Learning Analytics in Higher Education – The main benefits for students, teachers and administration and some concerns

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1 Introduction

The aim of this study is to make a survey of the up-to-date research and literature of learning analytics. Study is part of the national project, eAMK, where the aim is to find out the current status of learning analytics’ usage in Finnish Universities of Applied Sciences. Based on the project’s results the criteria for the acquisition of the learning analytics programs are formed. As well as training for the teachers about learning analytics is designed and implemented.

Learning analytics (LA) has been an emerging key trend in education science for some years (Slade & Prinsloo, 2013; de Freitas et al, 2015; Avella et al 2016). The driving forces for learning analytics have been the rising interest for the use of learning management systems (LMS), massive open online courses (MOOC) and other online and digital learning tools (Merceron et al 2015, Picciano A.G. 2014). The modern data economy has also enabled affordable means for collecting and analyzing data over substantial amount of diverse students (Greller & Drachsler 2012, Long & Siemens 2011, Phillips 2013).

IBM estimates that 2.5 quintillion bytes of data is created daily worldwide and that 90 percent of this data today has been created in less than two years (Cárdenas-Navia & Fitzgerald, 2015). Yet, the ability to collect and store data often exceeds the capacity to make sense of it and utilize it effectively across domains (Cárdenas-Navia & Fitzgerald, 2015). Analyzing large data sets – so-called big data – is becoming a critical success factor in many industries and also in educational domain (Wymbs, 2016). McKinsey Global Institute estimates that there will be 4-5 million jobs in the U.S. requiring data analysis skills by 2018 – and large amount of job positions will only be filled through training or retraining (Wymbs, 2016).

According to the NMC Horizon Report (2017) learning analytics continues to gain foothold at institutions as a way to assess and essentially improve student learning. With the help of data it is already possibly to predict which students are most likely in danger of failing in a particular course. In near future the learning management systems are developing towards learning environments where analytics and visualization software are used to illustrate learning data in a multidimensional and portable manner (NMC Horizon Report, 2017 p.13-14). Data solutions applied to education enables the analysis, visualization and decision making concerning students’ behavior through the examination of both structured data (qualifications, test results, web search patterns, etc.) and non-structured data (interaction through writing, audio or video) (Lopez-Catalan & Bañuls 2017).

According to Buckingham Shum and Deakin Crick (2016) it is a truism that we live in a multifaceted and unclear world. Technological and cultural disturbance generate unprecedented intricacy, tumult, and instability. A society’s competence to learn is essential to its welfare, but economic, social, and technological tumult set unprecedented strain on citizens’ capability to concern instability and adjust to change. Because of this educational institutes are transposing their learning and teaching at resourcing students with knowledge, expertise, and tendency that make them ready for lifelong learning, in a multifaceted and unclear world. Buckingham Shum and Deakin Crick (2016) itemize the “21st century competencies” as follows:

- Critical thinking
- Creativity
- Collaboration
- Metacognition
- Motivation
- Cognitive skills
- Interpersonal skills
- Intrapersonal skills

Williams (2013) also raises collaborative problem solving and learning in digital networks as the future key skills. Wymbs (2016) and Cárdenas-Navia & Fitzgerald (2015) call for improving students’ data analytics skills, as the data management touches many future professions.

Collecting and storing data in understanding customer and market behavior has been a common practice in business analytics for years (Williams, 2013). However, using big data in the educational domain is a relatively new phenomenon. Picciano (2014) defines big data as an entity were the information or database systems are used to collect and store large quantities of data both longitudinally and down to very specific transaction. Data mining is then used to extract meaningful information from the large data set in order to create plausible predictive models (Williams, 2013).

Data mining seeks to find out “data patterns, organize information of hidden relationships, structure association rules, estimate unknown items’ values to classify objects, compose clusters of homogenous objects and reveal many kinds of findings that are not easily produced” (Chamizo-Gonzalez et al, 2015). Therefore, data mining provides valuable benefits in decision making throughout different industries.

According to Niemi & Gitin (2012) big data aids the educational domain by hinting the best learning paths to students, suggesting instructional approaches for students and providing educational researchers an opportunity to test learning principles in an authentic educational setting. Educational data mining, EDM “develops methods and applies techniques from statistics, machine learning, and data mining to analyze data collected during teaching and learning” (Bienkowski et al, 2012). Educational data mining in higher education can collect information about the student behavior in activities that have been executed in LMSs or in other eLearning tools like assignments, tests, blog posts or contributions in discussion forums (Chamizo-Gonzalez et al 2015, Basuhail 2015).

