



# Driving Modern Day Education

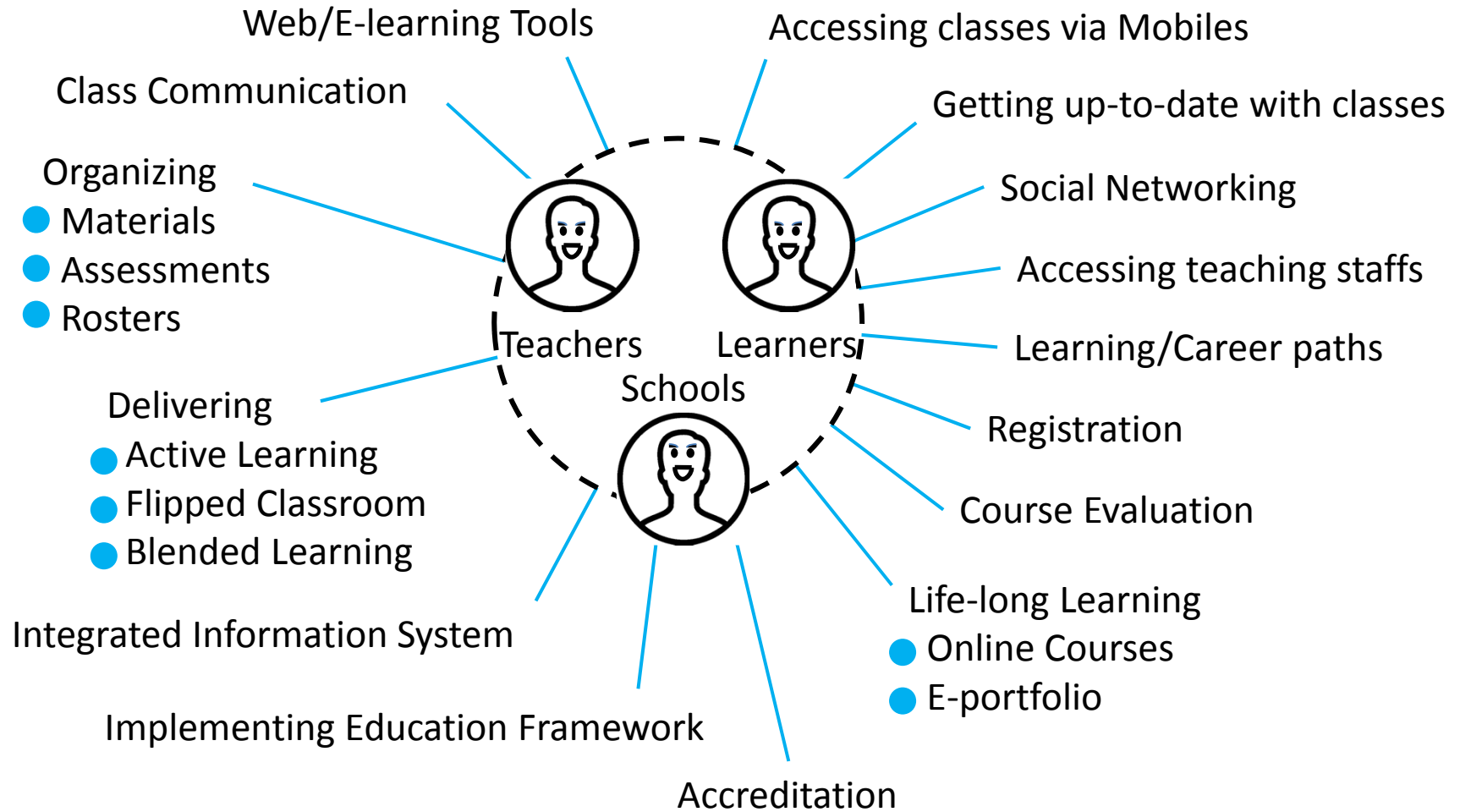
with

my  
**CourseVille**

A case of  
**Chulalongkorn University**

- The “Many” Needs of Modern Day Education
- The story of a Home-grown Solution
- From “LMS” to “Education Platform”
- Learning Analytics
- Immediate Directions

# Modern Day Education



I'm proud of myself.

