Learning Analytics Tools

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Lecture No 2.2

Data Collection in TELE

Hello. Welcome back to learning analytics tools course. This is the data collection part two. In the last video we saw data collection in classroom also in the Moodle or MOOCs. In this video we will see data collection in a Technology Enhanced Learning Environments.

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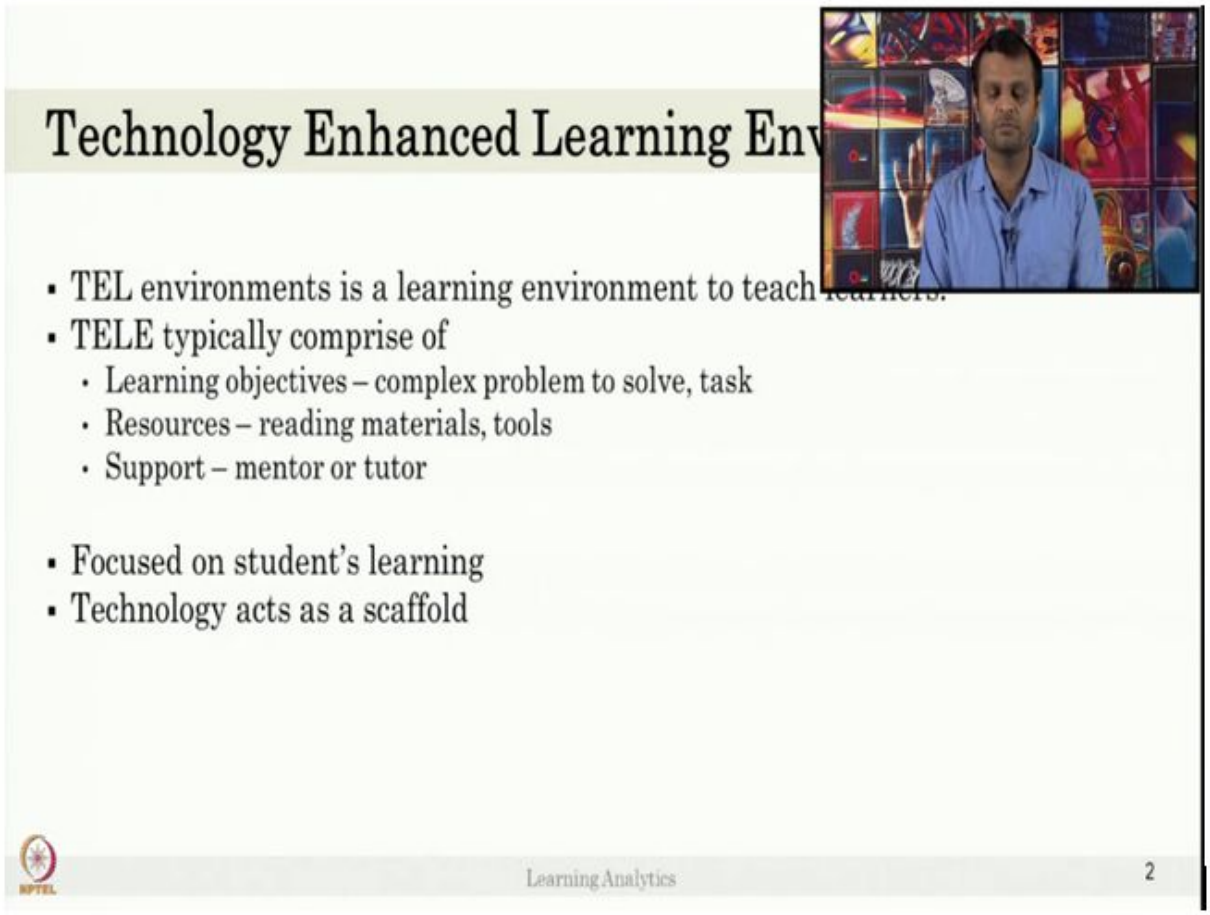

TEL environment is a learning environment to teach learner. It is a technology enhanced. Why it is called technology enhanced? A TELE typically compromise of learning objective that is, a student has to solve a complex problem or student has to learn a particular subject, a particular topic something like that. or you can assign a task to the students saying that in TELE, student should able to create a project or create model or able to create a concept map something like that.

And the TELE typically have the resources to solve it like if you ask them to create a model, there should be a tools, simulators or reading materials, everything has to be available. Sometimes you can also have a support in the form of mentor or tutor like agent, animated agents. That support can be provided. In TELE, the focus is on students learning. It is not about how do you deliver the delivery content, you want to deliver using a video, delivery mechanism or device. The more focus is on, how to help the student to learn.

So, we can have a technology. It can act as a scaffolding. In TELE, technology can act as a scaffolding, giving feedback when the student completes level 1, the TELE can help them to move onto level 2. And when they have a trouble in level 2, they can give feedbacks to improve the learning or improve the understanding.