Figure 1 illustrates the types of common learner data (Adejo & Conolly, 2017)
Figure 1. Common sources of learner data (Adejo & Conolly, 2017)

The actors of educational data mining in online teaching and learning management systems is shown in Figure 2. The aim is to be able to link the student behavior with the final learning outcomes of students in a particular subject (Chamizo-Gonzalez et al 2015). The additional benefit for teacher of educational data mining includes for example the possibility to see which learning materials or texts are the most read among the students.

Figure 2. The different actors in educational data mining (Chamizo-Gonzalez et al 2015)

Educational data mining has more of a technological focus within its analysis, whereas learning analytics provides more practical element to data and strives to improve teaching and learning (Percell, 2016).

Siemens (2011) and Long & Siemens (2011) define the learning analytics in the 1st International Conference on Learning Analytics and Knowledge as “the measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs”. Each student’s course assessment, entry on discussion board or in blog or wiki is recorded in real or nearly in real time. Analytics software is then used to analyze the collected data and suggest courses of action (Picciano 2014).

According to Long and Siemens (2011) learning analytics focuses data analysis on the learning process, which consists of analyzing the relations between learner, content, educator and institution. The definition of Long & Siemens is widely cited in learning analytics research area.
Some of the other definitions highlight the impact of learning analytics to learner itself. Learning analytics “reveal data and information about usage, trends and patterns of learning” (Mattingly et al, 2012) and “aims at improving learner’s success” (Vatsala et al 2017). Slade & Prinsloo (2013) define learning analytics “as the collection, analysis, use, and appropriate dissemination of student-generated, actionable data with the purpose of creating appropriate cognitive, administrative, and effective support for learners”.

Agudo-Peregrina et al (2014) bring out the different stakeholders in defining learning analytics as “the analysis of electronic learning data which allows teachers, course designers and administrators of virtual learning environments to search for unobserved patterns and underlying information in learning processes”.

As a conclusion from all the definitions, learning analytics is a developing field in educational science, where data analysis tools are used to improve education and learning outcomes (Firat, 2016). In addition to analyze the learner’s behavior in history and in predicting the future, learning analytics should lead to transformation in existing teaching, learning, and assessment processes, as well as in academic work, and in administration (Long & Siemens, 2011).

The purpose for this literature review is find out the benefits of learning analytics to main stakeholders. This is done by searching through the recent research of LA in the higher education context. But as there are some concerns with learning analytics as well we cannot bypass those in this report.

Specifically, this paper seeks to find answers to the following research questions:
- What are the main benefits of learning analytics to teachers/educators, students and administration?
- How does the learning analytics help on understanding and supporting individual student and in creating better learning outcomes?
- What kind of ethical and privacy issues and other challenges are linked to the use of learning analytics?

2 Method and the research process

A systematic literary survey was chosen as an approach for this study as the aim was to find as much relevant publications as possible in an efficient and organized way. A systematic review differs slightly from a traditional literature review. The following table 1 illustrates the key differences.

<table>
<thead>
<tr>
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<th>Traditional review</th>
<th>Systematic review</th>
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<tbody>
<tr>
<td>Aim</td>
<td>To achieve a comprehensive understanding of the research in the field</td>
<td>A specified target and objectives with specific research questions</td>
</tr>
<tr>
<td>Planning the review</td>
<td>Not specifically defined, leaves room for creativity and exploration</td>
<td>A clear and traceable process</td>
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</tbody>
</table>
Study process | Searching is probing, following up suitable leads and studies one by one | Precise and comprehensive search for all relevant studies
---|---|---
Selection of studies | Researcher selects appropriate range of studies | Predetermined criteria for incorporating and excluding studies
Methodological report | Not always available | Included due to traceability of the review

A systematic review has a specific target along with the research questions to where it aims to find answers. It looks for all the relevant research in the field precisely and following a clear and traceable research process. Predetermined criteria give guidelines which studies will be included and excluded. The methodology is illustrated for readers due to transparency. (Jesson et al, 2011)

Some literature reviews have been done already in learning analytics field, for example a systematic literature review of Avella et al 2016. But as Avella et al (2016) argue there is still a gap in research of learning analytics in higher education. Also Dede et al (2016) call for more research on how learning analytics could help students and teachers improve learning. And Firat (2016) for more research on the effects of learner behavior in learning management systems in regards of their learning results.

