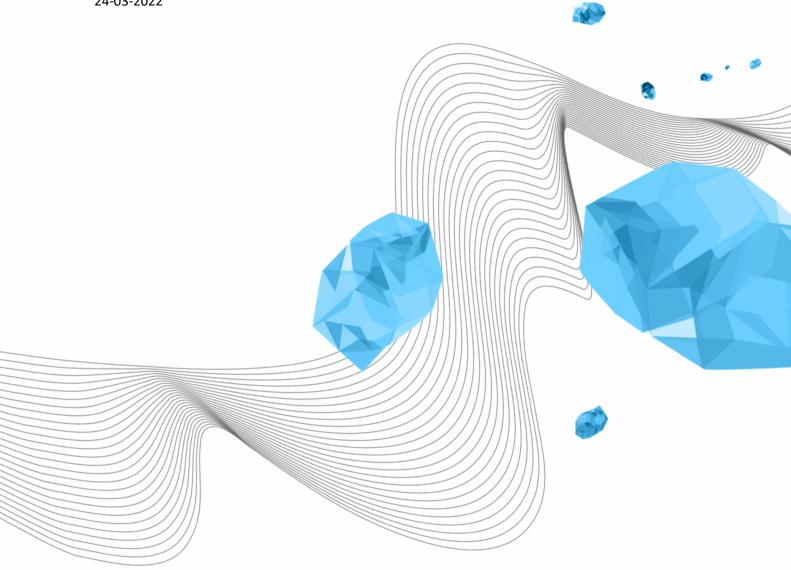# EVALUATION PROOF OF CONCEPT

LEARNING ANALYTICS

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UNIVERSITY OF TWENTE.

COLOFON

ORGANISATIE
Technology Enhanced Learning &Teaching (TELT)

TITEL
Evaluation Proof of Concept

ONDERWERP
Learning Analytics

PROJECT
Learning Analytics

KENMERK
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1. Overview Proof of Concept

1.1 Background

Learning Analytics is on the radar of the University of Twente. The University of Twente's Vision 2020 & Shaping 2030 policy document draws attention to Personalized Learning and Student Driven Learning. Themes where Learning Analytics can have added value. The Quality Agreements plan for the WSV funds also draws attention and funds for the orientation (2020), pilot (2021) and implementation (2022/2023) of Learning Analytics.

The University of Twente has indicated that it wants to experiment with LA in their education. Students want to see how they perform compared to their fellow students during their education. It is about generating insights so that students know whether they are performing below, at or above level during their study process.
Teachers want to have insight in how their education is being followed, experienced and engaged, which is important for the quality of their education.

Before the final development of Learning Analytics enabled education and the implementation of LA within the UT's current education, some experience need to be gained. At the current stage of the exploration for LA, the focus within the Proof of Concept (PoC) will initially be on these key questions:

- *What insights can we offer the student through LA within the learning process;*
- *What support / interventions can we offer the student based on the insights obtained;*
- *How do we ensure an AVG proof LA system;*
- *Which data sources can be used for LA and how can we capture and analyze this data.*

1.2 Scope

Within the scope of the PoC are:

- *Testing of technical feasibility within existing education systems;*
- *Assessment of LA concept (design) within education;*
- *Supporting students in their learning process using LA;*
- *Supporting teachers in their education/content evaluation.*

The scope of the PoC does <u>not</u> include:

- *Full LA pilot within the UTLC faculty;*
- *Direct scalability to rest of curriculum / education / faculties / UT.*

1.3 Projected achievements

The following results will be available after evaluation:

- *Conclusion whether the results of the PoC can be used for further implementation and economies of scale within the UT;*
- *An evaluation of the PoC by involved students and teachers, which indicate whether LA can positively influence the learning process;*
- *A description of which process steps have been taken under the PoC to implement the GDPR;*
- *Knowledge and expertise at TELT in the field of LA and its application in education;*