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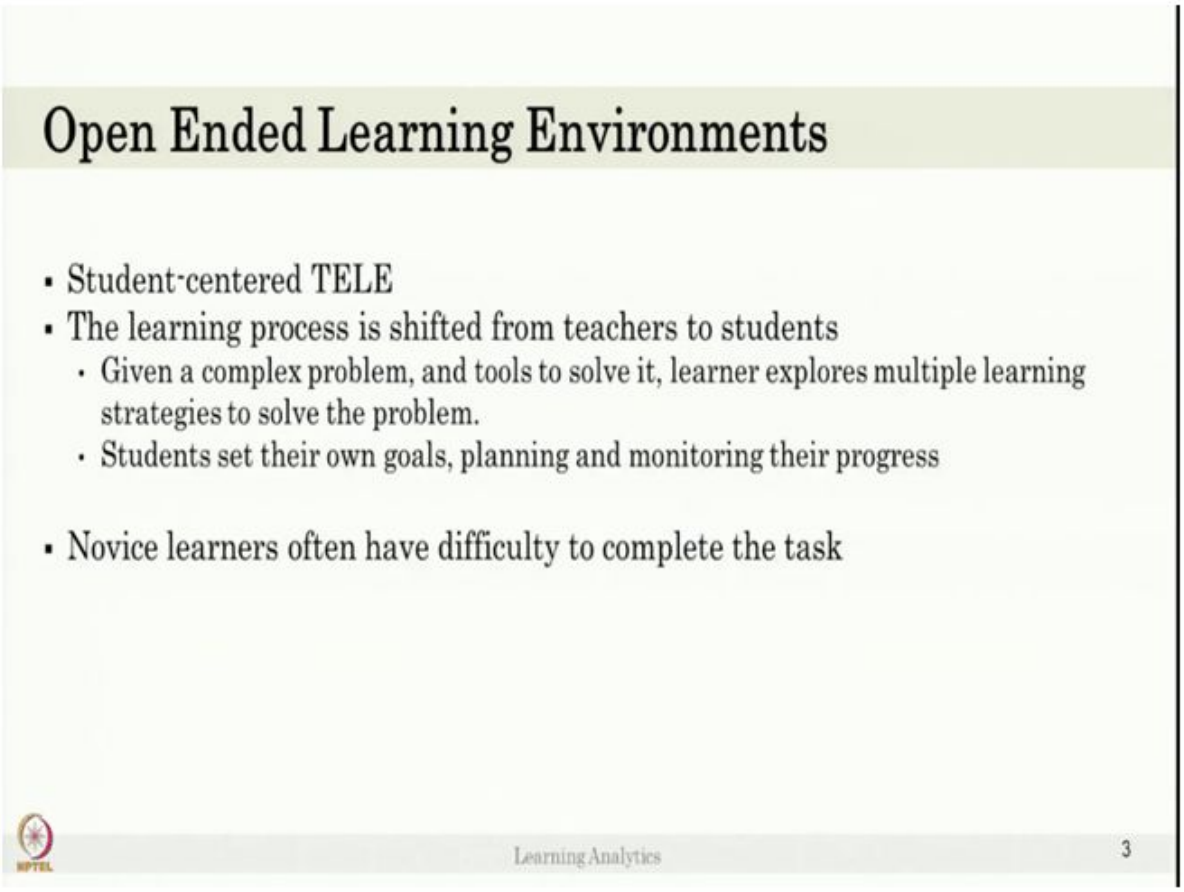

Open Ended Learning Environments is student centered TELE. It is also a TELE. Here, the learning process is shifted from teacher to students. In TELE, the teacher is the one who is setting up the path saying that the student has to learn this task. Fist after completing task 1, they should do the task 2, then task 3 or they have to read this material, create this particular model and they have to go and answer some quiz questions.

Here, the teacher is setting up the, the learning path, that is in TELE. However, in Open Ended Learning Environment, the learning process is shifted from teachers to students. That is, given a

complex problem and tools to solve it, learner explores multiple strategies to solve that problem. A teacher is not telling that you have to do this step first, you have do the step 2 like that.

We have given a problem, we will give all the tools and resources required to solve the problem. Let the student to explore his own path. He can read first or he can do and take the exam first or he can create model without reading, does not matter. It is a students exploring their own learning path.

So, here students sets their own goals, you know. Students will think about I want to solve one part of this task. Then I want to apply it and test it, then solve the part of second task or something. So, student sets his own goals and he, he sets his own planning and he might monitor his own process, if the process is not working and he might re-plan, all these things happen.

So, the problem is, this OELE is not good for Novice learners because Novice learners often have difficulty to complete the task. So, what to do with that? So, we will collect data and based on that we can provide recommendations without knowing what will be the students path. Based on historical data we can say, the student may have trouble here, the student might be having issues in this particular tool or resource, so we can provide that feedback with option for them to cancel the feedback or take it or not take it. So, in order to create it, we need to collect data from this Open Ended Learning Environment or the TELE. Let us talk about what data you want to collect from these kind of environment.