There is a network of leading international researchers who are studying the role and impact of learning analytics on teaching, learning, training and development called Society for Learning Analytics Research (SoLAR). They have been organizing an international conference on learning analytics and knowledge (LAK) yearly since 2011. They also publish a peer-reviewed open-access journal, Journal of Learning Analytics. Despite of this research community Merceron et al (2015) and Strang (2015) call for more coordination and collaboration in the learning analytics community for LA to be utilized in a meaningful and effective way in learning.

Kelly et al (2017) notes that Learning Analytics research in higher education is mainly concentrated in North America, Europe and Oceania. As this is a fairly new field in the educational science, there is room for more academic research. In this paper, we are focusing on the latest research published in years 2012-2017 as the research field is fairly new, changing and developing fast.

Our first search with “learning analytics” and filters: “English language” and “e-books” published during 2012-2017 generated 58 results, from which 10 were relevant.

The next search was done with “learning analytics” and eArticles with only publishing year filter: 2012-2017. This search generated 15 994 articles. We realized we needed to find more relevant filters to decrease the amount of material into reasonable amount. After having a meeting with the TAMK client, we identified these additional filters: “higher education”, “learning outcomes”, “meaningful data”, ethics and privacy”, “education management view, benefits and concerns in implementation”.

The next search with “learning analytics” in “eArticles” and the following filters: “peer reviewed”, “full text available”, “English language”, “higher education” and published in 2012-2017 brought 167 articles of which 59 were relevant.

These articles were grouped under the topics the following sub categories:
- General, big data, meaningful data, 27 articles
- General and trends, 3 articles
3 Findings – Benefits of learning analytics to main stakeholders

3.1 Teachers/educators

Monitoring students’ academic achievements and following their LMS usage is one of the key application of learning analytics (Williams, 2013). Through learning analytics a teacher can analyze each student’s performance to provide formative feedback quickly and efficiently. Data is presented normally in dashboards with the help of visual elements like graphs and tables, which makes it easier for teacher to track the learner’s interaction with content, teacher and other learners (Firat, 2016). The Khan academy – an open educational resource provider – employs for example an extensive Learning analytics in tracking performance and progress to teachers and students (Williams, 2013).

While the learning data dashboard shown to teachers should look different than the dashboard seen by students, it’s important that both the teacher and student can access the data and are fully aware of the learning outcomes (Heider, J. 2015). Figure 3 illustrates the learning analytics dashboard of online accounting student.
Analytics can aid the teacher or instructor through the learning cycle of a new module, as it is a form of intervention and engagement which tracks a students’ comprehension of the topic from the start of a course to its completion (Myring et al. 2014).

For teachers and educators learning analytics provides several benefits: Based on learning data which the course monitoring systems offers, planning targeted interventions for struggling students and adjusting pedagogical strategies based on the received learning data is much easier and faster (Greller & Drachsler 2012, Phillips 2013).

Picciano (2014) divides the teacher’s benefits of learning analytics into two parts. First and in the most basic level LA tracks each students’ access and behavior in the LMS, like time spent in a course and the amount and type of instructional interactions. These could be further divided into assessments (like tests), content (views for course material like videos or articles) and collaborative activities like posts in discussion groups, blogs or wikis (Picciano, 2014).

Secondly by using more detailed data on instructional interactions LA could drastically improve student support and guidance by 1) identifying at-risk students and plan early intervening support means, 2) by combining instructional activities with other student data like age, gender and major. LA is able map the student performance from a student and course through the entire educational institution and 3) longitudinal analysis which could lead to predictive behavior analyses and patterns. (Picciano, 2014)

Overall making predictions concerning student’s learning and providing effective feedback could be seen as two major benefit of learning analytics (Firat, 2016). The third major benefit is learning analytics’ potential in transforming pedagogical process by providing a mean for sophisticated, adaptive assessment and personalized and adaptive content (Williams 2013).
As a conclusion there is proofed evidence of learning analytics benefits for teacher in supporting students’ better learning outcomes. Chamizo-Gonalez et al (2015) found evidence that Business Administration students of Spanish University, UCM, who have taken part in the LMS by submitting in exercises and cases and taken part in the course forum’s peer discussions and news sections, did obtain the highest course marks. Also, students who had looked at the teacher’s exercise corrections and the most up-to-date information in the LMS did perform better than the other students (Chamizo-Gonalez et al, 2015).