- *A substantiation of our findings with a Learning Record Store (LRS) and whether this is a desirable and necessary addition to the UT learning landscape;*
- *A description of the technical steps taken under the PoC to implement LA;*
- *An overview of which data from both Canvas and H5P can be used for LA;*
- *An overview of which data from an authoring tool can be used for LA.*
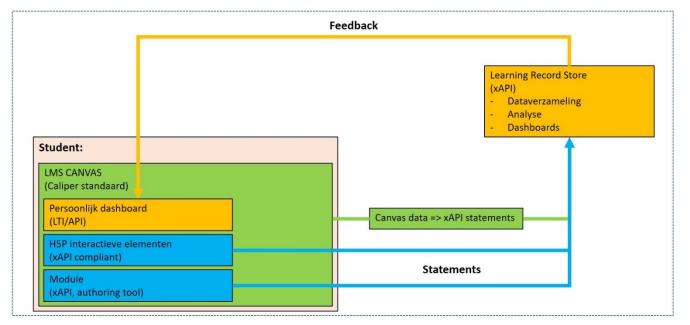
1.4 Project team

For the designing and implementation of the PoC within the UTLC the following where involved or consulted:

- Security officer
- Privacy officer
- Head of department (TELT)
- E-learning specialist (TELT)
- BI specialist (LISA)
- Canvas functional management
- Teachers (UTLC)
- Veracity consultant (LRS)

1.5 Technical scenario

The Proof of Concept Learning analytics is based on the following technical design:

Learning Ecosystem

2. Evaluation setup

The evaluation of the Proof of Concept was done in alignment and coordination with the UTLC and their quality and process evaluation.

The assessment groups where asked to complete a survey. In addition to the surveys there was also a personal feedback session with the involved teacher to evaluate the complete process and lessons learned how to use learning analytics in education.

2.1 Assessment groups

The testing and evaluation of the PoC was done by the following assessment groups:

- 9 students in a eLearning module, provided by the UTLC;
- 8 teachers from the UTLC.

Both groups experienced the PoC within the role of student (17 total). The teacher role was separate after completing the module as a student, with access to the teacher dashboard (8 total).

2.2 Process

The process of testing and evaluation was designed as follows:
- Following module (build in Dominknow authoring tool) in Canvas:
    - Follow H5P enriched content (quizzes, video, slides, etc)
    - Engage and contribute in Canvas discussion boards
- Using the Learner dashboard in Canvas, based on provided data from the LRS;
- Filling in the evaluation forms:
    - One for the role as a teacher (only teachers)
    - One for the role as a student (all)
    - One for the quality process of the UTLC (all)

3. General Summary

In general we can divide the feedback of the evaluation in 4 parts:

- Content development
- Learning Record store
- Use of Learning Analytics
- Privacy & GDPR

3.1 Content development

For the PoC there is content developed in different tools. In general we can conclude that it for the purpose of the PoC worked very well. The quality of the content was sufficient and all the contenders where able to follow and conclude the module. In comparison, with the earlier runs of this module, there was no difference in engagement or results.

It was also possible and, more important, easy to feed data points in the content to get useful data to analyze. The look & feel of the content wasn''t effected by inserting the data and teachers and students experienced the exact same content as in earlier runs.

But we also must conclude that although it worked in this setting, it is not a suitable solution for up-scaling. The feedback was very clear that it was difficult to switch between the content in H5P, Canvas and the content made in the authoring tool. To make this suitable for up-scaling in the education of the UT, we need to find a better integrated solution. Luckily we think there is a tool available that's need to be tested in further pilots.

3.2 Learning Record Store & Data

For this PoC we used a Learning Record Store to gather and visualize the learning data from the different data sources. This tool is crucial to embed Learning Analytics within the UT's education, if LA is implemented the way we used it in this POC.

The connection from the different data sources (Canvas, H5P and Dominkow) was easy, fast to realize and data was almost real-time to view.

The creation of the dashboards for students and teachers was more work. Main reason for this was to understand the meaning of the received data. It took more time than expected to understand the data and make it suitable for analyzing. The data from H5P and Dominkow needed more tagging to understand 'what's what'. This is an important learning point for next pilots and implementation of LA in education. You must understand what data needs to be collected and how it's feed back to the LRS.

The Learners dashboard for students and teachers in Canvas was easy to create from the LRS and implemented with a LTI connection.

Enabling the content with data was easy and most of it was fully automated within the tools itself.

3.3 Use of Learning Analytics

It was unclear how the usage of Learner Analytics was received by the learners and teachers. Although they made clear before the PoC that they would like to receive support from data, it was unsure how the support was received.

We provided the assessment groups with as little information about the dashboards as possible. This was done by purpose, because the idea was to investigate how self-learning Learning Analytics would by and how self-explaining the provided dashboards would be.

This resulted in some uncertainty of the usage of the dashboards and the provided information on it. This is also an important lesson learned in the PoC. There need to be a lot more explanation done upfront and on the dashboards itself (legend). When this can be done there is no doubt that LA can be helpful for both students and teachers.