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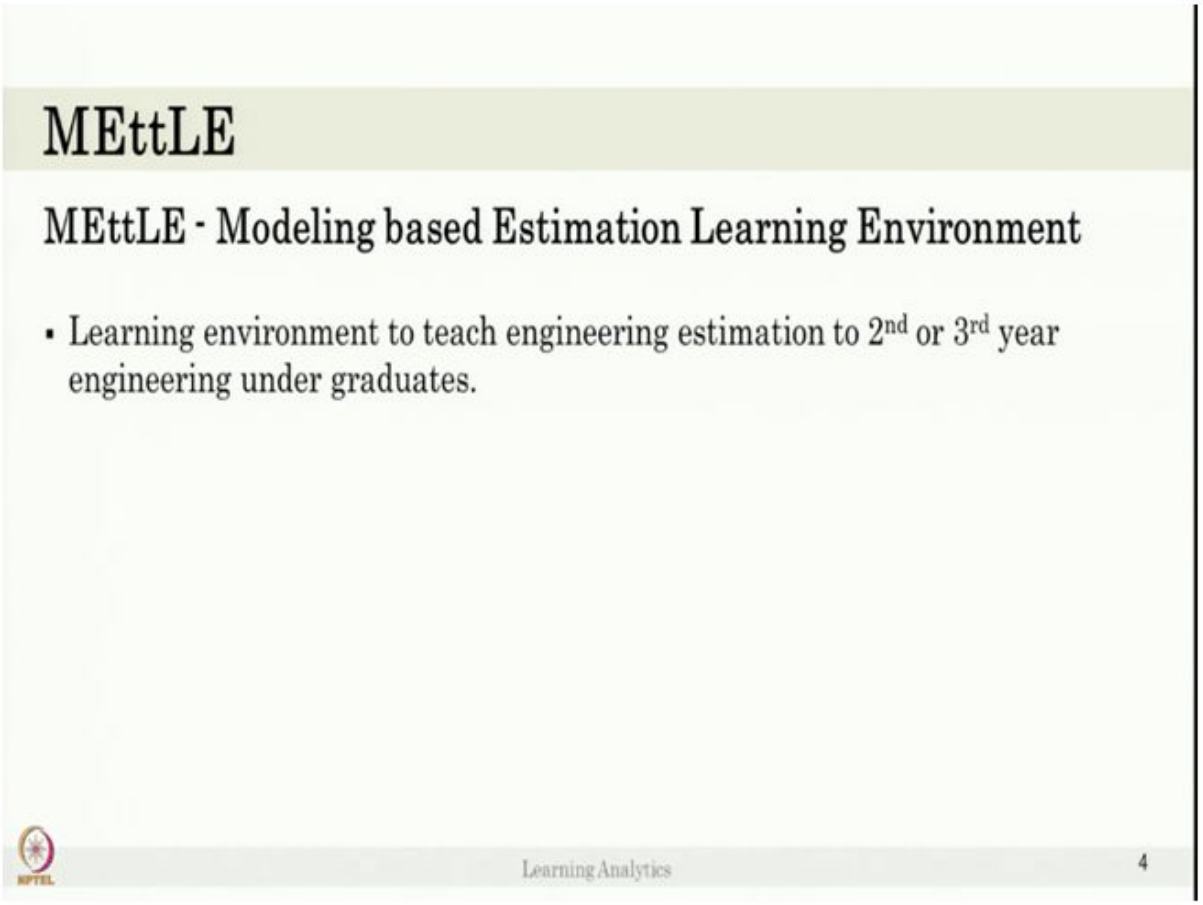

Here is a one example of Open Ended Learning Environment called MEttLE. It is a modelling based estimation learning environment. It is the learning environment developed to teach engineering estimation to second and third year engineering undergrad students.

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MEttLE

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I will show the video of MEttLE. This is screenshot of how MEttLE works. Please observe carefully what are the tools in MEttLE, what are the action student can do, think of that angle, then let us move on to activity. When the student logged in, we will get the instructions, then he will move on to the problem. The introduction video will show there is a complex problem which can be broken down into smaller sub problems so that students can create solutions for sub problems and combine the solutions to solve the bigger problem.

Here, MEttLE gives the sub problems for engineering estimation like quantitative modelling, qualitative modelling, calculation, estimation, evaluation, all these are problems are needed in order to understand the engineering estimation skill. This each sub problem is further broken down into a task. You can see that in the right side of the screen. This is called problem map.

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MEttLE

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After solving the problem map, the student is given the real time problem. So, student starts solving the problem. Student having problem map then selects one particular sub topic. When you select a sub topic, you will be provided with a set of questions and answers to answer and also you can ask for “guide me” to understand how to interact with the system.