Based on these findings the lecturers in the UCM will use learning analytics to start their subjects, to create better working groups and learning activities and to improve the training of teams for student participation in LMS forums (Chamizo-Gonalez et al, 2015).

3.2 Students

There is a limited amount of research of student perceptions of learning analytics (Roberts et al. 2016, Firat 2016). LA is most commonly indicated to students via a dashboard (Roberts et al. 2016). An example of a student view of Khan Academy’s dashboard is show in Figure 4.

![Khan Academy's Learning Analytics dashboard](image)

**Figure 4. An example of student view of Khan Academy's Learning Analytics dashboard (Bienkowski et al 2012)**

In the recent study students found the LA helpful for keeping them informed about the progress and as a mean for teaching staff to identify and provide more support for those students who needed it (Roberts et al. 2016). A study conducted in Purdue University reinforced the scenario that most students thought learning analytics’ dashboards with traffic lights type of signals more personal, inclusive and motivating (Williams, 2013).

For the student learning analytics provides tools to support self-reflection of own learning progress as well as customized recommendations for further learning materials, alternative learning paths or peer student suggestions (Greller & Drachsler 2012). LA also deepens higher education institutions awareness of students’ learning commitments (Slade & Prinsloo 2013). And this further affects positively on students’ learning and progression (Slade & Prinsloo 2013)
Due to continuous feedback students act more proactive in meeting the course targets and the university gains significant improvements in student retention (Williams 2013). This shows that frequent personal feedback for successful students further increases their motivation and less-successful students benefit from teachers’ early interventions. Clarke and Nelson (2013) find the learning analytics especially beneficial for the first year students.

In a larger than one course scope need learning analytics could inform the student regarding the decisions to be made in choosing the school, the major, the career goals, the courses within the school etc (Schaffer et al 2017).

When studying learner’s perspective on learning analytics’ benefits Firat’s (2016) found out that all the students shared the opinion that LMS with learning analytics could help them to get better academic achievements under the following conditions: the LMS and its user interface should be functional for effective use, it should foster interaction and empowering feedback, it should also be easily accessible and have connection with social media.

But, there are also concerns about LA limiting the students’ independence regarding own studies and for potential pressure it will create, when the grades and participation level is constantly visible in the dashboard (Roberts et al. 2016).

3.3 Administration

The management of educational institutions in higher education face growing pressure for quality of teaching, financing, student retention, graduation rates and suitability to work life (Myring et al 2014, Heider 2015). This has created the need for learning analytics to strive to better learning outcomes. For the administration analyzing the learning analytics data sets is essential to address the important questions about student learning outcomes, advising, funding, new pedagogical approaches, and overall program effectiveness (Morris, 2016).

The ability to predict graduation rates of college students has turned out to be increasingly important to colleges and universities in the USA and worldwide (Oztekin, 2016). Students’ graduation rates have a direct impact on university rankings and therefore they represent an imperative measurement of institutional performance and student success (Oztekin, 2016). Higher education institutions’ graduation rates are also under close surveillance with legislators and policymakers who control and allocate funds for education, with the parents who pay for their children’s education, and with the students who make college choices based on the evidence of institutional quality and reputation (Oztekin, 2016).

The dropout rate for online courses is 10 to 20% higher than for courses in traditional classroom environments, which makes the retention as one of the major challenges with online education (He et al, 2014, Calvert 2014) Using learning analytics to develop an early warning system and identification at-risk students and allow for more timely pedagogical interventions to improving student retention is important (He et al, 2014, Calvert 2014). An effective early warning system could provide formative grade feedback to online students and could help educational institutions to take proactive steps to intervene before a student drops out or falls behind in the course (He et al, 2014).

By improving the retention of online at-risk students, institutions could improve overall student satisfaction and graduation rates (He et al, 2014). Improving graduation rates requires a thorough
understanding and analysis of the deriving factors behind. Such an understanding is the basis for accurately predicting at-risk students and appropriately intervening to graduate them on time (Oztekin, 2016).

