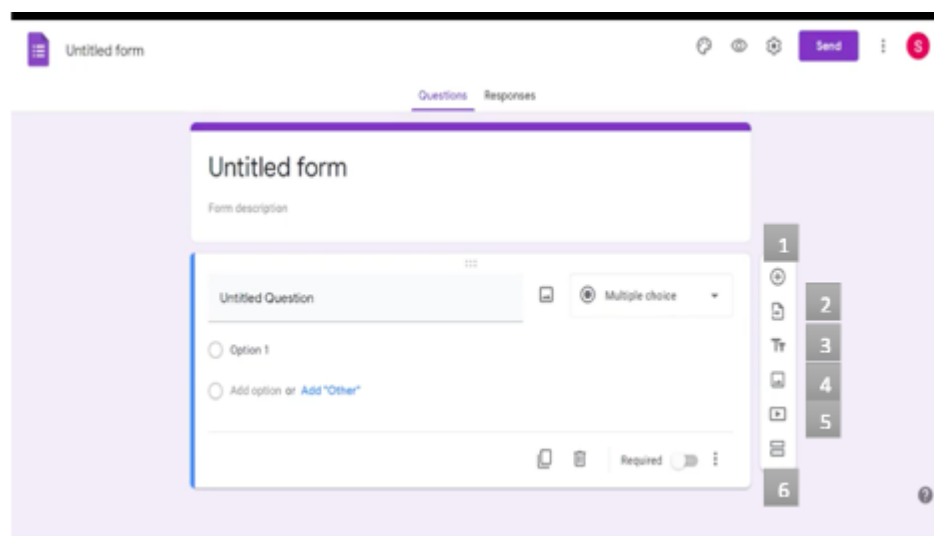
As presented on the following picture the title bar allows to give a name to the Form and underneath it's possible to add a description in order to explain what is this Form about and what subject will be covered for example.



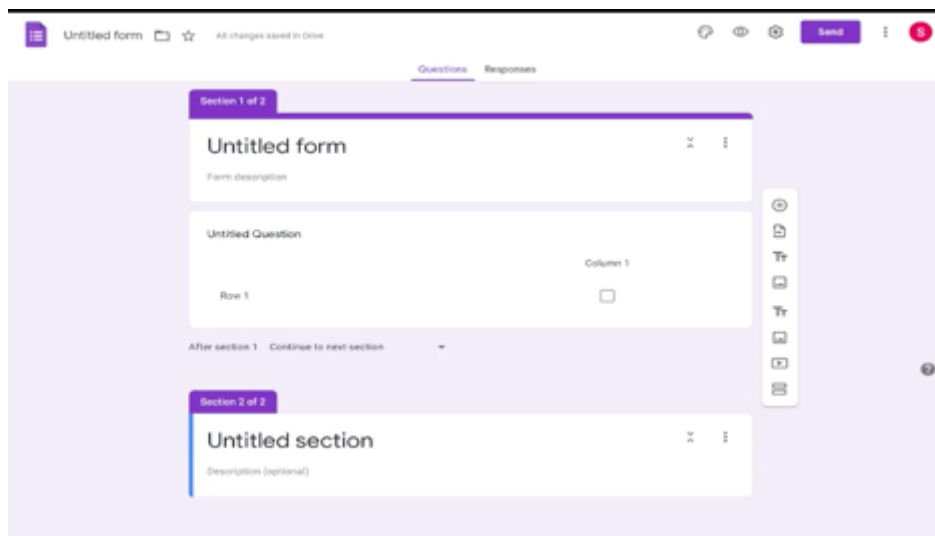
➤ **Build a questionnaire**

The first button on the right is the + button that will allow to create a new questionnaire in the Google Form

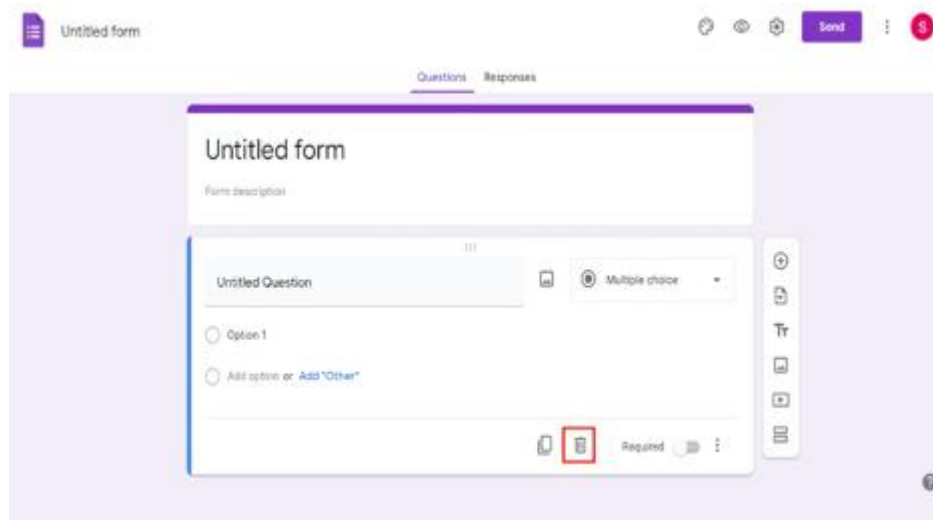
1. The second button will allow to import questions from another Google Form in case the creator needs to do so
2. The third button allows to add a title and a description to the set of questions that will come next
3. In case the creator wants to include a graph or a picture he/she need to click on this button
4. In case the creator wishes to add a video, he needs to click on this button to add to the question
5. This button serves to add multiple sections to the questionnaire



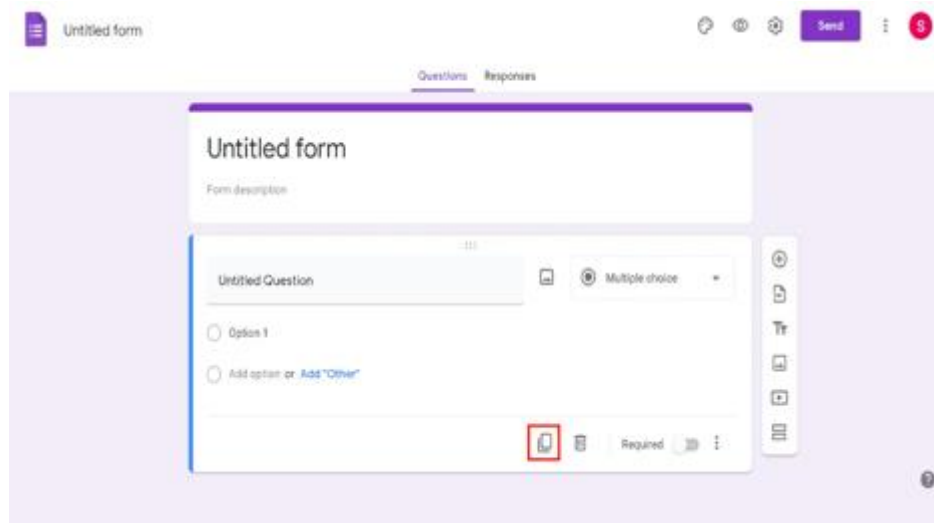
After clicking on the section button (6), this is what the creator gets. It will be possible to add what is desired throughout the questionnaire.



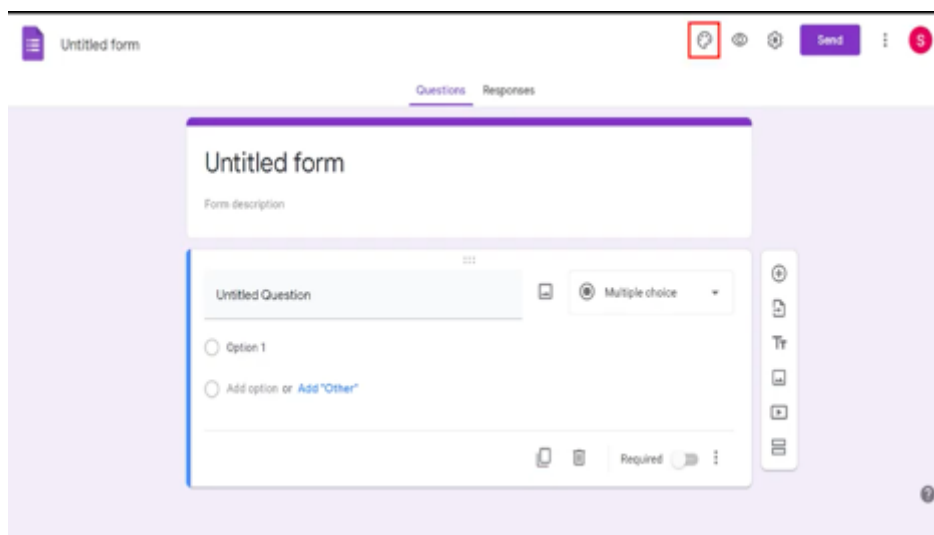
In order to delete the question that the creator is working on, this button must be selected.



In order to create the exact same question as double with the same layout. The creator must click on the copy paste button.



The following button will allow to have access to the theme of the title in case of changing the colour or the layout.

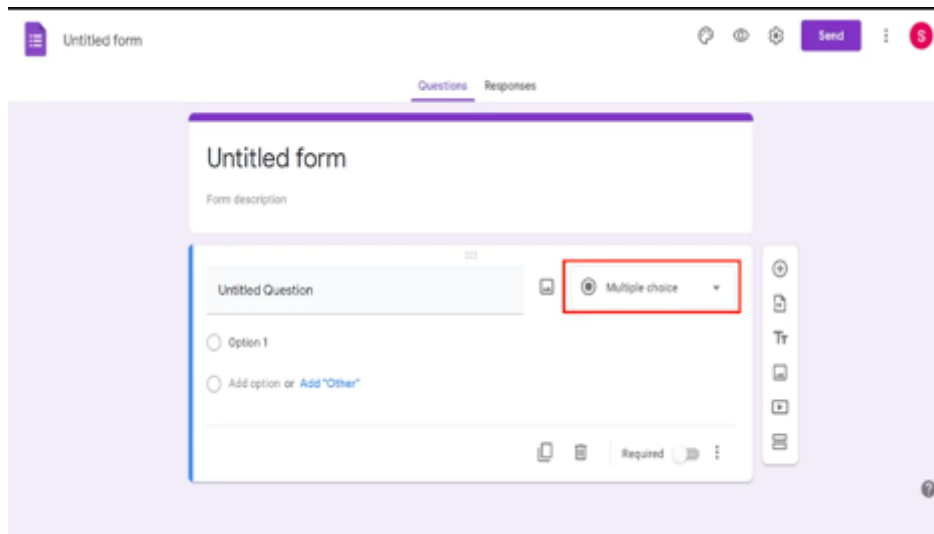


➤ **Types of questions**

There are many types of question that Google Forms allow to create.

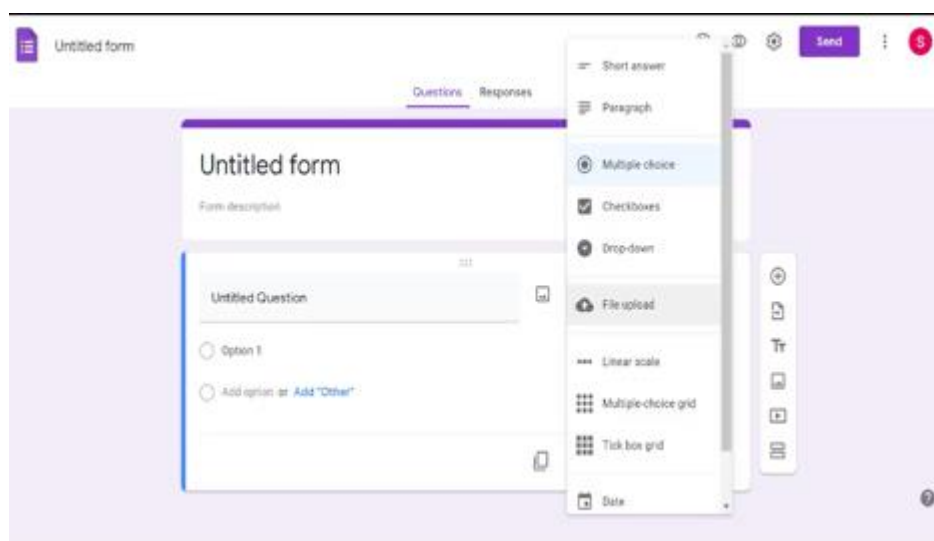
1.The multiple-choice

The first type of question presented is the “multiple-choice” questions. The “multiple-choice” questions are default format of the questions.