Or there are the tools like a simulator, where student can play the simulator video and try to understand what is going on and also there is a graph to interact with and these graphs are interactive. Like simulator, we have some other tools say, calculator and scribble pad. In simulators there are two pages, you are looking at the second page now. Where the learner can change the value of the variables.

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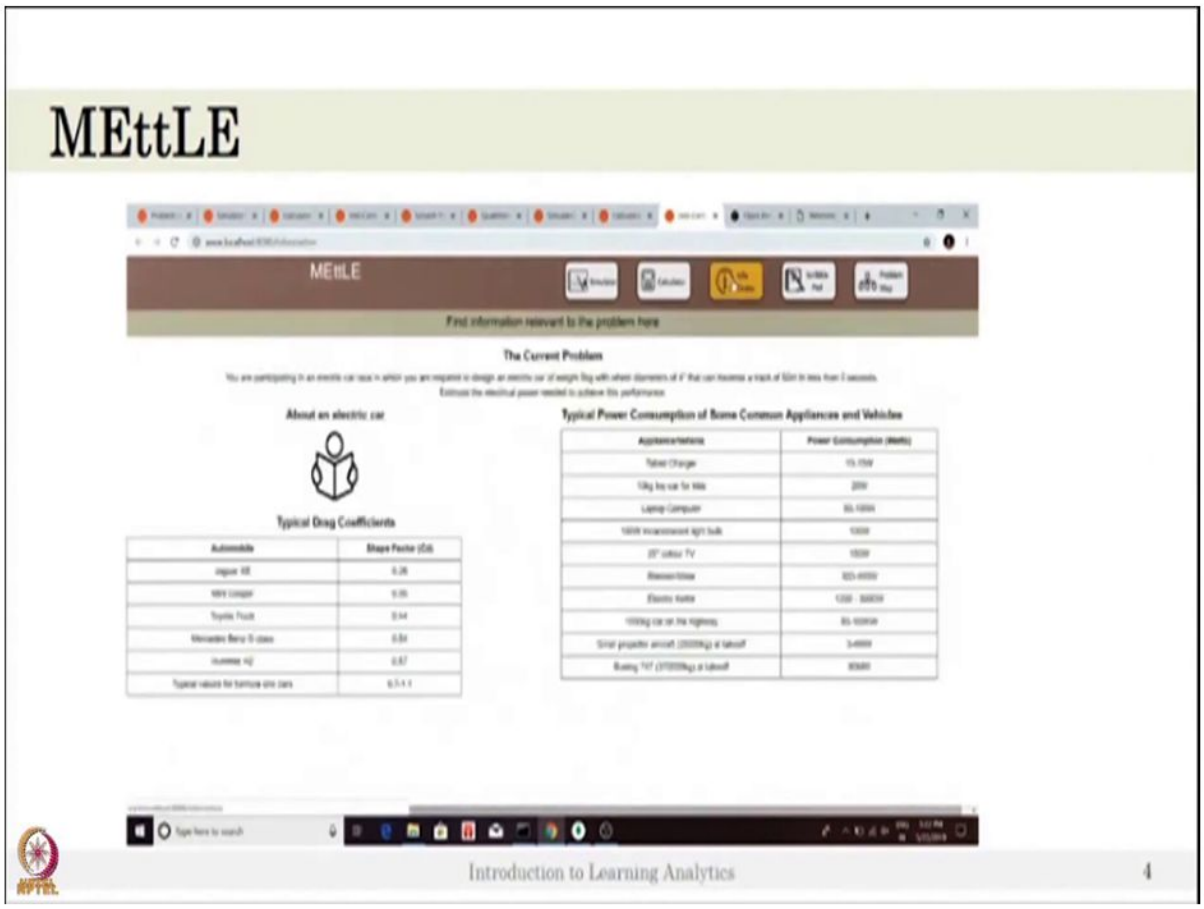

Here is a calculator screen and there is a information about different values, the parameter values.