Learning analytics enables more timely support which improves retention or it could offer students more information about alternative choices based on the predicted likelihood of success (Calvert, 2014). An example of administration view of learning analytics dashboard is shown in Figure 5.

Figure 5. An example of Administrator view of LA dashboard (Bienkowski et al 2012).

For institutions LA offers ways for quality assurance and improved efficiency and student performance, which is nowadays critical to many institutions in the higher education (Greller & Drachsler 2012, Mattingly et al, 2012). Learning analytics provides a way to predict and model learner behavior, which helps to adapt services and curricula and build a drop-out alert system (Greller & Drachsler 2012). Therefore Open University UK has started to exploit powerful statistical analysis, using predictive analytic techniques in providing evidence base to be able to organize supportive and intervention activities early (Calvert, 2014).

Besides the retention rates a well-implemented and integrated learning analytics strategy could, provide a mean to develop appropriate and well-timed adaptive curriculum content and supportive student guidance (de Freitas et al, 2015). Mattingly et al (2012) suggest that institution who is planning to implement a LA system, should define objectives and outcomes for the project clearly and establish a strategic plan which clarifies the implementation process, procedures and, key tasks and responsibilities. They (2012) also suggest collecting comprehensive formative feedback and analytics on how students learn and on their motivational as well as on other factors that produce effective learning prior making the strategic planning on learning analytics. Thus, learning analytics allow higher education institutions to raise their perceptive of students’ learning demands (Slade & Prinsloo, 2013).
In the study of public university in the US Oztekin (2016) found evidence that the learning analytics results provide university administrators a mean to predict graduation rates. His study revealed that students’ learning outcomes in the first semester is the most significant factor in predicting whether or not a student will graduate within six years (Oztekin, 2016).

Some research indicates there is a strong correlation between the students’ online contribution in LMS and students’ final grades in higher education level online courses (He et al 2014). Therefore for the online learning organizer LA could provide a significant advance in ensuring that the quality of an online degree is equivalent to its traditional counterpart (Myring et al 2014).

As a conclusion Long and Siemens (2011) summarize the benefits of learning analytics for educational institution as follows:

- Better institutional decision making and resource use
- Improved learning for at-risk students
- Increased institutional transparency
- Transformative change to teaching methods
- Better insight into networked knowledge
- Data-driven experimentation for administrative problems (e.g., enrollment and retention)
- Increased “organizational productivity and effectiveness”
- Value-ranking of faculty activity
- Comparative learning metrics for students (e.g., how a student compares to her or his peers in a particular area)

3.4 Ethics and privacy

As the benefit to different stakeholders show above, there is no question that learning analytics is potentially useful in higher education (Rubel & Jones 2016, Prinsloo & Slade, 2014). However, there are also some concerns regarding learning analytics (Prinsloo & Slade, 2014). In order to be able to make correct conclusions and corrective actions, the data needs to be accurate and timely (Picciano, 2014).

Therefore, Picciano (2014) suggests that learning analytics work best for online courses, where all the transactions happen electronically and are traceable. Additionally, Greller and Drachsler (2012) & Mattingly et al (2012) argue that the biggest challenge with learning analytics is the idealized datasets in other words that learning data includes only context-free meaningful data which is relevant to learning process.

Roberts et al (2016) suggest that students should be engaged in the decision process of learning analytics to increase students’ knowledge about what information is stored and who has access on it. In the research of Roberts et al (2016) the majority of university students were unaware of big data and learning analytics. Mattingly et al (2012) even propose providing an option for an individual student or faculty member to opt out him or herself from learning analytics.

The major concern regarding learning analytics is ethical and privacy issues as the collected amount of student data is massive and integrated into other databases (Picciano, 2014). According to Johnson (2017) there are at least four major ethical concerns: privacy, individuality, autonomy, and
discrimination.

As a critical point of view to learning analytics and its usage Johnson (2017) asks can it be done ethically or not. Ethics could be defined as various concerns for the protection of central human values such as life, health, security, happiness, freedom, knowledge, resources, power and opportunity (Adejo & Connolly, 2017). It includes the fundamental decision on what is good, bad, right or wrong before acting (Adejo & Connolly, 2017).