The screenshot shows the 'Untitled form' interface. At the top, there's a header with 'Untitled form' and a 'Send' button. Below the header, there are tabs for 'Questions' and 'Responses'. The main area displays a question titled 'Untitled Question' with a dropdown menu set to 'Multiple choice'. The question has two options: 'Option 1' and 'Add option or Add "Other"'. A red box highlights the 'Multiple choice' dropdown menu. On the right side, there's a vertical toolbar with various icons for adding different question types.

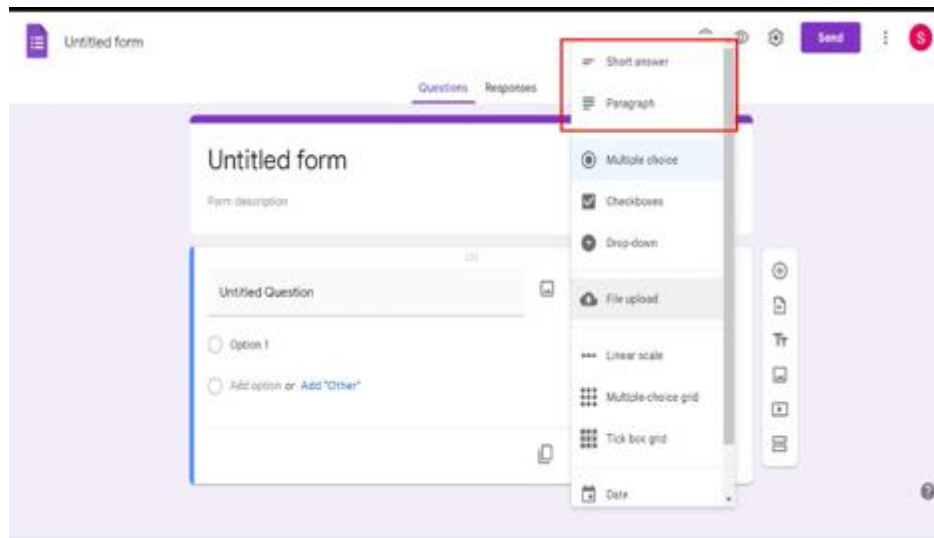
In case the creator wants to change the format, he/she must click on the button presented below. By clicking on this button, a drop list with all types of questions will appear so that the creator can choose from it.



This screenshot shows the same 'Untitled form' interface, but with the dropdown menu open. The menu lists various question types: 'Short answer', 'Paragraph', 'Multiple choice' (which is highlighted), 'Checkboxes', 'Drop-down', 'File upload', 'Linear scale', 'Multiple-choice grid', 'Tick box grid', and 'Date'. The background shows the same question editor with 'Option 1' and 'Add option or Add "Other"'.

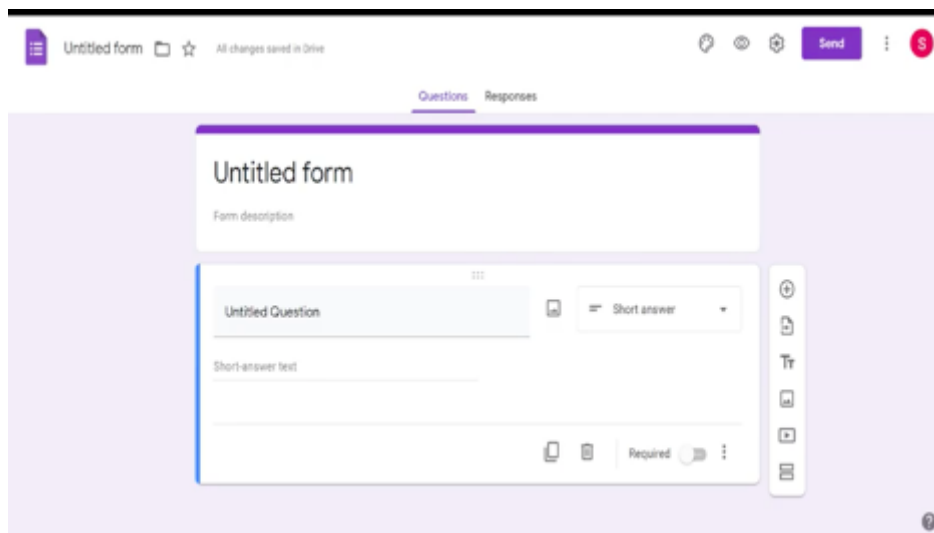
2. Short answer and Paragraph

The first two types of answers are the "Short answer" and the "Paragraph". These types allow the users to enter their answers themselves.



The screenshot shows the 'Untitled form' editor. A dropdown menu is open, displaying various question types: Short answer, Paragraph, Multiple choice, Checkboxes, Drop-down, File upload, Linear scale, Multiple-choice grid, Tick box grid, and Date. The 'Short answer' option is highlighted with a red box. The background shows the form structure with a question placeholder and options.

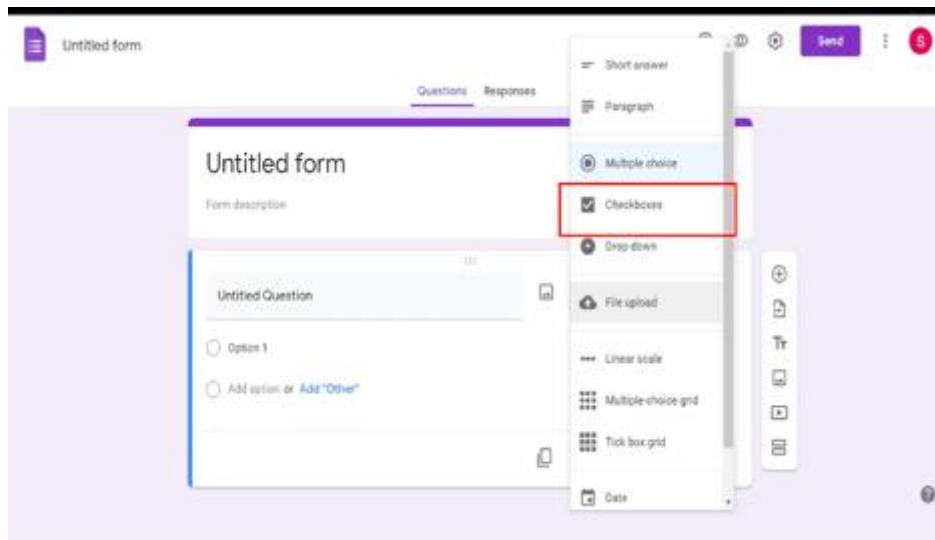
That will look approximately as presented below. Question(s) can be added, and the users will have the text box in which they can add their own answer.



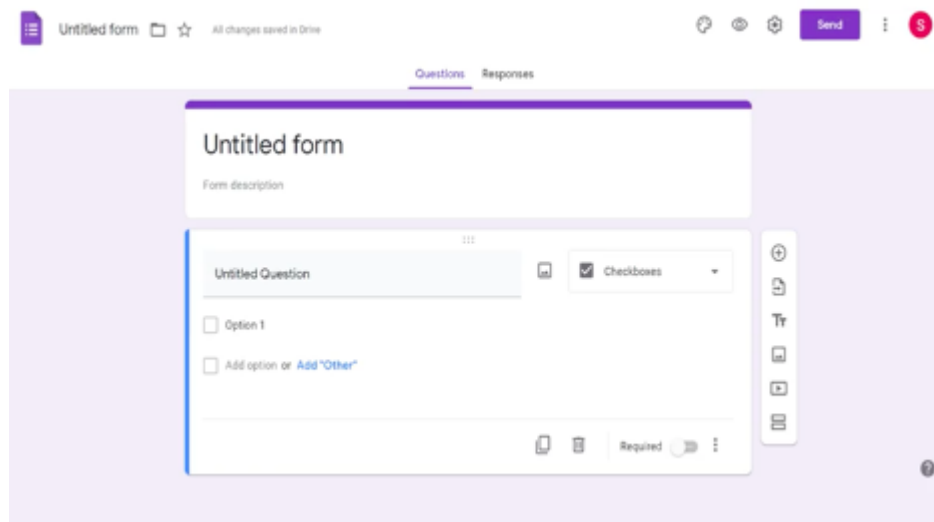
The screenshot shows the 'Untitled form' editor with a 'Short answer' question type selected. The question is labeled 'Untitled Question' and has a 'Short-answer text' input field. The 'Required' checkbox is visible at the bottom right of the question card. The interface includes a top bar with 'Send' and 'S' buttons, and a sidebar with various form elements.

3. Checkboxes

The creator can also select “Checkboxes” as a way to answer in which the participants will be able to check the boxes that fit the answer.

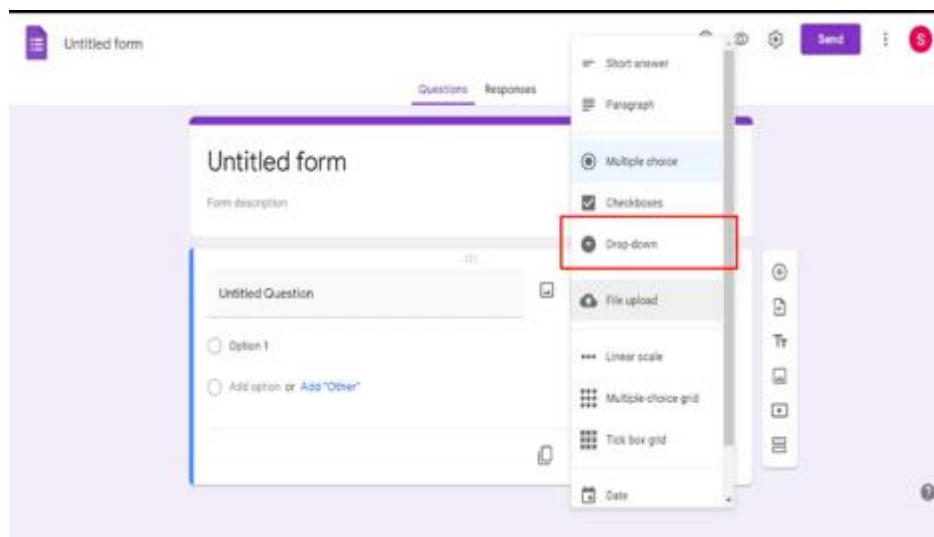


It will look approximately like in the picture below, where the creator can select options that the users will choose.

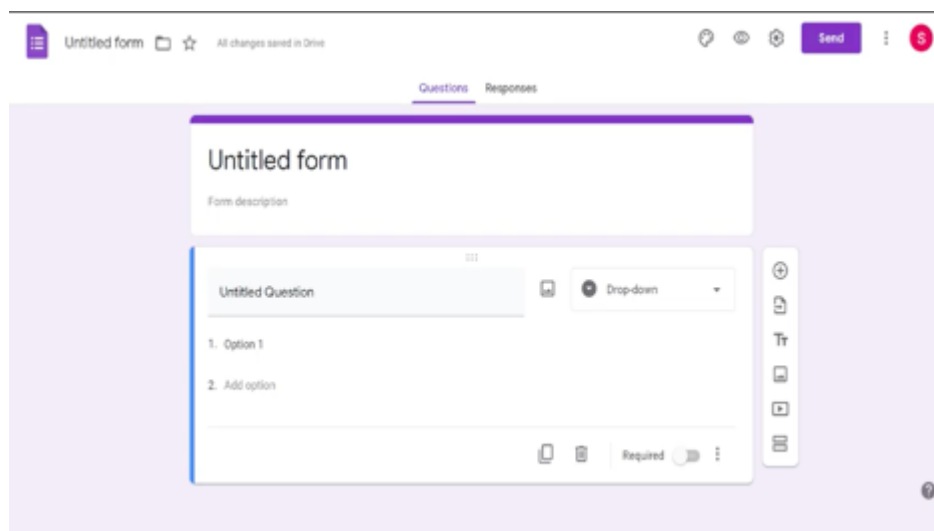


4. Drop-down

If the creator wants the participants to choose from a list of options, he/she could use the "Drop-down" format.