3.4 Privacy & GDPR

Before the start of the PoC we consulted the privacy and GDPR specialist of the UT. We constructed an information and approving document for teachers and students. We also managed to link the goals of the PoC to the GDPR requirements. Both were reviewed and approved by the privacy and GDPR specialist.

Contenders were also given the option to bail out of the analytics part of PoC if they wanted to. We had the option to erase all the data of the participant, but to complete the module as normal. This was a large requirement of the GDPR rules, which we were able to comply to.

The biggest conclusion that we can make on this topic after the PoC, is that a lot is still possible with Learning Analytics even when you need to comply to the Privacy & GDPR requirements.

This was an important goal for the PoC, because we can gain trust with users and we can build a stronger foundation for further exploration of the use of LA.

4. Conclusion

Looking at all the different goals we set for this PoC, we can conclude that it was a positive result for both the technical as the educational part of the PoC.

The technical challenges were easy to resolve. The setup between our tools was very easy to connect, which was one of the biggest goals for this PoC. Although we need to make some changes to the dashboard and most of all make the data more easy to understand for learners. This is not a deal breaker and should be easy to correct in further pilots.

On the educational side of the PoC it was not clear what to expect, because participants where not sure what they could expect from Learning Analytics, although they were interested in the topic. We can conclude that there is support for Learning Analytics, but this needs more exploration to understand better how we need to implement Learning Analytics within the UT education. For instance we need to explain a lot more to students and teachers how Learning Analytics can support the learners process and also how the information is presented. This was something we anticipated on before the PoC and is confirmed by the learning process we designed. This is something we can work further on, now we have a better understanding on what is expected from the learners and teachers.

The end conclusion should be that the PoC Learning Analytics is worthy to be further investigated and developed towards a full pilot within the UT. During the process of the PoC we had some faculties approaching us with questions about Learning Analytics. The interest for the topic is definitely there within the UT and we can run several pilots with teachers and students in Q3 and Q4 of 2022.

We also need to explore a different authoring tool. An option could be Xerte. This is a tool already in use in higher education and other universities within the BeNeLux and the UK. Exploration of this tool should be under way in Q1 and Q2 of 2022.

5. Future and next steps

Now the Proof of Concept has been successfully concluded, it's time for the University of Twente to investigate further steps in the field of Learning Analytics.

After the PoC we have identified some potential interesting projects which needs to be investigated further. In Q2 we are planning to start a pilot within the TNW faculty, with a general anonymous dashboard for the teacher. Purpose is to measure the activity online before face to face contact moments. Another goal is to measure if nudging is an effective way to guide students in their learning process.

Another project which we are going to start is the exploration of the authoring tool Xerte. There is demand for an easy content creator with full interactive possibilities. Xerte could provide that, preferably with a full Canvas integration. For Learning Analytics a data providing authoring tool is important, because datapoints needs to be inserted within the content. Xerte could provide that much better than the content creator in Canvas. At the moment there is interest in the use of Xerte within 3 potential projects, with one of them with a Learning Analytics component in it. Current schedule for these project is Q2 to Q4 of 2022, with an evaluation after concluding the projects.

Appendix 1: Student evaluation

Part 1: Informing

1. I was well informed about the Learning Analytics pilot at the beginning of the course.
Score:
- **4,3** out of 5

Remark:
- I think the way it was introduced was not clear enough. I wasn't really sure in the beginning how I was supposed to follow the course!

2. I was well informed about how my personal data is being used in this pilot at the beginning of the course.
Score:
- **4,5** out of 5

Remark:
- -

3. The learning module in Canvas is well structured.
Score:
- **3** out of 5

Remark:
- There are instances where I was redirected to an entirely new window. This made it a bit confusing which I should follow, stick with the original window or continue through the modules in the new popup window.
- The pop up windows make it a little bit confusing.
- I got confused switching between platforms, sometimes the instructions do not show up again after clicking the discussion and there are so many windows open I cannot find the page I came from to re-read the instructions.
- It was sometimes difficult to track activity in the course as I did not complete it in one day. Every time I opened the course, it started back at the beginning. The pop-ups and separate windows were a problem too. I found it distracting and difficult to follow.
- I think it is well structured but the presentation makes it confusing, flipping between platforms and so on

