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Information technology — Use cases on advanced learning analytics services using emerging technologies

Technologies de l'information — Cas d'utilisation concernant les services avancés d'analytique de l'apprentissage utilisant des technologies émergeantes

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Contents

Page

Foreword ... **iv**
Introduction ... **v**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Abbreviated Terms ... **2**
5 Advanced learning analytics service ... **2**
6 Emerging technologies for advanced learning analytics services ... **3**
7 Categorization of use cases on ALAS and their inter-relationships ... **4**
7.1 Categorization of use cases on ALAS ... 4
7.2 Interrelationships of the six groups ... 4
8 Group I learning environment or pedagogical support ... **5**
8.1 Learning environment ... 5
8.2 Pedagogical support ... 5
9 Group II data collection and data ecosystem ... **6**
9.1 Data collection ... 6
9.2 Data ecosystem ... 6
10 Group III assessment, reasoning and prediction ... **6**
10.1 Assessment ... 6
10.2 Reasoning ... 6
10.3 Prediction ... 6
11 Group IV learning outcome and feedback ... **6**
11.1 General ... 6
11.2 Learning outcome ... 7
11.3 Feedback ... 7
12 Group V data visualization ... **7**
13 Group VI privacy protection and data ownership ... **7**
13.1 Privacy protection ... 7
13.2 Data ownership ... 8
14 Use case list ... **8**
Annex A (informative) **Group I learning environment or teaching support** ... **9**
Annex B (informative) **Group II data collection and data ecosystem** ... **15**
Annex C (informative) **Group III Assessment, Reasoning and Prediction** ... **21**
Annex D (informative) **Group IV Learning Outcome and Feedback** ... **24**
Annex E (informative) **Group V Data Visualization** ... **28**
Annex F (informative) **Group VI Privacy Protection and Data Ownership** ... **30**
Bibliography ... **32**

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 36, *Information technology for learning, education and training*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

The ISO/IEC 20748 series on learning analytics provides reference and guidance for learning analytics services.

ISO/IEC TR 20748-1:2016 [1]

ISO/IEC TR 20748-2:2017 [2]

ISO/IEC TS 20748-3:2020 [3]

ISO/IEC TS 20748-4:2019 [4]

Emerging technologies, such as cloud computing, big data technologies, AR/VR, Digital Twin, and AI are being adopted and explored throughout learning, education, and training environments. Learning analytics play a pivotal role in enhancing learning effectiveness, customizing learning content, as well as real-time learning tool adaptations. Significant advantages of emerging technologies can be seen when they are used in learning analytics services.

This document provides abundant use cases of advanced learning analytics services and presents the current development status of learning analytics services. And it provides insights for potential standardization fields related to learning analytics.

The study of advanced learning analytics services explored in this document focuses on the following aspects,

a) to improve individual learning achievements;

b) to promote learning outcome-based decision-making, learning resource design, learning activity selection and more;

c) to help teachers achieve improved instructional effectiveness;

d) to provide data-based learning evidence that can be used to support teaching planning;

e) to enable the integration of learner competencies and knowledge;

f) to incorporate standards and specifications for the purposes of data privacy protection and data security;

g) to exemplify innovative technical implementation such as skill embedding, deep knowledge tracing and more.

In order to encourage a more well-rounded and active discussion with stakeholders and to investigate potential standardization items, a large number of private, public and non-profit institutions were invited to share their use cases by using a use case template

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Information technology — Use cases on advanced learning analytics services using emerging technologies

1 Scope

This document provides a collection of use cases on advanced learning analytics services, which leverages emerging technologies such as cloud computing, blockchain, virtual reality, internet of things, artificial intelligence in K12 education, higher education, and vocational education and training (VET). This document also establishes a categorization of different groups of learning analytics services and outlines their interrelationships.

This document is applicable to the design and development of learning analytics activities.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org

3.1
learning analytics
LA
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

[SOURCE: ISO/IEC TR 20748-1:2016 [1], 3.11]

3.2
learning analytics service
system that aggregates and analyses learner data that is collected when learners interact with a platform and software

[SOURCE: ISO/IEC TS 20748-4:2019 [4], 3.7]

3.3
data analysis
systematic investigation of the data and their flow in a real or planned system

[SOURCE: ISO/IEC 2382:2015 [5]]

3.4
data collection
process for gathering information by different means

[SOURCE: ISO 19731:2017 [6], 3.14]

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3.5
learning outcome
what a learner is expected to know, understand or be able to do at the end of a training programme, course or module

[SOURCE: ISO/IEC TS 17027:2014 [7], 2.57]

3.6
privacy
right of individuals to control or influence what information related to them may be collected and stored and by whom that information may be disclosed

[SOURCE: ISO/IEC TR 26927:2011 [8], 3.34]

3.7
data visualization
presentation of data or information in an insightful format such as a graph, chart, scatter plot, diagram, infographics, data dashboards, interactive reports and even animations

3.8
dashboard
user interface based on predetermined reports, indicators and data fields, upon which the end user can apply filters and graphical display methods to answer predetermined business questions and which is suited to regular use with minimal training

[SOURCE: ISO/TS 29585:2010 [9], 3.3]

4 Abbreviated Terms

LAS	Learning analytics service
ALAS	Advanced learning analytics service
LET	Learning, education and training
IoT	Internet of things
AR/VR	Augmented reality/virtual reality
AI	Artificial intelligence
K-12	Kindergarten to grade 12 and secondary education or level 1-3 of UNESCO international standard classification of education
TVET	Technical and vocational education and training
ML	Machine learning

5 Advanced learning analytics service

A learning analytics service (LAS) can be regarded as a system that aggregates and analyses learner data generated through interactions with digital platforms and software.

In this document, an advanced learning analytics service (ALAS) refers to an enhanced LAS that leverages cutting-edge technologies with innovations to deliver deeper insights and more sophisticated analytics capabilities.

In this document ALASs are divided into 6 groups as follows,

a) learning environment or pedagogical support;

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