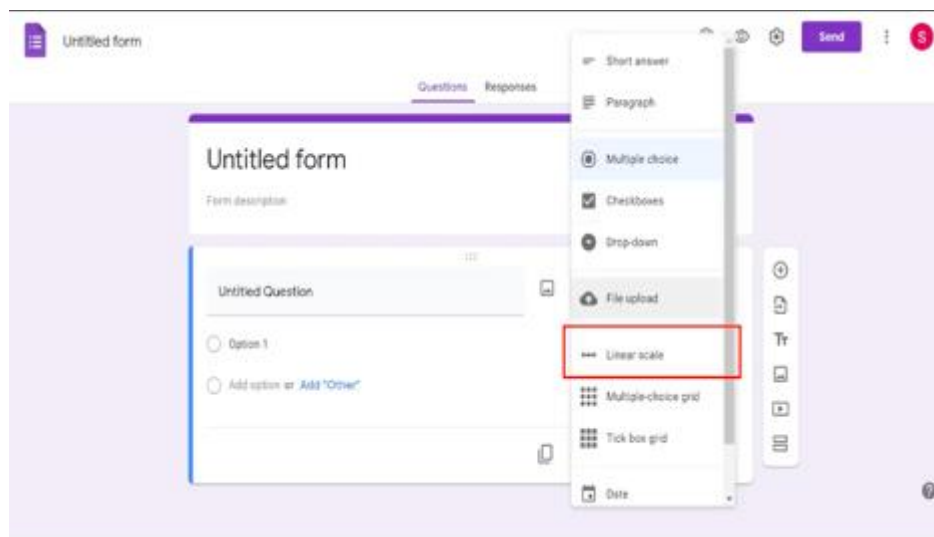


The “Drop-down” format will look approximately like as it is presented in the following picture where different options can be added.

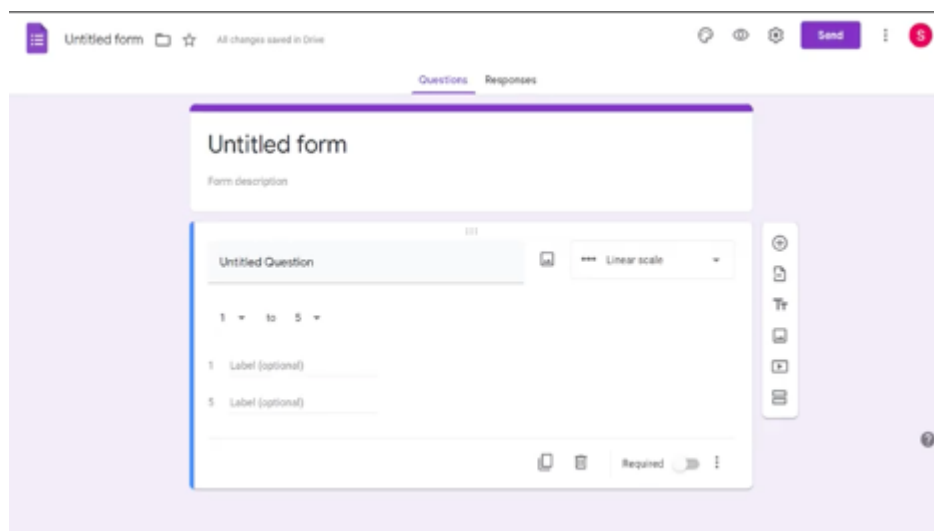


5.Linear scale

This button allows to create a question with a linear scale if the creator wishes to ask the participants to give an answer on a scale from one to seven for instance.

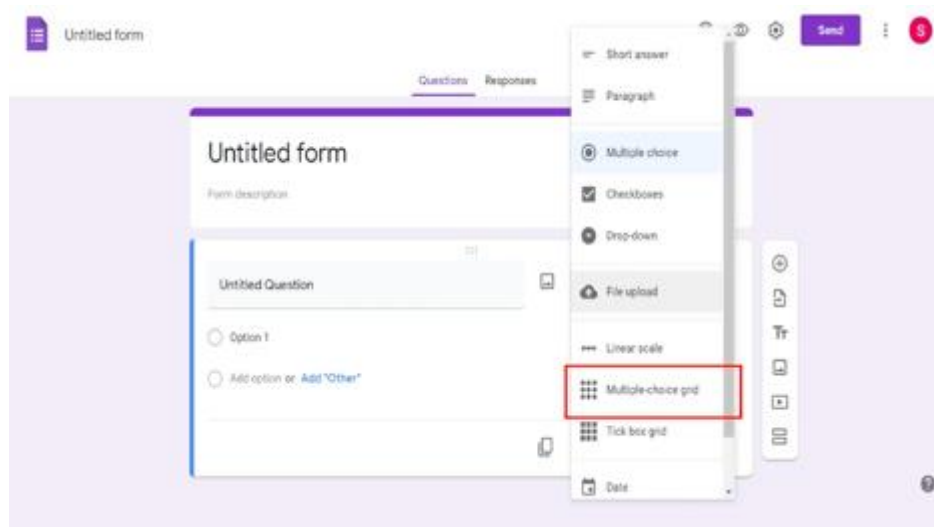


This type of question looks as the following where the creator can set a scale from one to five, however, it could be from any number to any other number. Both ends of the scale can be labelled in any way the creator wants.

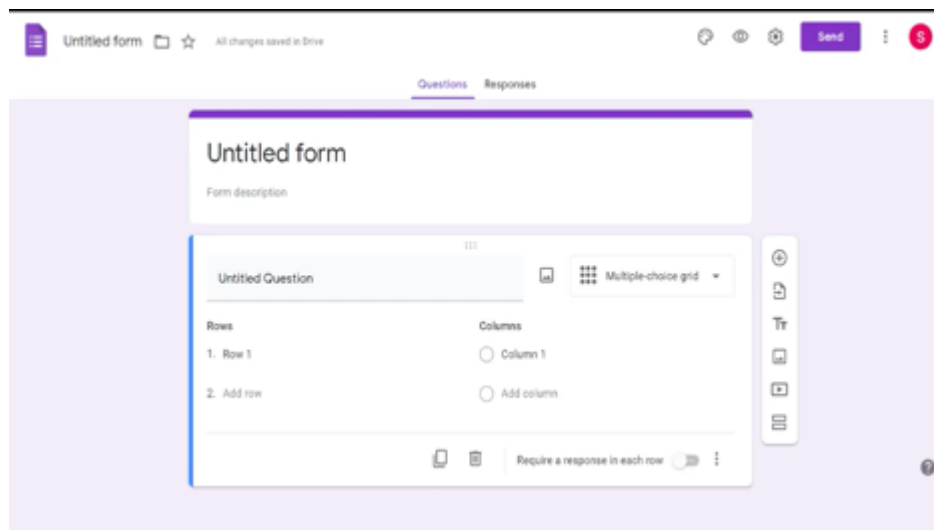


6. Multiple choice grid

The “Multiple choice grid” button serves to create a question with a grid of answers that the participants can choose from.

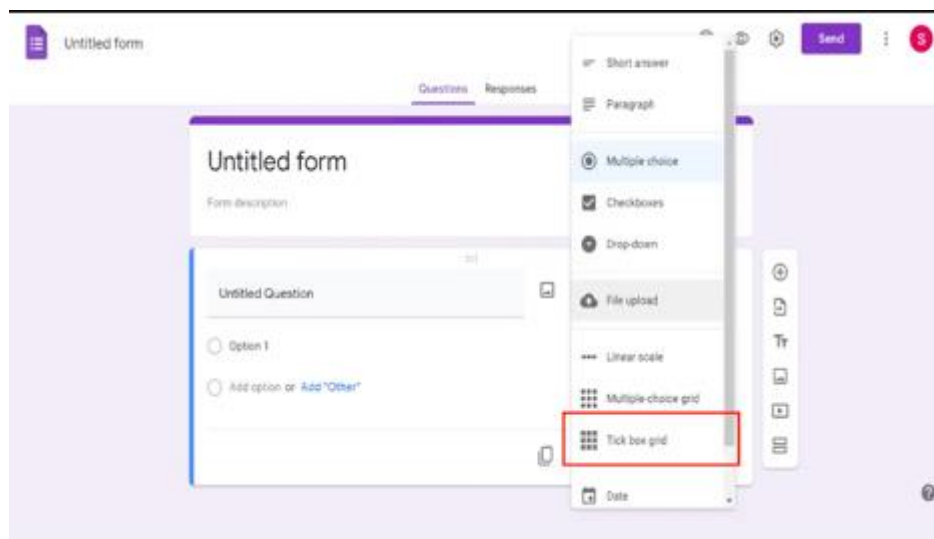


The “Multiple choice grid” is presented below. Rows, columns and choices in all the cells can be added so that the participants can choose from.

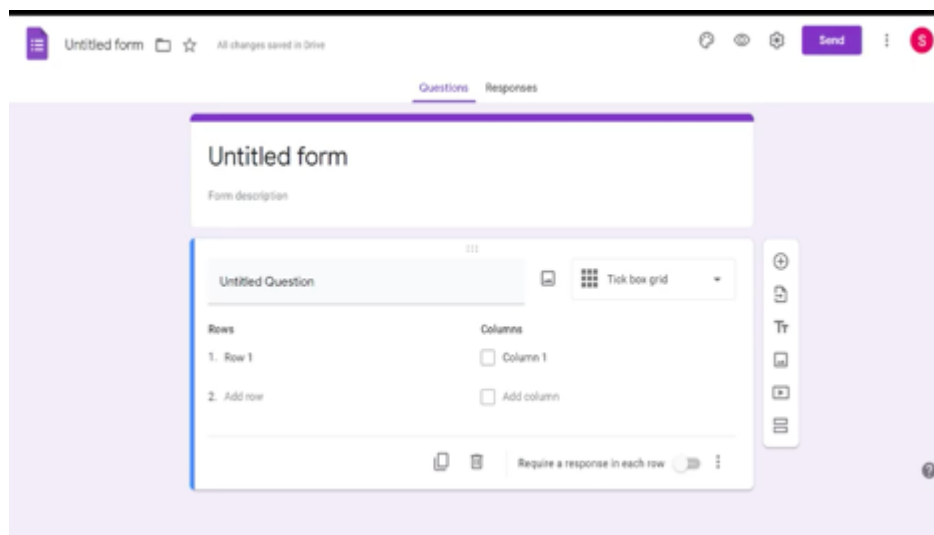


7. Tick box grid

“Tick box grid” is more or less the same thing as the “Multiple choice grid”. It allows to create a grid in which there are all the options that the users can choose from.

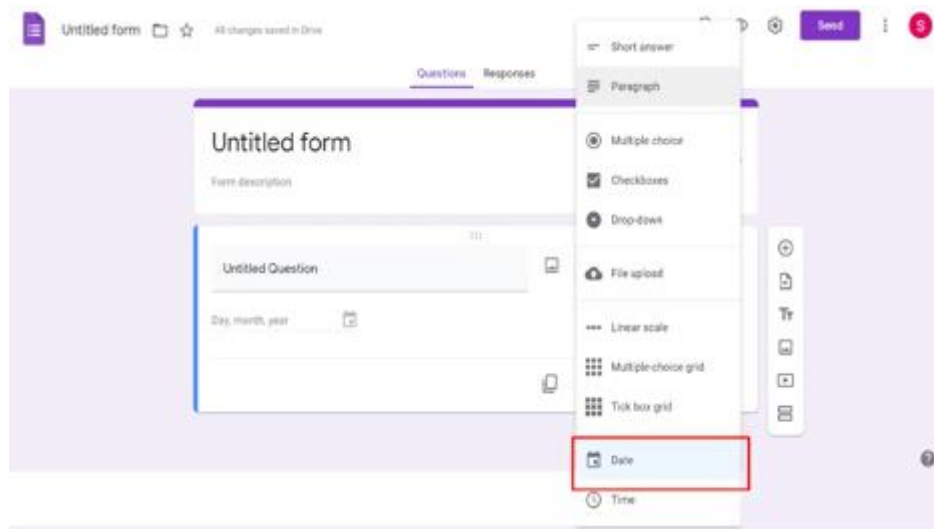


“Tick box grid” looks approximately as presented below. It’s also possible to add in the columns and in the rows everything that the creator wants or needs.