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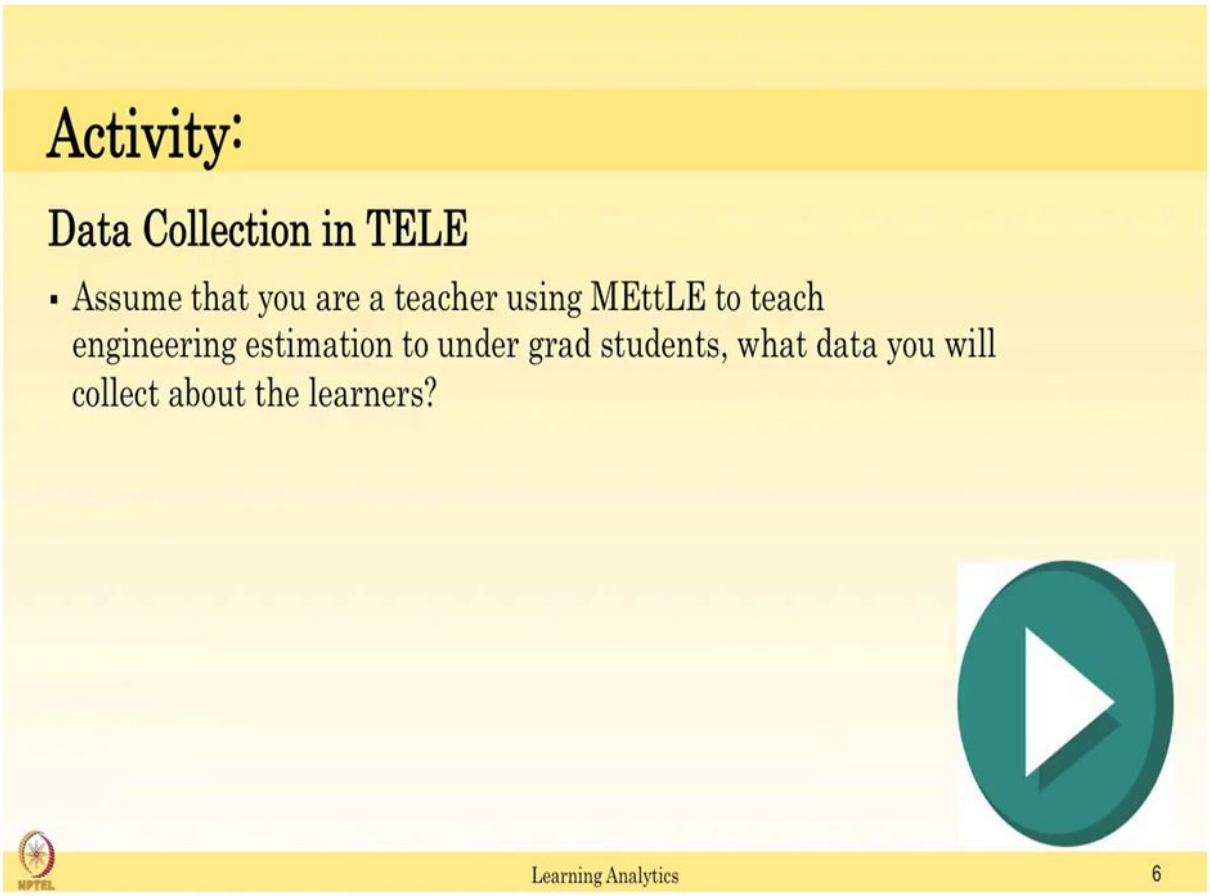

You have seen the MEttLE's screenshot or you have seen the video of MEttLE. Given that, assume that you are a teacher using MEttLE to teach engineering estimation to under graduate students. What data you will collect about the learner from the MEttLE interaction? Assume that you have skills to collect whatever data you want and your programming skill to store the data in one database to use. Please pause this video and write down your answers and after writing it down, please resume to continue.

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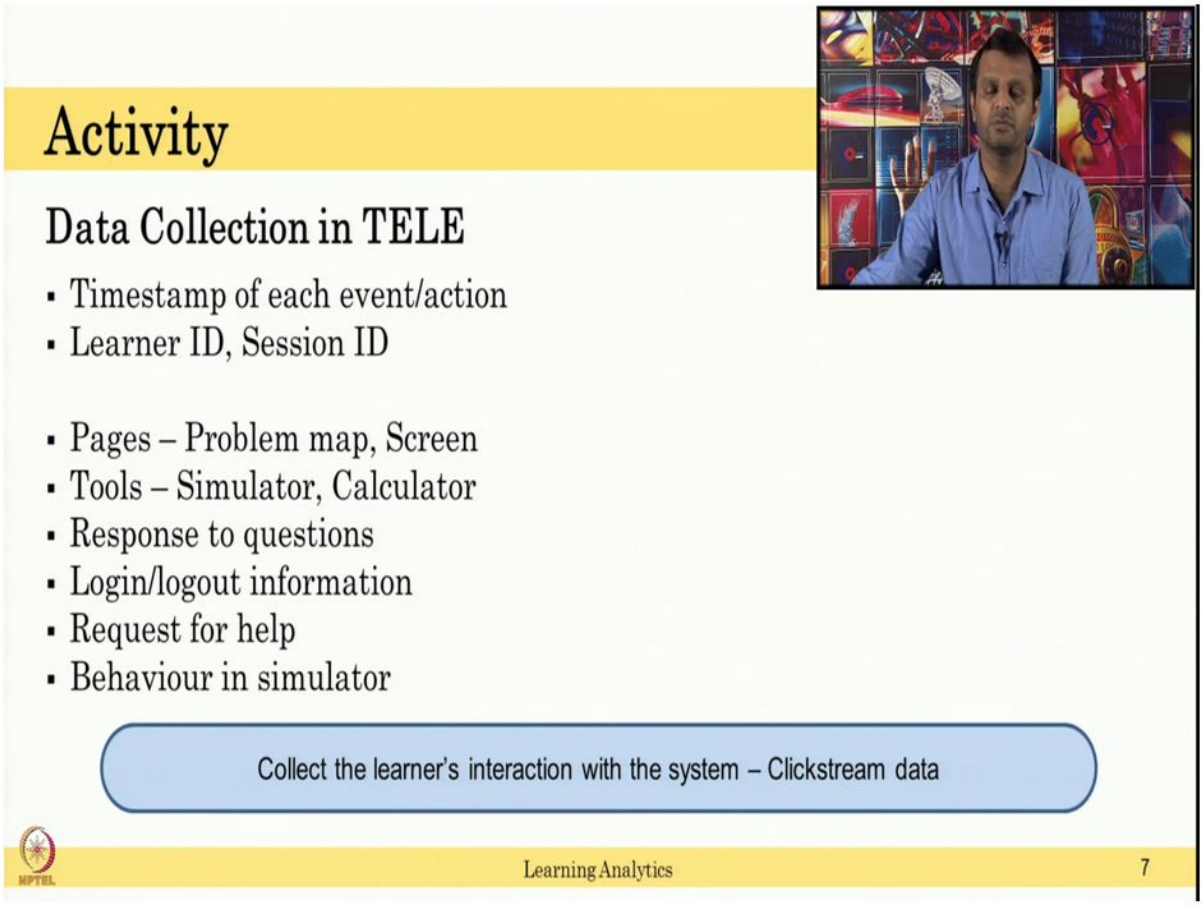