The ethical issues regarding learning analytics are concerns on how the learners’ data that is available to the users could influence on learners’ lives and uphold their moral values (Adejo & Connolly, 2017). Therefore, all potential ethical issues should be identified and tackled during the course design, development and implementation of the technology (Adejo & Connolly, 2017).

Some of the main ethical issues and questions concerning learning analytics are listed in the table below.

Table 2. Ethical issues concerning learning analytics (Adejo & Connolly, 2017; Slade & Prinsloo, 2013)

<table>
<thead>
<tr>
<th>Property/ownership of data</th>
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<tbody>
<tr>
<td>- Who really owns the data?</td>
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<tr>
<td>- How can the data be used?</td>
</tr>
<tr>
<td>- What type of learner data is stored in the database?</td>
</tr>
<tr>
<td>- Which geographical areas can the data be used?</td>
</tr>
<tr>
<td>- What happens to the data after student’s completion of studies?</td>
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<table>
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<tr>
<th>Accuracy</th>
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<tbody>
<tr>
<td>- How to ensure validity through the minimization of incomplete and inaccurate data?</td>
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<table>
<thead>
<tr>
<th>Security</th>
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</thead>
<tbody>
<tr>
<td>- How is the security of data handled?</td>
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<tr>
<td>- How are the security breaches/loss of data prevented?</td>
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<tr>
<td>- How about un-authoriz ed access or unintended or inappropriate disclosures/exposure of data.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Location and Accessibility</th>
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</thead>
<tbody>
<tr>
<td>- How and for what duration can the data be stored?</td>
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<tr>
<td>- Where is the learner data stored?</td>
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<tr>
<td>- Who has the access to learner data and analysis?</td>
</tr>
<tr>
<td>- Does learner itself have access to own data?</td>
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<tr>
<td>- Is learner able to make sure accuracy and correctness of his/her own data?</td>
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<table>
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<tr>
<th>Trust</th>
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<tbody>
<tr>
<td>- The issues of trust by the learner in the use of his/her data</td>
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</table>

Adejo & Connelly (2017) add also privacy as an ethical issue, but we handle it separately. As the use of LA technologies increase, the risks and consequences of an unethical use of learner data may rise especially in a shared networked environment Adejo & Connelly (2017).

Data gathering provides individual student little information regarding what data is gathered about and to what purpose it may be used (Rubel & Jones 2016). Big data practices may classify individuals based on one’s socioeconomic status, race, ethnicity, or gender (Rubel & Jones 2016). And when predictive analytics are used without using other explanatory data the result is the
statistical models and their interpretation may continue to preserving “old prejudices” (Rubel & Jones 2016).

Rubel and Jones (2016) list five key areas addressing privacy and learning analytics: (1) privacy and information flows with respect to whom; (2) privacy about what; (3) how to fully weigh the benefits and burdens of information collection; and (4) the extent to which various stakeholders, especially students, know about, choose, or endorse information collection, analysis, and use; (5) whether collecting information about students, learning environments, and outcomes conflicts with the values that justify higher education in the first place.

To tackle these concerns Rubel & Jones (2016) suggest following measures: (1) Learning analytics systems should provide differential access controls to private student data; (2) educational institutions should be able to justify their data collection using specific criteria — pure relevance is not enough; (3) the LA’s perceived positive benefits may not be equally beneficial for all students, and the cost, on the other hand, of invading a student’s privacy may be more or less harmful, and therefore a full accounting of how benefits are distributed for different stakeholders is needed (4) students should be made aware of collection and use of their data and given reasonable choices regarding collection and use of their data. To the wider question of justifying learning analytics in higher education, it could be done just to the extent that it does really promote autonomy (Rubel & Jones, 2016).

3.5 Additional challenges and criticisms of learning analytics

Besides the ethical and privacy issues concerning learning analytics, there are also some other challenges that are recognized. Clarke and Nelson (2013) point out that educational institutions are still struggling with the implementation process of learning analytics. Data is collected, but combining it from the different sources and providing useful insights and pathways to learners which would empower them and help them in making better choices about their learning is lacking (Clarke and Nelson, 2013).

As Phillips (2013) puts it big data alone does not solve the problems itself, but needs analysis and a clear method for using specific information for a certain purpose. There are also concerns if the teachers and educators have enough skills and knowledge to interpret the learning analytics.