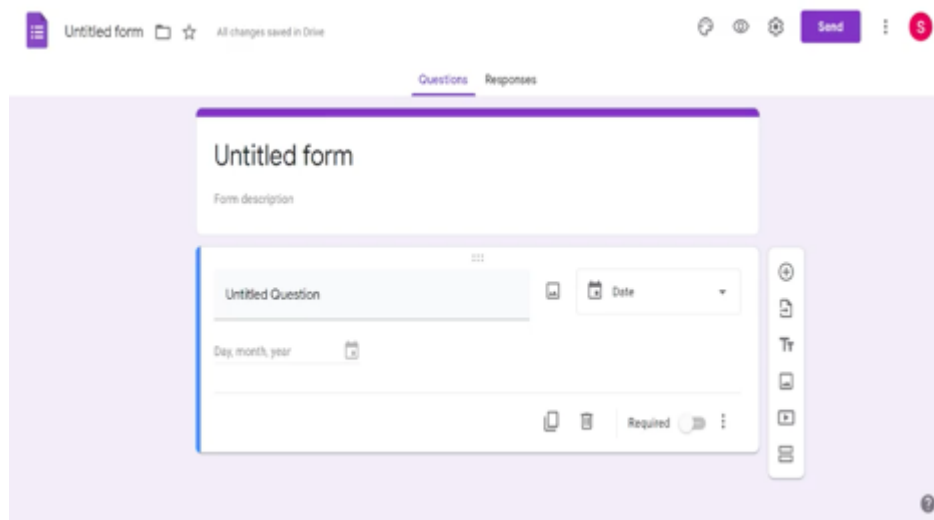


8.Date

In case the creator wishes to add a “Date” for the users. The following button must be used.

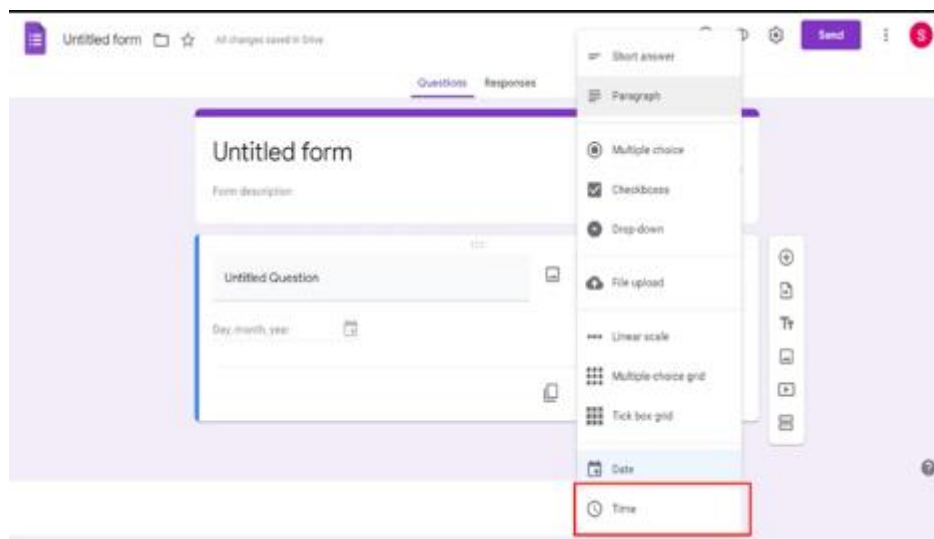


This button will allow the users to enter the date as the answer to the question.



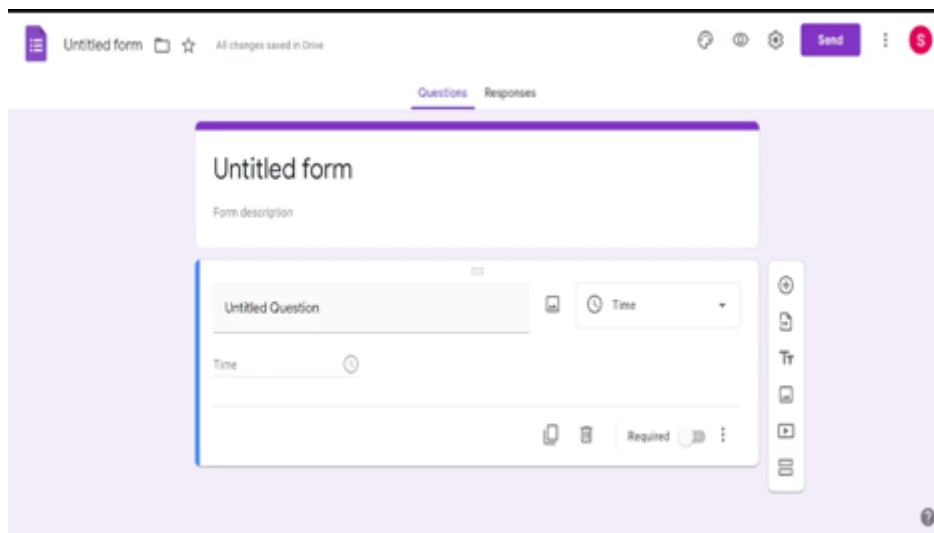
9.Time

Same for the “Time”, in case it has to be added to the format of the question



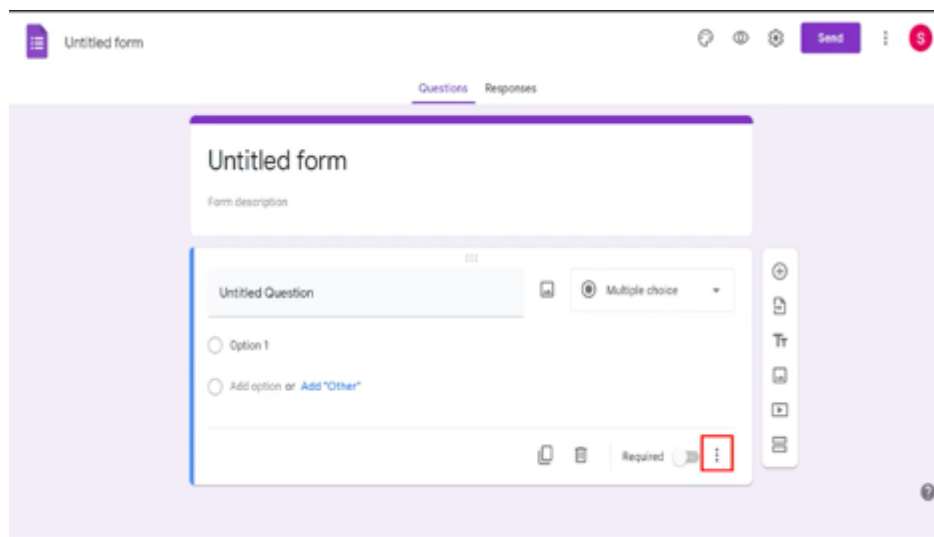
The screenshot shows the Google Forms editor interface. At the top, it says 'Untitled form' and 'All changes saved in Drive'. Below this, there are tabs for 'Questions' and 'Responses'. The main area shows a form titled 'Untitled form' with a description 'Form description'. A question titled 'Untitled Question' is being edited. The question type menu is open, showing various options: Short answer, Paragraph, Multiple choice, Checkboxes, Drop-down, File upload, Linear scale, Multiple choice grid, Tick box grid, Date, and Time. The 'Time' option is highlighted with a red box.

Users can be able to add time as the answer below.



The screenshot shows the Google Forms editor interface. At the top, it says 'Untitled form' and 'All changes saved in Drive'. Below this, there are tabs for 'Questions' and 'Responses'. The main area shows a form titled 'Untitled form' with a description 'Form description'. A question titled 'Untitled Question' is being edited. The question type menu is open, showing various options: Short answer, Paragraph, Multiple choice, Checkboxes, Drop-down, File upload, Linear scale, Multiple choice grid, Tick box grid, Date, and Time. The 'Time' option is highlighted with a red box.

Further settings for each set of questions can be accessed through this button. This button will allow to customize the questions with different options.



Untitled form

Form description

Untitled Question

Multiple choice

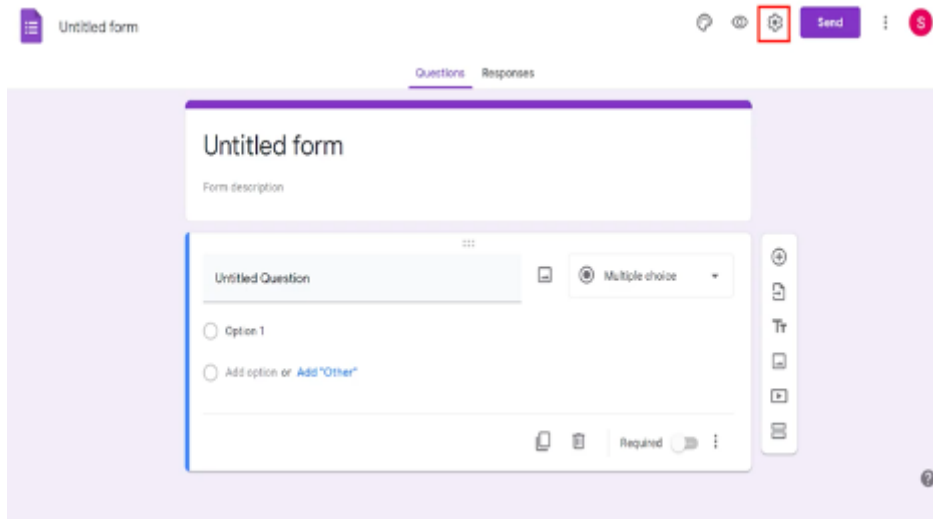
Option 1

Add option or Add "Other"

Required

➤ General Settings

This button allows to access the settings of the Form.



Untitled form

Form description

Untitled Question

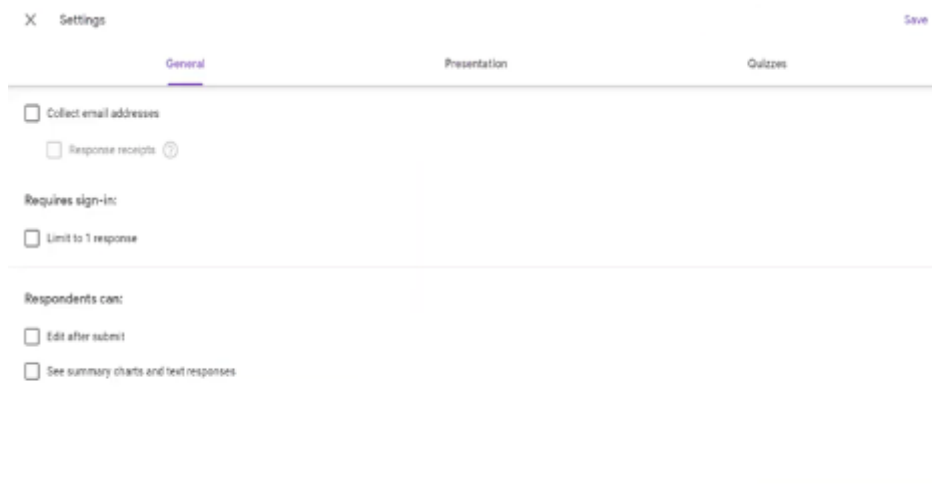
Multiple choice

Option 1

Add option or Add "Other"

Required

As presented below there is "general" settings, "presentation" settings and "quiz" settings. In the "general" settings for instance it's possible to limit the number of answers and collect e-mail addresses.



X Settings Save

General Presentation Quizzes

☐ Collect email addresses

☐ Response receipts ⓘ

Requires sign-in:

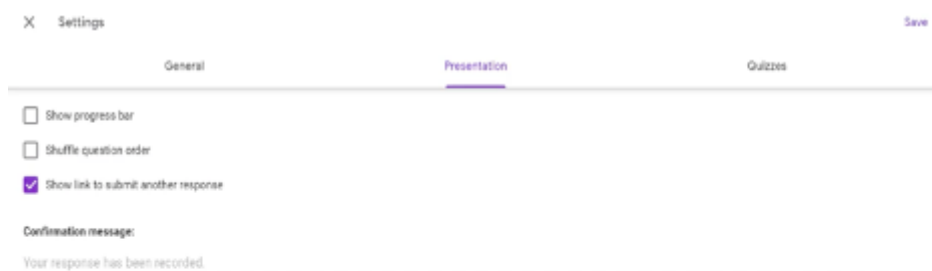
☐ Limit to 1 response

Respondents can:

☐ Edit after submit

☐ See summary charts and text responses

In the “presentation” settings it’s possible to change the way the presentation is. A progress bar can be provided or shuffle the order of questions every time a participant opens the Google Form.