You can collect timestamp of each event and action because time is very important. We talked about it in the MOOC also. Especially you have to collect the learner ID, session ID and you have to store them. You might want to collect the pages, problem attempted, which page they are in, are they in a screen, which screen they are in, which problem map they are in? You can also collect about tools, simulator, calculator, all this information can be collected. Response to questions like, what is the students response to question asked in the MEttLE and log in and log out information.

Also if the students request for guidance or help, that can be noted down. Or the students interaction behavior in the simulator, whether they are increasing the value of the velocity or they are increasing the value of some other variables, you can store that. In short, you have to

collect learner's interaction with the system. You can collect all the learner's interaction or we can say clickstream data like we discussed in a MOOC, clickstream.

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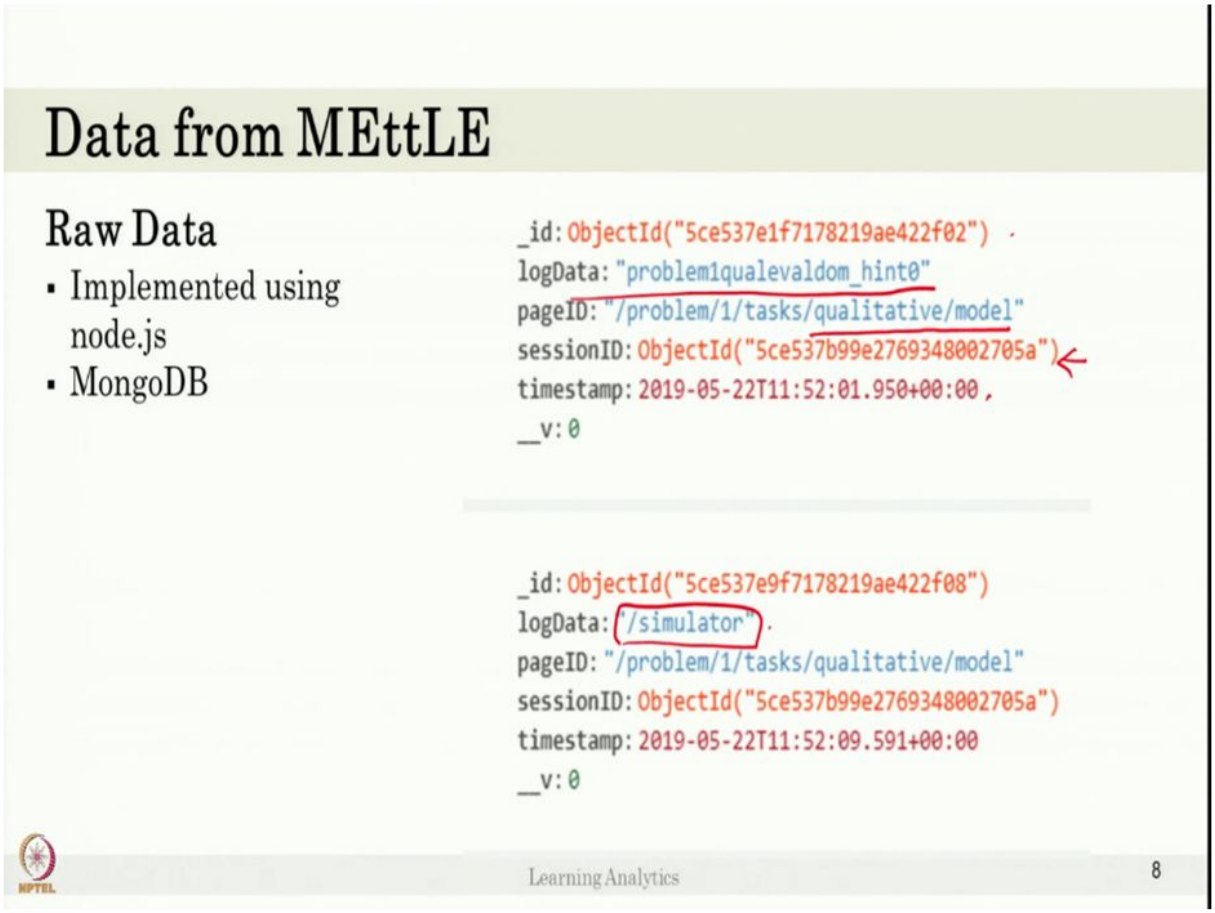