Ferguson sees (2012) that even though gathering educational data has become more common, there is still lack of knowledge for using collected data into improving learning design and outcomes. Ferguson (2012) identifies four challenges in the learning analytics area: integrating experience from the learning sciences into data mining, developing methods for working with a wider range of datasets, focusing on learner perspectives and developing ethical guidelines for collecting and storing data.

Greller and Drachsler (2012) raise a valid question regarding use of LA. According to them (2012) learning analytics do not reveal whether a learning activity has a high or low impact on a student’s learning process as the learners are diverse. Strang (2015) raises up the same concern from several academics; learning analytics may not be able to reliably predict deep learning. In his study (2015) for students of online HRM course which was facilitated in a Moodle environment, he even found evidence that the amount of transactions in Moodle course environment didn’t correlate positively with better academic learning outcomes. Firat (2016) supports these findings. In his study (2016) the total number of student logins in the LMS did not correlate positively on academic achievement.
However, there was a positive relation between the time student spent on LMS and learning outcomes (Firat, 2016).

Kelly et al (2017) point out that LMS data neglects the learning that takes place outside the educational institution. A significant amount of learning happens outside of learning management systems either in other activities on computer or out of the pre-determined learning environments (Kelly et al, 2017).

Greller and Drachsler (2012) point out that even though learning analytics could be build in a pedagogically neutral way, certain technologies are not that and this has an influence on the learning process. Different analyzing methods, technologies and algorithms could produce different results of the same data and this could lead into different conclusions (Greller and Drachsler, 2012). Williams (2013) finds current applications of Learning Analytics being far from constructivist learning theory with assessment for learning; students’ learning is tracked recordable actions, not with what they feel or think and ignoring student’s identity, self-worth and autonomy (Williams, 2013).

4 Conclusions

Using learning analytics on improving the quality of higher education is a fairly new research area due to the recent development in online teaching and the complexity of observation and interpretation of data (Chamizo-Gonzalez et al, 2015). LA is still at an early stage of its development, but higher education institutions should recognize its potential in achieving improvements in their learning practices (Williams, 2013).

Online learning will inevitably grow in the next 10 years, so that it becomes part of all degrees of higher education (Porter, 2015, Myring et al 2014). In a study of key eLearning trends the results indicated that learning analytics will stand out for a significant evolution and could triple its current presence (Lopez-Catalan, & Bañuls, 2017).

We have identified the key academics in the learning analytics field, whose research provide useful insights for the institutions and educational administration who is looking for implementing learning analytics. When an educational institution is planning implementation of learning analytics process there are obvious benefits, but also concerns and challenges which the administration should consider and tackle during the implementation process. In this paper we have identified the main benefits, but also concerns.

Learning analytics enables the adaption of learning contents and teaching methods based on the needs of individual students (Wulf et al 2014). The development of existing e-learning methods and online technologies will in future promote individual learning targets and personalized courses (Wulf et al 2014). Individual support by the teacher, structured small group tasks, and evaluation of individual and group performance are important contributors in creation of better learning outcomes and in preventing drop-outs especially in online teaching (Wulf et al 2014). But the institutions should not neglect the use of traditional students support measures, either.

Even stronger alignment of the learning analytics methods with educational theory would be
important to obtain meaningful interpretation of the results which then could be easier connected into practice of learning and teaching (Gašević et al 2014). As future trends, Learning Analytics should be designed for non-technical users to improve user friendliness and usability (Chamizo-Gonzalez et al, 2015).

Learning analytics could provide benefits in online education by adjusting course content according to the participants’ pre-requisite skills or educational background; changing course content according to the participant’s location or country of origin and showing relevant individualized case studies or further readings (Daniel et al 2015).

5 Restrictions

This study focused on research, which was available in English. This means we may have neglected some valuable research that exists in other languages.

6 Further discussion

This is a report of a TAMK’s development work, but this will be further developed into a research paper.

7 References


Buckingham Shum, S., & Deakin Crick, R., Learning analytics for 21st century competencies. *Journal of Learning Analytics* Vol 3, No 2, p.6-21


Firat M. (2016) Determining the effects of LMS learning behaviors on academic achievement in a learning analytics perspective. *Journal or Information Technology Education: Research*. Vol. 15, pp. 75-87


Long, P. & Siemens G., (2011) Penetrating the Fog: Analytics in Learning and Education