X Settings Save

General Presentation Quizzes

☐ Show progress bar

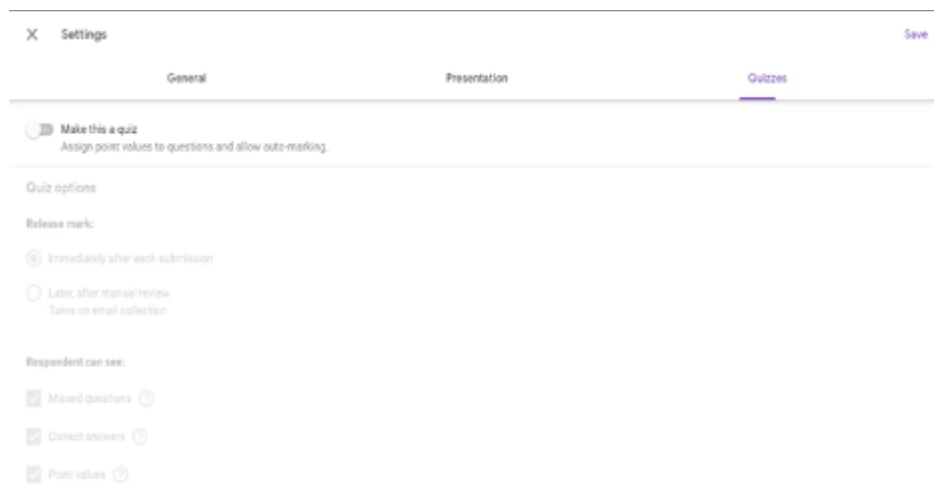
☐ Shuffle question order

☒ Show link to submit another response

Confirmation message:

Your response has been recorded.

Finally, the Google Form can be turned into a “quiz” in order to have other options (quiz options for example) that the participant will have access to and will allow the creator to customize it as much as he/she wants.



Settings Save

General **Presentation** **Quizzes**

☒ **Make this a quiz**
Assign point values to questions and allow auto-marking.

Quiz options

Release mark:

☒ Immediately after each submission

☐ Later, after manual review
Turns on email collection

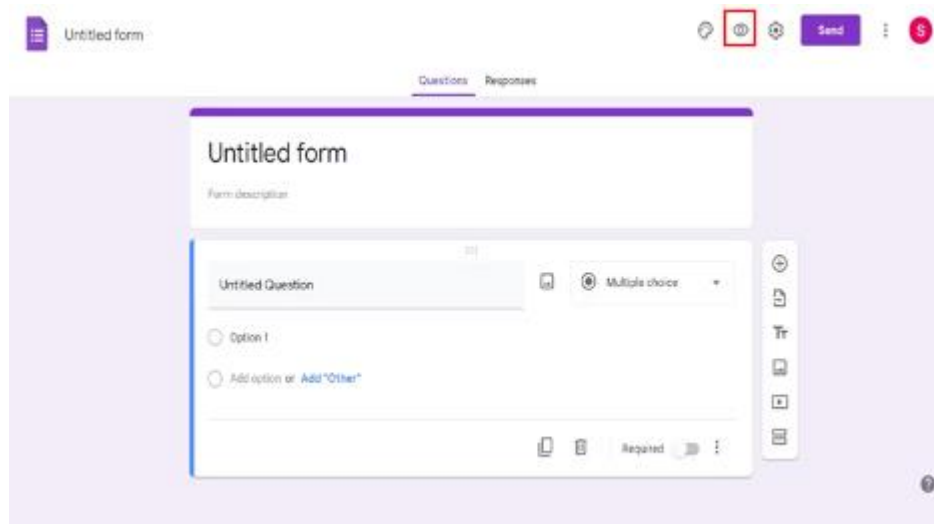
Respondent can see:

☒ Missed questions

☒ Correct answers

☒ Point values

After creating the Google Form, the creator can click on the following button in order to have a preview.



Untitled form Preview Send Share

Questions **Responses**

Untitled form
Form description

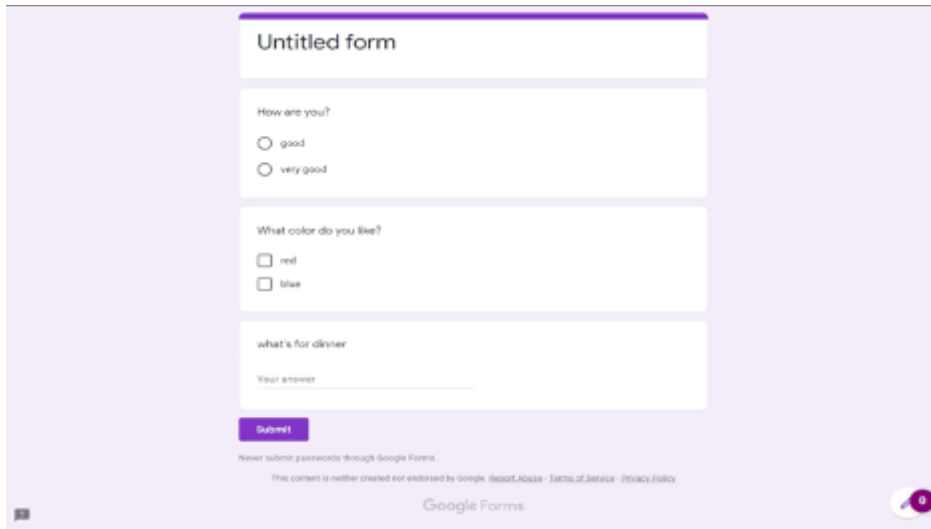
Untitled Question Multiple choice

☐ Option 1

☐ Add option or Add "Other"

☐ Required

For instance, the preview is the one presented below. Different types of questions with types of answers.



Untitled form

How are you?

☐ good

☐ very good

What color do you like?

☐ red

☐ blue

what's for dinner

Your answer

Submit

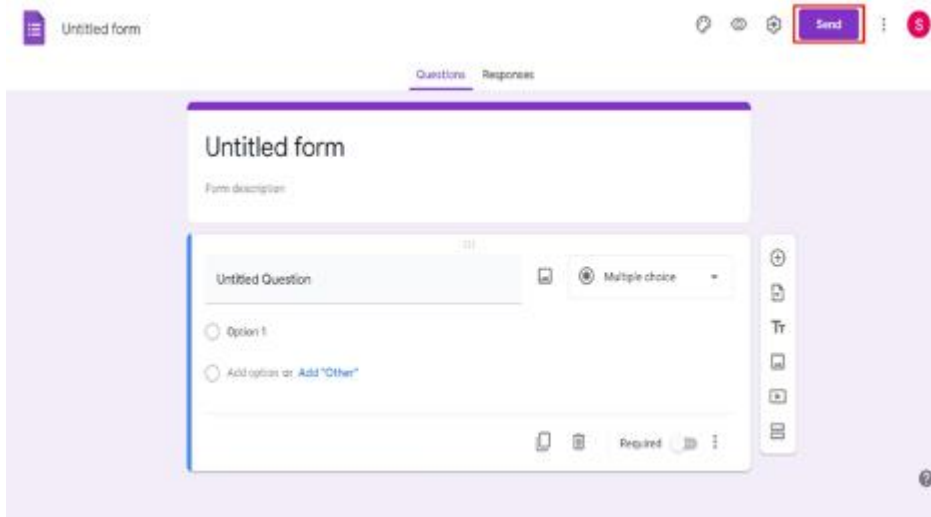
Never submit passwords through Google Forms.

This content is neither created nor endorsed by Google. (Report Abuse - Terms of Service - Privacy Policy)

Google Forms

➤ **Sending and sharing the survey**

In order to share the Google Form, this “Send” button presented below must be selected.



Untitled form

Questions Responses

Untitled form

Form description

Untitled Question

Multiple choice

☐ Option 1

☐ Add option or Add "Other"

Required

Send


After that, it will take the creator to this following screen in which all the e-mail addresses of the people that the Google Form will be shared with.

X
Send form

☐ Collect email addresses

Send via



Email

To

Subject
Formulaire sans titre

Message
I've invited you to fill in a form:

☐ Include form in email

 Add collaborators

Cancel
Send

The second option is to click on the following button.

X
Send form

☐ Collect email addresses

Send via






Email

To

Subject
Formulaire sans titre

Message
I've invited you to fill in a form:

☐ Include form in email

 Add collaborators

Cancel
Send

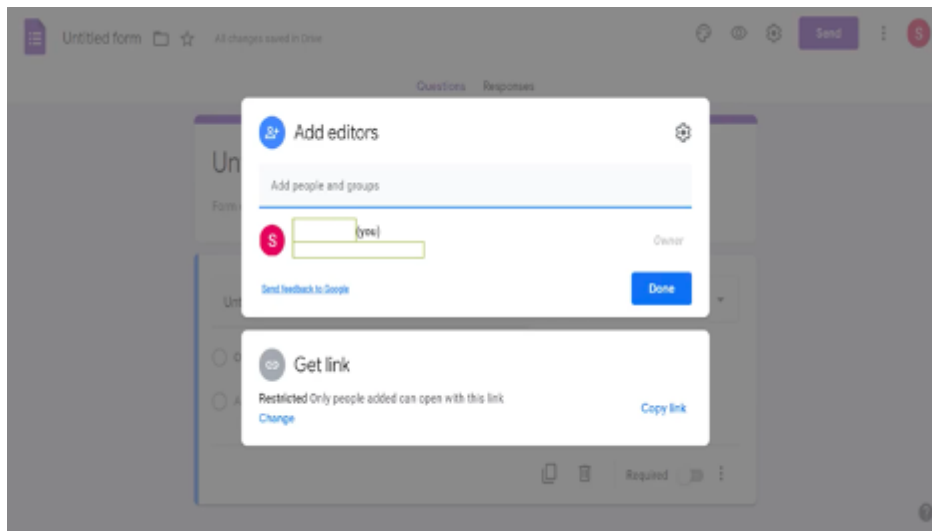
Which will bring the creator to the following screen where he/she can get the link of the GIF and send it directly to the users to share it with them.



It's possible that other people have access to this Google Form and be able to change the questions or the layout by clicking on the following button.

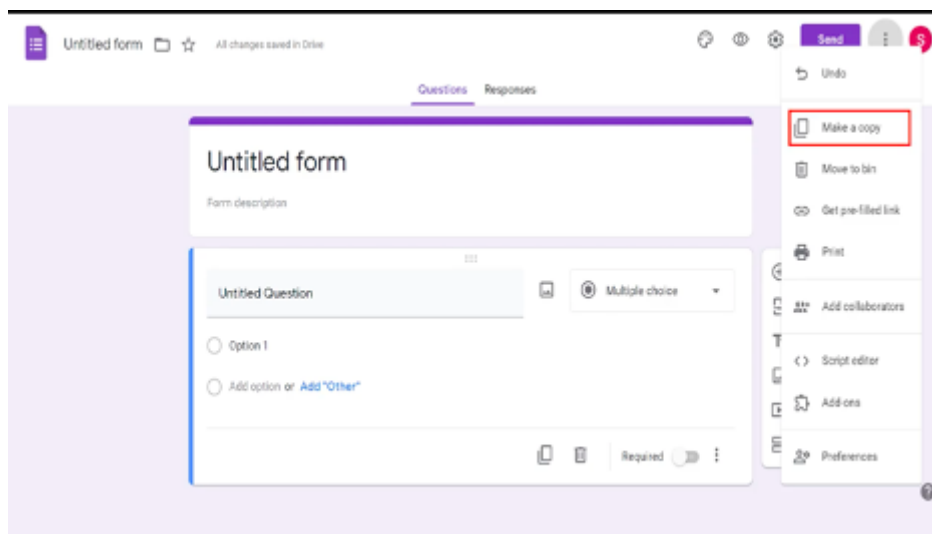


This screen presented below will appear where editors can be added to the Google Form. It's better to add them to the Gmail account of the participants so that they can have access, otherwise it's not going to work.