4. I give the quality of the learning content the following mark.
Score:
- **3,2** out of 5

Remark:
- I think there is potential for a lovely course here, and the materials are useful, but we have a way to go yet until it is coherent and compact.
- The content was good though some of the H5Ps were confusing.
- Some activities more useful than others. Discussions fit with reflective aim of course but H5Ps are sometimes a little basic or miss the mark. Would be nice if the journal was incorporated in the platform and dashboard

Part 2: Learner dashboard

5. My personal dashboard was easy to find.

Score:
- **2,8** out of 5

Remark:
- This feedback applies if the personal dashboard refers to the learner overview. The dashboard has quite a bit of analytical information which is nice to see but not sure of it's importance to a user.
- I managed to find it after i completed the chapters and read all the instructions. Maybe it would be easier to mention it at the top of the page, so one can easily access it whenever they want?
- It would vbe easier to find if it were integrated with the course - not going back to cavnas to find it.
- What is meant by "my personal dashboard"?
- I didn't see the dashboard until I had already finished the course.
- If it were integrated might be nice

6. My personal dashboard is easy accessible for me.

Score:
- **3** out of 5

Remark:
- If it were integrated it might be easier.

7. The information on my personal dashboard is explained to me, so I understand the information presented.

Score:
- **2,8** out of 5

Remark:
- I did not see any explanation for the charts and diagrams I saw. Perhaps more written text if the goal is to explain to the user what the feedback means.
- Dashboard in general was very confusing to read. There were so many different columns and information that it was difficult to understand which of them were more important.
- I am not sure of the point of the personal dashboard.

8. My personal dashboard is well structured.

Score:
- **3,2** out of 5

Remark:
- It is unclear tome why there is 'Dashboards' then you see 'Custom Dashboard'. At first glance I assumed 'Custom Dashboard' would be something I could manipulate.
- I guess my biggest problem is that there was a lot of information in such a small space.
- yes, for what it does.

9. My personal dashboard gives me all the information that I need.

Score:
- **3** out of 5

Remark:
- The design is not very intuitive. The first few moments I was a bit confused as to what I was looking at. It took some clicking around to get some idea, but it is still not clear to me.
- Probably it does, but it wasn't easy for me to read it.
- I thought it might include a summary of my interactions, so I could see my entries and scores from H5Ps and discussion entries.

10. My personal dashboard gives me insight in my learning process.

Score:
- **3** out of 5

Remark:
- The graphs and charts are helpful
- Probably it does, but it wasn't easy for me to read it.
- It shows me how long I've been logged in with a page open, and when I was studying, but not how I was learning.
- Because I didn't see the dashboard until the end, it was difficult to get something of value from it. I also did most of the course at the last minute because of limited time for this pilot.
- Yes, to a point. it is helpful to remind me of what I thought earlier in the course and how my idea has changed since writing an answer. Not sure it shows me my learning process in general though.

11. My personal dashboard helps me to understand where my strengts/weakness are in this course.

Score:
- **2,7** out of 5

Remark:
- I am not sure how the dashboard would do this or how I should be identifying my weaknesses and strengths.
- Probably it does, but it wasn't easy for me to read it.
- See my comment above.
- The quizzes on this course dont really have right or wrong answers, despite the set up. ON other courses where right and wrong answers were important I can see how this would help though.

12. My personal dashboard helps me to understand how I'm doing compared to my class/group.

Score:
- **2,5** out of 5

Remark:
- I couldn't understand where and how I could see the progress of the rest of the group comparing to mine.
- I think I missed the whole comparison-thing.
- I think more people would need to do the course for me to see this info. It was handy to see some of the other comments again though.

13. My personal dashboard helps me to ask detailed questions to my teacher.

Score:
- **3,2** out of 5

Remark:
- I don't know what to do with the information I see there.
- questions about this course, yes.

Part 3: Future of learning

14. A personal dashboard is an useful addition to education.

Score:
- **3,7** out of 5

Remark:
- It is a very interesting idea to be able to track your own progress. Especially at the point where you can see which parts need improvement.
- I'm not sure I understand it fully.
- I think it has the potential to be a useful addition.
- I think it would be very helpful for some and overload for others. It also depends on how it is integrated and used by teachers.

15. I want to have a personal dashboard on all my education.

Score:
- **3,2** out of 5

Remark:
- I believe it has great potential. I can clearly see that, however, some improvements can be made.
- See my comment above.
- I teach single workshops. it may be more useful for longer running courses.