So, we can store the data in a database. Here we use MongoDB, no SQL database. Here is the example of data we stored from MEttLE interactions. So, in this video, the student is in the problem page and from the problem page, the student goes to task and he is going to the qualitative model.

The object ID is the ID about this particular session. So, here we have a student ID, timestamp, session ID, then we have -which problem student is currently working on and what is the page he is in? So, the page is the action, he is actually doing the qualitative model action. He is using

some hint. After that the student is still in the qualitative model and he is interacting with the simulator. So, now you know the student was in qualitative model, then he looked at the hint, then he is moved to a simulator.

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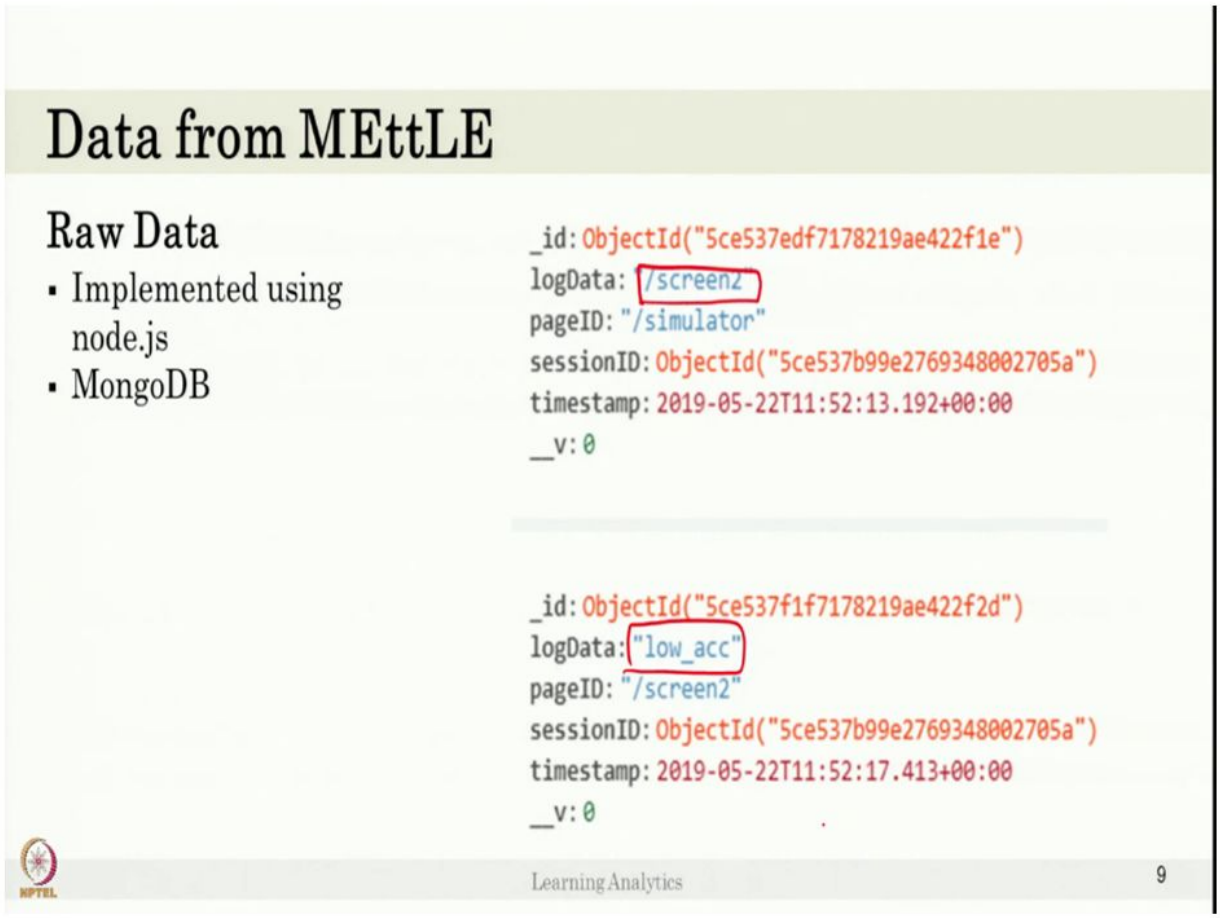

In this screen, see the timestamp is changing, we can see that the student is still in the simulator, the student has moved to the screen 2 in the simulator. Now, the action is simulator. So, who defines this kind of action? It is us when you create a system, you want to create simulator's action or the page level action. Now, he is in screen 2. In screen, the student is actually reducing the value of acceleration.