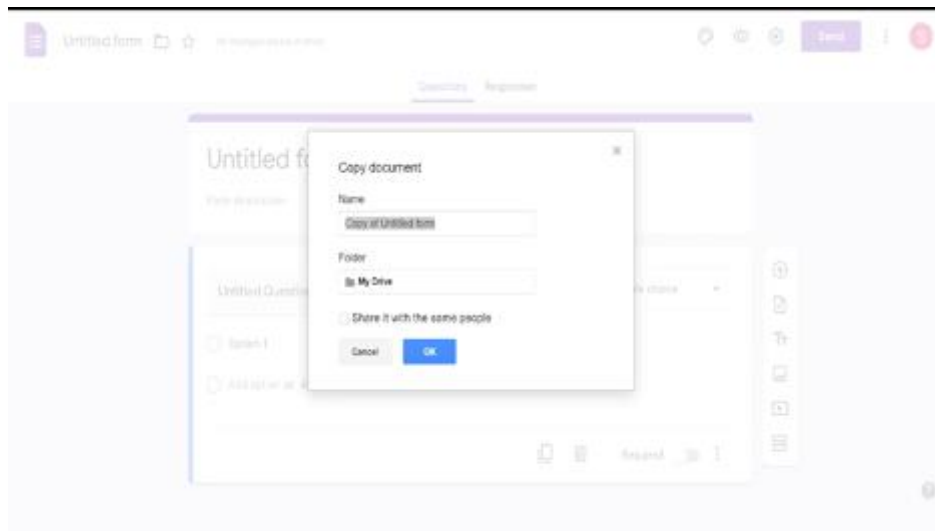


➤ **Copy the questionnaire and see answers**

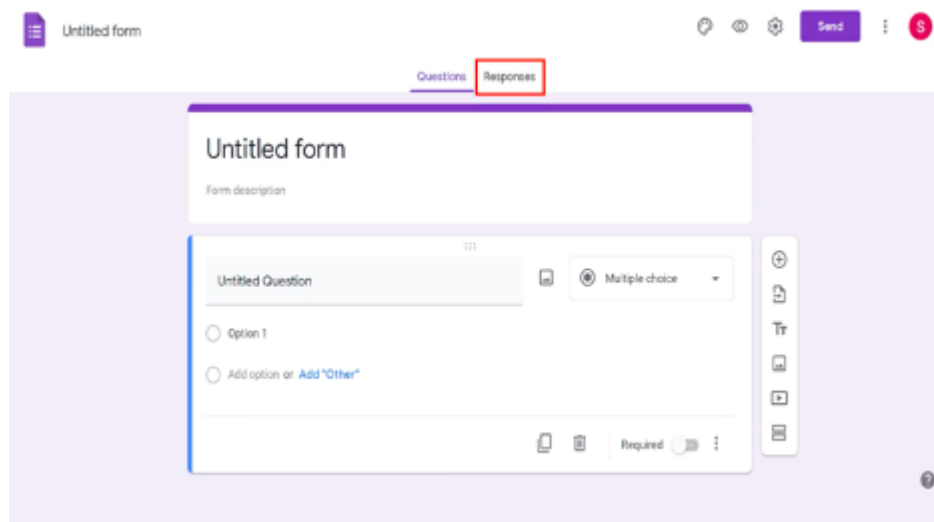
It's possible to copy the questions and keep a copy of it in the drive. The creator must click on the settings button on the upper right corner of the Google Form and select make a copy.



This screen will appear, it will allow to choose the presented folder in the drive in order to have a copy of the form.



In order to see the answers after all participants finished to respond, this button must be selected.



As we can see on the above picture there are no answers because there is no Google Form. All the answers to all the questions will be presented once they are submitted.

Further potential of MOOC graduates tracking systems

Strategic planning

Educational institutions in general are facing significant changes during the last decades. Moreover, COVID-19 has radically challenged their traditional role and operational models. Evidently, new tasks and strategic redefinition of the own position are necessary to fulfil emerging needs like budget cut-offs for education and the emergence of aging/knowledge-based societies.

So, an emerging need for data-driven decisions arises, either push-based (via technology) or pull-based (based on decision-making from the stakeholders), with a multi-criterion applicable integrated database search, which can contribute to a better planning for the institution.

As EU states *“Knowing how graduates perceive the relevance of their studies – and what they do after obtaining their qualifications – is key to improving education and training systems”*.

According to Sipos (2017), an educational institution, MOOC or e-learning provider has three different models of GCTS (Graduate Career Tracking System) to apply:

- short-term tradition model which fulfils specific needs and where the surveyed topics are quite heterogeneous and particular attention is on the current employment situation,
- long-term tradition model which uses a systematic data collection operating in predictable and stable frames, with strong central financial tools, typically using representative samples and cohorts--based surveys, where the data are available on the website of the responsible organizations and institutions that receive data for further analysis and benchmarking,
- complex service-package offering system, where administrative questions arise (how and where to apply, the type and level of training), the possible conditions and related data for long-term career and work are in focus.

Each model has pros and cons, but it is necessary for any MOOC and e-learning provider to plan, integrate and utilize a GCTS, taking into account the needs of the students, employees, trainees, stakeholders, etc. So, considering a GCTS as an input-output process, the aim is to maximize the added value of the output and use this knowledge in decision-making. While each institution maintains and updates its strategic plan for academic quality, learning outcomes, attractiveness, development & sustainability research and overall impact in the society in national and international level, it is crucial to utilize outputs of a GCTS and fuse it within organizations' quality assurance and accreditation system. The ability to track graduates is also considered a core component of effective Quality Assurance systems as it provides a mechanism for gathering intelligence on skills utilization in the labour market and placement rates. This in turn could lead to improvements in the curricula, training methods, learning goals and also in standardization of the e-learning life cycle.

Benchmarking with other providers

Due to ICT advancements, the administrative management of students have been evolved based on an increasing demand of more properly structured data and information handling.

Connection and interoperability among various information systems (internal and external) and the organization is an issue and a main target. Tracking and alumni mechanisms must fall into this category, in order to integrate into the educational providers' IMS channels the provision of valid data to support the development of quality assurance processes and an overall quality assurance strategy.

Moreover, the tracking mechanism must be able to provide information in such ways that benchmarking in national or international level will be possible and feasible. This means that various benchmarking tools should be initialized and integrated within the graduate tracking mechanisms of the educational providers and more specifically MOOC and e-learning providers, because of the physical distance among institutions and students.

Benchmarking in general could help the provider to compare itself against other similar organizations at national and international level, based on sound quality indicators and the corresponding scores, and use all the relative information for any improvements and decision-making actions.

Recommendations for future work

Lifelong learning is important for individuals, organizations and the society, as emphasized by the World Economic Forum, stating that there is an urgent need for a "global reskilling revolution": we need to reskill more than 1 billion people by 2030; by 2022 42% of core skills required to perform existing jobs are expected to change and in addition to high-tech skills, specialized interpersonal skills will be in high demand, including skills related to sales, human resources, care and education.

Moreover, EU through the European Skills Agenda, a five-year plan to enable individuals and businesses develop more and better skills and to put them in use, is planning to strengthen sustainable competitiveness, ensure social fairness and build resilience to react to crises, based on the lessons learnt during the COVID-19 pandemic. The European Skills Agenda sets objectives to be achieved by 2025 and for this a massive investment in skills is needed.

In this context, the role of online distance education and MOOCs and the partnership between state, HEIs and public and private lifelong learning centers is of great importance, in order to design, develop and offer innovative training programs in large scales. This means that it is crucial to understand the real needs of the labor market and align the curricula accordingly, with skills and knowledge that will make sense towards a purposeful reskilling/upskilling of the workforce in each European country.

To do so, it is very important for the stakeholders to evaluate the real impact of training programs offered so far via online distance education and MOOCs. This could be done by combining initiatives like tracking, alumni, career offices and social networks. In this way, there will be a holistic approach for the tracking process and connection with graduates, based on a balanced supply/demand model of the labor market.

Combined actions like alumni networks integrated into the information system and academic procedures of MOOCs and e-learning providers in general, and utilization of professional social networks like LinkedIn, will strengthen the bonds between graduates and providers. This will lead in higher utilization of tracking mechanisms which will be also more efficient because of the cultivated connectedness of the graduates. This in turn will result in higher response rates

from the tracking mechanisms and more qualitative data to analyze, combined with Learning Analytics from the learning platforms. Using Big Data Analytics will lead in more sophisticated processed information, better understanding of behaviors and expectations and perhaps better predictions.

Finally, alumni, tracking mechanisms and professional social networks could be integrated into a non-formal educational continuum, incorporating mechanisms for micro-credentials with block chain technologies, as well.

Post COVID era for MOOCs

As COVID-19 pandemic gradually gets under control, societies are moving towards the post-COVID era, where various consequences of this crisis will affect almost all of the humans' activities around the globe. The use of digital technologies such as mobiles and social networks, have contributed significantly to reduce the spread of COVID-19 infection and help people communicate, collaborate, work and counter isolation during the quarantine.

But perhaps the most important long-term social impact of COVID-19 is the prominent role of online education in all levels. The efforts by the governments across the world to ensure sustainability of learning during the crisis, has revamped the whole education system. Digitized education and easy access to the Internet is transforming the approach to learning with virtual classrooms, advanced learning tools and free educational content. The post-COVID online courses are likely to be further adapted to large student populations, with elevated efficiency and innovative use of technologies, such as 5G network, virtual reality, and block chains.

Concerning MOOCs, which are large-scale courses invented to provide free or low-cost education to people who could not afford or get access to traditional education services, there was a rapid growth around the globe prior to the pandemic. But, in recent years they had somehow faded from the public spotlight and most of the content was put behind paywalls. Moreover, despite the fact that many MOOCs are delivered by domain experts from reputed universities, they have failed to reorder higher education as they promised. Reich & Ruipérez-Valiente (2019) note that the vast majority of MOOC learners never return after the first year, the growth in MOOC participation has been concentrated almost entirely in the world's most affluent countries and low completion rate has not improved during the six years studied.

But the pandemic has affected these statistics to some extent⁶. MOOCs are proved to be very helpful for professionals and for those who already have some background knowledge about the subject and want to upgrade their skills. They are also helpful for self-motivated students who can invest time for deeper learning. As a consequence, COVID-19 pandemic has forced an unprecedented shift to online teaching and now various institutions are looking with renewed interest towards MOOCs as an alternative form of education. For instance, during the crisis, Coursera expanded free access to its courses, in order for HEIs (even if they aren't a partner of the company) to make use of MOOC content in their teaching. According to Stella Mikraki at LearnWorlds, e-learning was already growing at a 100% growth rate per year, but due to COVID-19, the demand for their virtual training platform has tripled⁸. Moreover, MOOCs played a crucial role in health education and the rapid preparation of the health professionals to cope with COVID-19, where the infrastructure could be scaled up to reach more learners leveraging digital tools and materials (Bhattacharya, Singh & Hossain, 2020).

According to Lockee (2021), before the pandemic, the primary purpose of distance education was providing access to those unable to participate in traditional education. As its purpose has shifted to supporting continuity of instruction, its audience, as well as the wider learning ecosystem, has changed. So, it will be interesting to see which aspects of emergency remote teaching remain in the next generation of education, when the threat of COVID-19 is no longer a factor.

However, it cannot be overlooked that as the system shifts to online distance education and MOOCs, the digital with respect to access to devices and connectivity will have a huge impact on the students belonging to the socio-economically disadvantaged category, who may risk falling further behind. Research has shown that online learning attracts learners of medium to high socioeconomic and education background (Zafras, Kostas & Sofos, 2020), so a challenge is to open up online distance education and MOOCs to people not traditionally participating in lifelong learning. Along this line, educational systems around the globe have to ensure that these efforts do not further amplify the existing inequalities in access to learning and must pay heed to quality of education and equal access to resources for all.

CASE studies

Here below you can find information on the successful implementation of the ASTRE tracking system in the four MOOC and e-learning providers of the consortium: UPV, Uaegean, ILI FAU, UniPegaso.

Objective of the case studies is to create visibility, credibility and clarity about the importance and the value of applying a tracking system for MOOC providers.