Appendix 2: Teacher evaluation

Information:
(+/-) reference towards student feedback

For example: 3,8 out of 5 (+0,8)
Explanation: teachers score 0.8 better than students in this topic

Part 1: Informing

1. I was well informed about the Learning Analytics pilot at the beginning of the course.
Score:
- **4,3** out of 5

Remark:
- Do you think it is relevant to mention it for the 2nd pilot? We want the students to feel they have something to gain from following the course instead of perhaps feeling like test subjects?
- No

2. I was well informed about how my personal data is being used in this pilot at the beginning of the course.
Score:
- **4,5** out of 5

Remark:
- Language needs revising, there were some errors/typos.
- No

3. The learning module in Canvas is well structured.
Score:
- **3,8** out of 5 **(+0,8)**

Remark:
- I got "lost" doing all the interactive Canvas exercises one after the other instead of following the given structure in the separate window of the Writers' Train
- Is the pop-up system needed because of the Learning Analytics? I found it very confusing and not user friendly compared to a regular Canvas environment
- The course was well-structured with a logical flow from one test to the next.
- I think it is well structured, but the number of windows and platforms makes it confusing

4. I give the quality of the learning content the following mark.
Score:
- **3,3** out of 5 **(+0,1)**

Remark:
- I really liked the voice over videos by Stef. Can't we have all the videos like this? So not use other sources? It would make the course look/feel more professional. The Bitable video was played a bit too fast, didn't have enough time to read all the info.
- Much of the course was reflection-based, which can be a challenge for students who are struggling with motivation. I also think that the H5P exercises was somewhat confusing

because they implied that there was one right answer when, in fact, they were a continuation of the reflective exercises.

Part 2: Learner dashboard

5. My personal dashboard was easy to find.
Score:
- **3** out of 5 **(+0,2)**

Remark:
- I had extreme difficulty with finding the dashboard.
- yes, but I am not sure how well it works as a link from canvas to another platform. is integration possible?

6. My personal dashboard is easy accessible for me.
Score:
- **3,3** out of 5 **(+0,3)**

Remark:
- It is, but I need a bit of time to use it and get the hang of it

7. The information on my personal dashboard is explained to me, so I understand the information presented.
Score:
- **2,3** out of 5 **(-0,2)**

Remark:
- It was not clear what things mean...for instance, what do the colours mean in the "path choices"?
- The information is not explained. After spending some time on the dashboard I understand most of it, but not all (e.g. Path Choices, Sessions)
- I like it. Nice overview

8. My personal dashboard is well structured.
Score:
- **2,5** out of 5 **(-0,7)**

Remark:
- The learning dashboard looks a bit chaotic to me. The 'expand'/'collapse' is not particularly user friendly.
- again, just getting used to another platform takes time

9. My personal dashboard gives me all the information that I need.
Score:
- **2,8** out of 5 **(-0,2)**

Remark:
- I cannot see the learner overview of the students, just my own (even though I am in the teacher dashboard).
- I see top posts in discussions, but it would be handy to see all posts

10. My personal dashboard gives me insight in the learning process my class.

Score:

- **3,3** out of 5 **(+0,3)**

Remark:

- It does give some useful insignts in the learning process of the class, but I was hoping to see something like a learner overview for the group (I am not sure this is possible though)
- Yes, it shows me where they are with it

11. My personal dashboard helps me to understand where my strengths/weakness of the class are.

Score:

- **2,5** out of 5 **(-0,2)**

Remark:

- I am not sure what is meant by 'strengths/weaknesses of the class'

12. The learning dashboard helps me to understand how the class/group is doing in general.

Score:

- **3,3** out of 5 **(+0,8)**

Remark:

-

13. My personal dashboard helps me to ask detailed questions to my students.

Score:

- **2,8** out of 5 **(-0,4)**

Remark:

- I would have to try this out to know if it works - and probably this would be more appropriate n a long running course with a live aspect

Part 3: Future of learning

14. A personal dashboard is an useful addition to my education.

Score:

- **3,5** out of 5 **(-0,2)**

Remark:

- Not sure yet
- I need to be able to see my dashboard before I can assess the usefulness of it.

15. I want to have a personal dashboard on all my education.

Score:

- **2,5** out of 5 **(-0,7)**

Remark:

- I would like to test it on an actual course (not a pilot) before deciding.
- It might be overkill to add it to everything! It certainly would add value to some courses though for both students and teacher. For one off workshops I think it would be overwhelming.