In screen 2, the student is reducing the value of acceleration. So, given this 4 type of data set, we know that the student first went to the qualitative model, the he checked the hint, then he moved to the simulator page. In simulator, he moved to the second screen of simulator, in the second screen the student reduced the value of accelaration. So, all the students interaction with the system that is, clickstream data has been stored in the MongoDB in a time series manner. That is a timestamp tells you that action 1 happens after that, second action happens. So, in sequence of actions.

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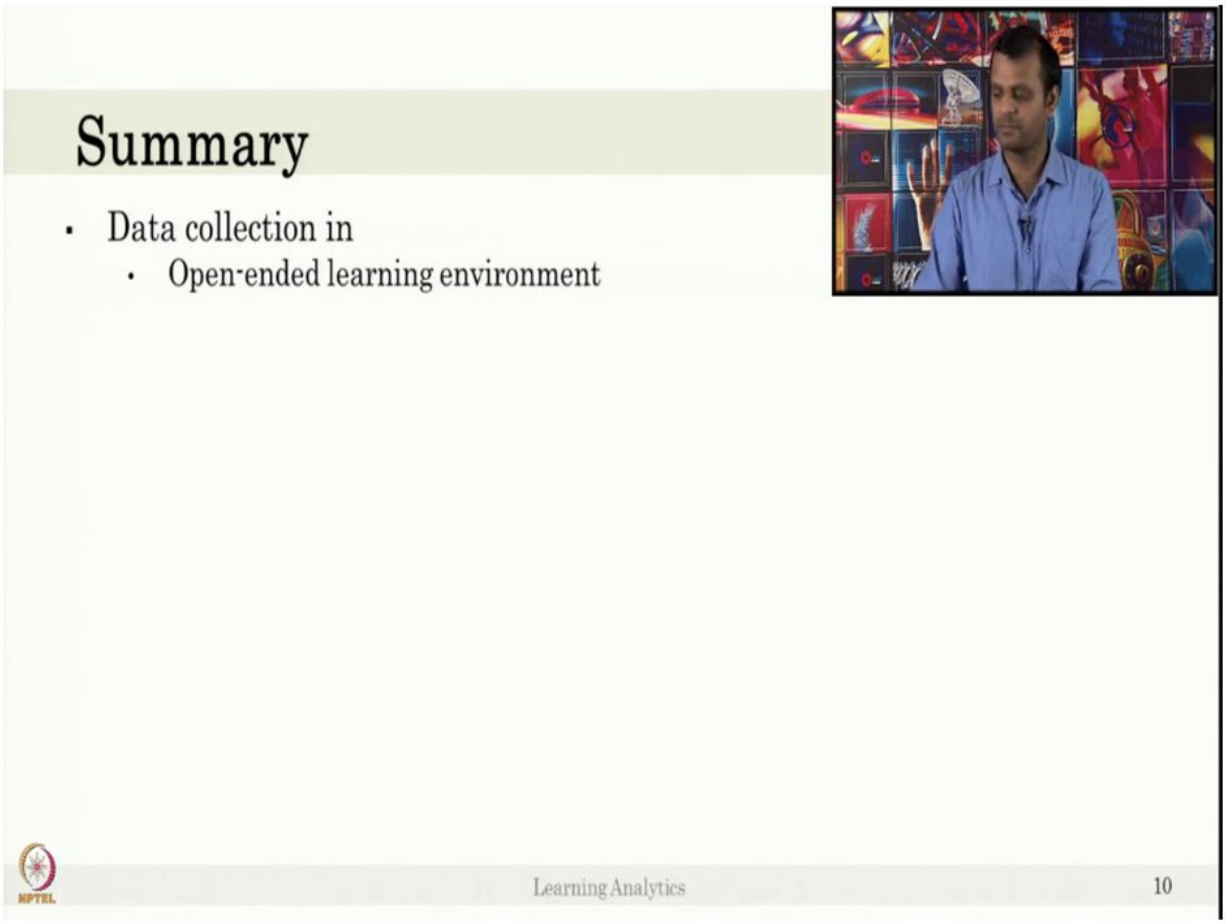

So, in this video, we saw how to collect data in a TELE or what data to collect. So, in short, what we were talking is collect all the clickstream data, a student's interacting with the system in a

database, in SQL or no SQL database. So, the format to store the data can be decided. Thank you.