UPV

Introduction
<ul style="list-style-type: none"> Existing situation: <p>At this moment, there is no system for tracking the impact of the training on the graduate's professional development, due to lack of staff and time.</p> <ul style="list-style-type: none"> Context of the application of the ASTRE methodology: <ul style="list-style-type: none"> ✓ Platform that offers xMOOC. ✓ Founded in 2013 to date. ✓ Number of courses offered by the platform: More than 100 courses. ✓ Number of students who have finished a MOOC from 2021 until 2017: 17.275 students. <ul style="list-style-type: none"> Challenge faced: <p>Meet target number of responses: The response rate of students to surveys is usually low. There is no culture for students of quality improvement based on surveys. They do not realise the importance of answering them.</p> <p>The survey contains some open-ended responses, whose data analysis is more laborious, in order to get feedback from the learner.</p>
Experiences using the ASTRE tracking system
<ul style="list-style-type: none"> Processes applied: <p>In the first phase, an email was sent to the email addresses of students who had completed a MOOC course in the last 3 years (since 2018). Total 12.491 students. The email had the following introduction, in addition to the link to Google Forms survey:</p> <p><i>Hello, we are sending you this email to ask you to help us improve the MOOC initiative of the Universitat Politècnica de València by answering a survey.</i></p> <p><i>We are collaborating in a European project to determine the usefulness of MOOCs in professional careers and we have been asked to pass a survey to those who have successfully completed one of our MOOCs. Our database shows that you passed the course XXXXXXXXXXXXXXXX in YEAR and so we are asking you, if you can spare 10 minutes, to answer the following survey:</i></p> <p>https://docs.google.com/forms/d/e/1FAIpQLSfQt9s_J7yjMg7NEfang6z5X_pLh_4v0NxYQ75epwiUwTjSkw/viewform</p> <p><i>Thank you very much</i></p>

In this first phase we receive 549 answers (Answer rate: 4,4%).

- Approaches used to increase the response rate:

In order to reach 600 responses, a second launch was carried out to learners who had completed a MOOC in 2017 (about 4.000 students).

With this launch we reached 767 answers (Answer rate: 4,4%).

- Procedure for data analysis:

For the data analysis, survey data in Excel format was obtained from Google Forms. Once the data are in Excel format and using dynamic tables, the data are easily exploitable and manageable. We can obtain information segregated by any of the variables that appeared in the survey (year of birth, country of origin, gender, level of studies, initial employment situation, etc.).

The open-ended question had to be processed individually and sorted according to a classification, so we were able to analyse them.

Lessons learned

- What went well:

The procedure and the survey had been easy to use and to send to learners. Google Forms application for developing and sending the survey, as well as for tracking the responses and the exportable Excel format made it easy to obtain, use and manage the information obtained.

- Obstacles and how they were overcome:

- ✓ Low answer rate: low culture of answering forms or people are tired of answering questionnaires or survey. We tried to increase the response rate by sending a second survey to students who had completed a MOOC one year before in 2017.

Not knowing which students have responded and which have not. There is the option of assigning a "token" to each student to know if he/she has responded or not. In this way we could have been sent a reminder to the students who have not answered the survey yet. This possibility is not available with Google forms

- ✓ Another point is the question "Which was the title of the course". It was left as an open answer which makes it difficult to analyse the data and establish more specific conclusions per course or group of courses per subject. In order to obtain more specific information about a specific course or group of courses and to establish opportunities for improvement of the quality of the courses, the tracking tool should have been applied individually (per course or course group). Another possibility is to associate in the URL a parameter that allows us to know the course that the student to whom the survey is being sent has completed. In this way, the question of the title and the level of the course completed would not be necessary.

- How the tracking methodology benefited the provider, what changes were introduced:

A tool that is easy to use, edit and adapt to your needs.

There are well formulated and detailed questions, which allows you to obtain very useful information about the courses offered.

To facilitate further data analysis, some free-response questions have been changed to multiple choice answers, such as Year of Birth or Country of student.

Some additional answers have been added to some questions such as gender or whether you obtained accreditation.

In the questions on remuneration, more salary ranges have been added.

Conclusions

The survey has been distributed to different students, at different levels of studies, without taking into account the course in which it was certified (type, subject, duration, whether it has more or less practical content, assessment tests, whether it requires training/basic knowledge...), so that the information collected has been diverse and covers many variables at the same time.

The mass mailing of the survey has made it possible to identify weaknesses and strengths from a very global point of view.

The survey is easily adaptable to any scenario, i.e For each platform with different characteristics, the questions in the survey can be modified or completed with those questions that were useful to the provider or that were adapted to the structure or particularities of the courses offered.

After the pilot run some changes had been indicated to be made to facilitate the work, such as avoiding open-ended questions, using tokens or programming parameters in the sending of the survey.

If the monitoring tool is to be integrated in the quality management system of the organisation, its delivery must be automated. The survey should be sent automatically at a set time after the end of the course. In addition, although the Google Forms application allows the data to be visualised graphically and extrapolated to Excel, a statistical control panel should be developed, one that allows a quicker and more visual analysis of the data and is suitable for the needs of the organisation in order to detect and establish improvements in the training offered.

UAegean

Introduction

Greek HEI's Lifelong Learning Centres were established recently, based on Legislation No. 4485/2017. It is therefore clear enough that this is a new institutional structure within Greek universities, which were organized and operated from scratch.

This fact has led to various administrative decisions, as to which procedures should be given priority to, for these new organizations to become operational and to offer self-funded training programs, mainly through online distance education all over the country.

Therefore, as one can observe in all LLL Centers, the development of mechanisms for tracking graduates and even internal evaluation mechanisms, has been almost non-existent.

In the case of the University of the Aegean, the situation was generally the same, but with some slight differences that can be summarized as follows:

- As early as 2012, the University of Aegean had already organized training programs for lifelong learning through online distance education, resulting in a relevant know-how in terms of program evaluation and feedback from trainees.
- In 2012, through a funded research project, AlumniNet, an electronic platform for interconnection between graduates, university, and the labor market, was implemented, leading to several useful conclusions.

The University of Aegean had therefore recognized the need to create a tracking framework in Formal and Non-Formal Education due to:

- Inability to maintain contact with graduates
- Inadequacy in the collection of career-related data
- Lack of mechanisms / tools to capture the degree of absorption by the labor market
- Lack of mechanisms / tools to connect with the labor market
- New needs created due to the rapid growth of Online Distance Learning and MOOCs
- the location of the university as a regional HEI, distributed in the Aegean Sea.

Experiences using the ASTRE tracking system

As partner of the ASTRE project, UAegean's LLL Center undertook the task to organize and run one of the four pilot applications of the tracking mechanism.

The pilot implementation took place in the period May-June 2021 with the distribution of the questionnaire (translated into Greek) to graduates of various training programs of the Center.

The basic procedure followed was the posting of an announcement in the Moodle course of each program, as in this way it was ensured the sending via email to each registered user in the system. It was estimated that in this way, the questionnaire was sent to over 10.000 graduates. In the 2nd phase, mailing lists and newsletters were used by individual training programs. This process was supported by the administrative staff of the center and the secretariats of the individual training programs.

Finally, 514 responses were collected, i.e., a completion rate of about 5%.

Data processing has been executed using SPSS v.16. and descriptive statistics were used for each question item. At the same time, a thematic analysis was made in the context of processing the answers to the open question.

Lessons learned

The process was completed with relative success, regarding the response rate of the questionnaire, as the initial estimates were lower. The reason was that from May 2020 to May 2021, many small or large-scale surveys about the COVID-19 pandemic were organized in Greece. People were starting to feel frustrated about this, thus not answering the surveys.

Also, a problem was that the graduates are not used to keep in touch with the Center, both due to an underlying culture and due to the lack of a mechanism that will strengthen and cultivate this relationship over time. This problem was tackled by technology, as the trainees who attended a MOOC had registered in the LMS Moodle with their personal emails and since this registration, based on our policy, is not abolished, we were able to send the announcement for the ASTRE pilot. At the same time, we tried to activate communication channels through social networks and mailing lists.

Based on the preliminary analysis of the data from the graduates' answers, it seems that 2 points need to be focused, among others: the improvement / upgrading of the educational process (material, communication, evaluation) to be even more in line with the modern training needs and the harmonization of the curriculum with real needs of specific professional profiles.

Conclusions

The pilot of the ASTRE tracking mechanism was very helpful for our organization because it provided us valuable information about the experiences and opinions of our graduates. Besides the results and conclusions derived from the data analysis of the 514 survey answers, this effort will be used as a pilot to implement a permanent tracking and alumni mechanism during 2022.

ILI FAU

Introduction
<p>ILI is the e-learning provider for the FAU University and it has been developing MOOCs for a number of years supporting online learning and training of teachers, students, educators etc. However, due to the nature of the Institute ILI does not have control of the e-learning systems as that relies upon the departments of the University. Though, to overcome this problem and to take full advantage of the monitoring system developed by ASTRE, ILI has started developing its own MOOC platform which will be based on ILIAS, which is an open source learning management system.</p> <p>The ILI MOOC platform will include all the MOOCs developed by ILI's National and European project and incorporate the ASTRE tracking system to extract useful data for a range of courses. The ASTRE tracking system will be transferred to the ILIAS environment before deployment.</p> <p>The development of the platform is expected to be on alpha version by the end of the year (2021).</p>
Experiences using the ASTRE tracking system
<p>The experience gained so far by using the ASTRE tracking system has been limited due to the reduces used of the tracking system at ILI. The reason for that being that the Institute is not running any courses and as a results is not allowed to introduce the tracking system in other courses.</p> <p>As soon as the tracking system will be introduced on to the ILI's MOOC platform using the ASTRE tracking tool will become part of the MOOC experiences with learners needing to complete the survey before they obtain their certificate of completions. For those not completing the course email reminders will be used.</p> <p>Regarding the data, ILIAA offers an automated data analysis tool and a data visualisation that will be used to extract information.</p>
Lessons learned
<p>There are no lessons learned at this stage since the development of the platform is ongoing, but the findings will be reported as soon as possible with the end of the alpha development phase.</p>
Conclusions
<p>The ASTRE tracking system is a monitoring system that currently missing from many MOOC and e-learning providers including FAU and ILI. As a results to take a full advantage of the opportunities the tracking system offers ILI is developing a MOOC platform where will deploy the tracking system and monitor the progress and development of the participants in its MOOC courses.</p>

UniPegaso

Introduction

Pegaso Online University (Instituted by a Ministerial Decree, the 20th of April 2006 - GU n. 118, the 23rd of May 2006, Ordinary Suppl. n. 125), is an Italian University built on the most modern and efficient technological standards in the e-learning. Today, it is the largest European online University, with about 68,000 students enrolled in several degree courses and more than 100,000 students enrolled overall, also considering the master's courses.

Thanks to the most modern and effective technological standards aimed at supporting e-learning processes, Pegaso Online University is committed to extend a wide educational offer to cover the educational needs of the modern University student, including bachelor's and online master's degree courses recognized at an academic level.

Pegaso Online University has developed a system for quality assurance (QA) of teaching and research, solid and coherent, which is clearly translated into public documents of direction, strategic planning and consistent with the strategic vision and the objectives defined at central level. In this context, the Pegaso Quality Committee plays an essential role in the evaluation and self-evaluation process.

In Italy, the National Agency for the Evaluation of the Academic and Research System (ANVUR), established by the Ministry of Education in 2006, requires all Universities to track the degree of satisfaction of their graduates and the results obtained in terms of their placement. Most Italian Universities rely on the Almalaurea Consortium to fulfil these tasks of ex post monitoring and verification. Today, Almalaurea's information system collects data from 78 out of 97 Italian Universities (75 of these have joined the Consortium and 3 have entered into a specific agreement just for data gathering).

Even though Pegaso Online University does not adhere to the Almalaurea Consortium, it has always managed this kind of surveys independently and it has always focused on verifying the satisfaction of its graduates. From the surveys that the University has done in previous years, two important elements convinced Pegaso online University to take part in the ASTRE project:

- 1) although results in terms of graduate satisfaction have always been satisfying, the response rate has always been very low, especially with reference to the surveys carried out 3 and 5 years after obtaining the degree.
- 2) moreover, the previous monitoring system lacked some elements of analysis, especially with reference to the placement and to the income positions of graduates, which are essential to adequately monitor the gap between the e-learning process and the world of work.

Application of the ASTRE methodology: the context

In line with the provisions of the ANVUR legislation and in order to improve its self-assessment process, Pegaso Online University has considered necessary to structure a new model for detecting the satisfaction of its graduates and the effectiveness of the training offer, in terms of consistency with what is required by the labour market. To this end, it was considered appropriate to carry out a large-scale survey that would be useful to possibly intervene both on the side of the organization of the training and on the side of job placement policies.

With such premises, the Pegaso Quality Committee has commissioned an internal working group - composed of Professors Stefano Palermo, Eugenio D'Angelo and Clorinda Sorrentino - to prepare and start the pilot experimentation of this new monitoring procedure, with the

aim of maximizing the aforementioned cognitive result, taking into due consideration the following points:

- a) the quantity of answers obtainable (given the large and growing number of graduates - response rate).
- b) the needs imposed by the Quality Assurance process, while expanding the range of detectable aspects and courses of study under investigation.

Starting from these assumptions, with the support of the Statistical and Informatics Office of the Pegaso Online University (USTIN) led by Prof. Antonio Tufano, during the second quarter of 2021 the working group started the experimental phase of the new survey process. Based on the results achieved, it will be possible first to correct the methodological criticalities that emerged during the survey and, subsequently, to define the methods of institutionalization of this new procedure.

The major challenges faced

As part of the ASTRE partnership, it was decided to make the questionnaire flexible, since the pilot experimentation phase, in order to allow the involved Universities to comply with the national laws and to reconcile all the cognitive purposes in a single survey process.

The first challenge for Pegaso Online University was structuring a questionnaire that would consider:

- a) the Italian regulations.
- b) the experience gained in other national University contexts.
- c) the desk research process and the methodology developed by the international consortium of the ASTRE project.

The second challenge, strictly connected to the previous one, was structuring a final questionnaire that was not excessively time consuming for respondents.

The third challenge was linked to the response rate: the KPIs of the ASTRE project requested to reach a minimum of 2,000 graduates, with the aim of obtaining at least 600 answers. From the previous experience of Pegaso Online University this was perhaps the most complex challenge to accept and win. Moreover, although the KPIs of the project were already sufficiently challenging, they were not significant when monitoring a University like Pegaso, which is characterized by more than 60,000 students and this forced Pegaso to reach a much more important volume of respondents.

Experiences using the ASTRE tracking system

Processes applied

In defining the structure of the questionnaire to be administered during the pilot trial, the Pegaso Quality Committee took into consideration, two important points:

1. the configuration of the evaluation questionnaire already prepared in the past by the University and approved by ANVUR.
2. the method of detecting the same cognitive objectives by the Universities belonging to the Almalaurea Consortium.

The outcome of this preliminary analysis was merged into a first draft questionnaire.

Having been advised of Pegaso Online University participation in the ASTRE project, the QA working group considered it appropriate to bring to the attention of the project partners its aforementioned draft of the questionnaire. In this way, the initial questionnaire has been expanded and enriched, until it reached a final version consisting of 45 questions, mostly shared and validated within the framework of the ASTRE international partnership.

From a structural point of view, the questionnaire is ideally divided into three sections:

- 1) the first, aimed at outlining the profile of the respondents from a personal and academic point of view, also in order to give the opportunity to analyse responses

by homogeneous clusters (gender, age, residence, year of graduation, course of study, expectations, etc.).

- 2) the second, aimed at assessing the satisfaction of graduates with reference to the course of study and the knowledge learned, with particular reference to e-learning.
- 3) the third, aimed at measuring the effectiveness of the course of study in terms of career advancement and remuneration of graduates.

Approaches used to increase the response rate

After having modified and integrated the questionnaire structure according to the ASTRE project, in order to better adapt it to the cognitive purposes of Pegaso Online University and to the Italian regulations, the questionnaire was first validated by Pegaso Quality Committee and subsequently transmitted to the Statistical and Informatics Office of Pegaso online University (USTIN) which sent it, through the University's digital platform, to all students who have completed their studies in one of the ten degree courses (DC) that are part of the educational offer of the Pegaso Online University (with the exclusion of the DC in Letters, humanistic knowledge and training, Modern Linguistics and Philosophy and Ethics, too recently included in the educational offer). The questionnaire administration lasted four months: it was launched on 1 June and ended on 30 September 2021.

In order to raise the best response rate, on 25 June 2021 an email was sent to all students informing them about the survey process and requesting the answer to the questionnaire, explaining its purposes and its importance to better orient the University's policies in terms of teaching improvement and job placement. A concise version of the email was also conveyed by Pegaso Online University Communication Office through the University social channels (Facebook, Instagram and LinkedIn).

Procedures for the data analysis

The system set up by the Statistical and Informatics Office of Pegaso Online University (USTIN) allows from the University platform (fig. 1), only by accessing with QA credentials, to download an excel file (fig. 2) with statistics relating to each individual question contained in the questionnaire.

Università Telematica Pegaso

30/09/21, 08:34



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Questionario di ingresso

Titolo

Questionario Laureati

Descrizione

Questionario di valutazione del laureato

Descrizione domande

Questionario di valutazione del laureato

Giorni iscrizione minimi

0

Anni accademici

Domande

DOWNLOAD XLS FILE

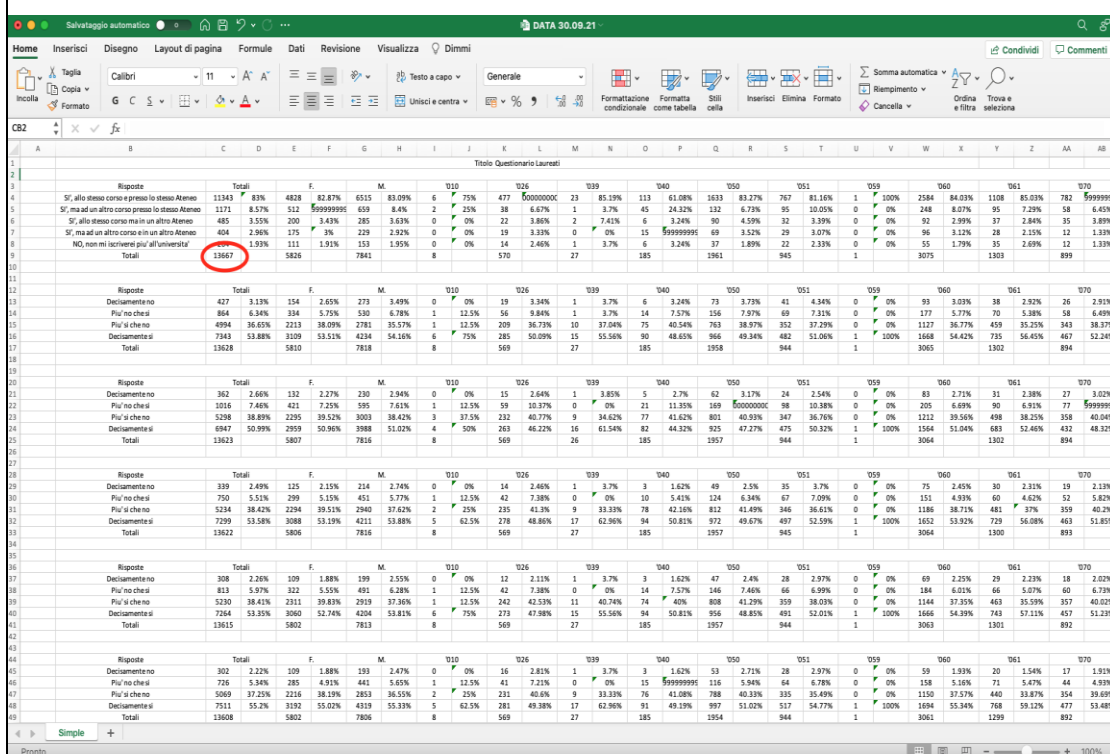
 Scarica in XLS

To the date of 30 September 2021, **13,667** responses to the questionnaire were received, an amount of absolute significance if we consider that the targeted universe is composed of the 64,947 people who graduated at Pegaso Online University between 2006 and 2021 (response rate of 21.04%).

The excel file consists of 285 rows and 78 columns and shows the results, for each individual question, depending on:

- the gender of the respondent
- the year of achievement of the title
- the degree courses

This method of data storage has allowed the Pegaso Quality Committee to collect data that can be immediately used and commented, because already exposed in tabular form. It was therefore only necessary to select relevant information, to synthesize such a large amount of data and to produce useful indications for the governance of the University.



The screenshot shows an Excel spreadsheet with a grid of data. The columns are labeled with letters A through Z, and the rows are numbered. The data is organized into sections, with some cells containing formulas like =SUMIF. A red circle highlights a cell in the 'Total' row for a specific question, showing the value 13667. The spreadsheet is titled 'DATA 30.09.21'.

Lessons learned

What worked well

Pegaso Online University has found, with extreme satisfaction, a very high response rate (about 21.04%), proving, on the one hand, the changed approach of students when it comes to answer to questionnaires detecting their satisfaction (either with reference to the training course and placement) and, on the other hand, the importance of administering the questionnaire through the learning platform. On previous occasions, the transmission of the questionnaire by e-mail had not produced such a high result. In addition, as already mentioned, social channels and email dissemination activities has sensitized and further pushed graduates to respond to the questionnaire.

Obstacles: how they were overcome

Thanks to a highly effective IT process, Pegaso Online University did not find any obstacles of particular importance to cope with. The institutionalization of the tracking process that will take place at the end of the pilot experimentation needs correction actions only about the data extraction method. Pegaso Quality Committee has asked to have a panel database and no longer excel tables already pre-established. This approach will allow more advanced statistical analyses to which the aforementioned method of extracting the results is poorly suited. In order to guarantee the privacy of the interviewees, this process will inevitably pass through a limitation to the accessibility of personal data; the Statistical and Informatics Office of Pegaso Online University (USTIN), when providing panel data results, will have to plan an appropriate procedure before disseminating them, even if only internally.

How the University has benefited from the monitoring methodology and what changes will be introduced

As mentioned in previous points, the tracking system is an integral part of a broader evaluation and self-evaluation process that Pegaso Online University is carrying out under the guidance and responsibility of Pegaso Quality Committee. Following the sharing of the results of the pilot trial, some aspects will be corrected and the tracking system will be institutionalised. This will represent a radical change in the procedures adopted so far. In terms of benefits, it is evident that the completeness of the questionnaire, in one with the very high response rate, will allow to carefully monitor any reductions in the level of satisfaction of graduates and to eventually make changes, both with reference to the structure of the courses of study and to the placement policies.

Conclusions

Thanks to the precious collaboration of the ASTRE partners, the tracking process carried out by Pegaso Online University has made it possible to verify how, in aggregate, there is a very high degree of student satisfaction, with reference to the course of study, and in particular to the specificities of e-learning, as well as with reference to placement opportunities and the income progression of graduates.

With reference to the individual degree courses, in which it was possible to cluster the answers, thanks to the tracking system, the University was able to detect how some training courses outperform others, either about the graduates' personal judgment or in terms of placement.

Conclusions

Conclusively, by completing this guide it's expected that MOOC and e-learning providers will be aware on the relevance and importance of tracking their own graduated students. The guide was developed to support them during the process of creating their own tracking system as well integrating it into their quality assurance system.

Five chapters were integrated in this guide to present different perspective and objectives of the tracking system for MOOC and E-learning providers. The first chapter has introduced the relevance and importance of applying a graduates' tracking system. It has defined the tracking system, presented tracking systems approaches by country, highlighted the advantages of tracking graduates and pointed out the motivation and challenges for this tracking mechanism. The second chapter presented step by step methodological guidance on how to establish the tracking system for graduates. The third chapter focused on the steps to include the tracking system into an organization's quality assurance system. The fourth chapter presented the ASTRE tracking system as well as its main features. Chapter five noted the further potential of using a graduates' tracking systems. The sixth and last chapter presents four case studies which reveal the experience where the ASTRE tracking systems for graduates were implemented.

Hence, all MOOC and e-learning providers are advised to create their own tracking system, following the guidelines presented in this guide. Moreover, MOOC and e-learning providers are certainly recommended to establish evaluation criteria for their contents and didactic proposals. For instance, they can establish qualitative evaluation criteria based on the analysis of the results obtained, propose new ideas aiming to achieve better results and apply the appropriate methodology required in each situation. In addition, in this guide several ideas were proposed to MOOC and E-learning providers so that they can establish an effective tracking system for their learners. Tracking, alumni, career offices and social networks, all these methods can now be used by MOOC and e-learning providers in order to build a permanent connection with graduates. They will also enable MOOC and e-learning providers to possess a better understanding of behaviours and expectations.

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