announced  
recorded  
rewarded  
shared  
admired



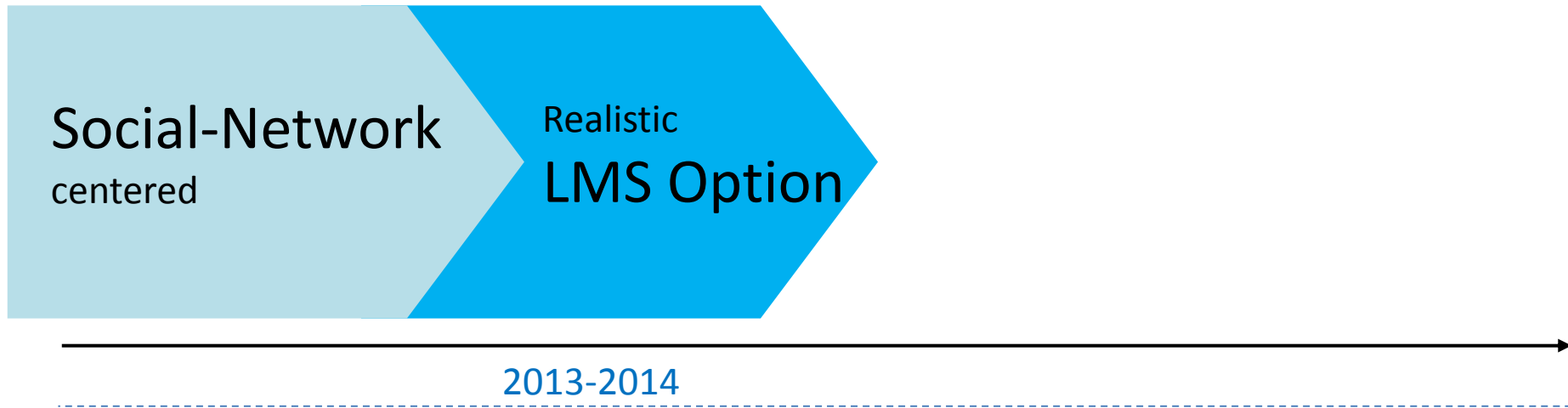
This is my  
**CourseVille**

## Social-Network centered

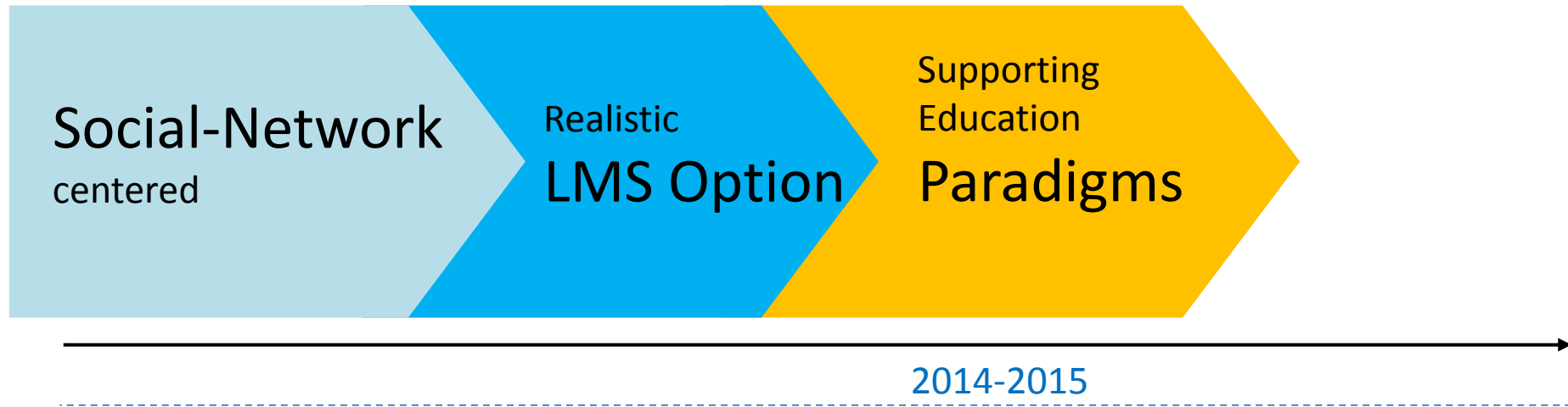
2011-2013

- Always on with a Social Network Account
- Experimental Look & Feel
- Verbal Introduction to a group of colleagues
- Catching up with other mature LMS

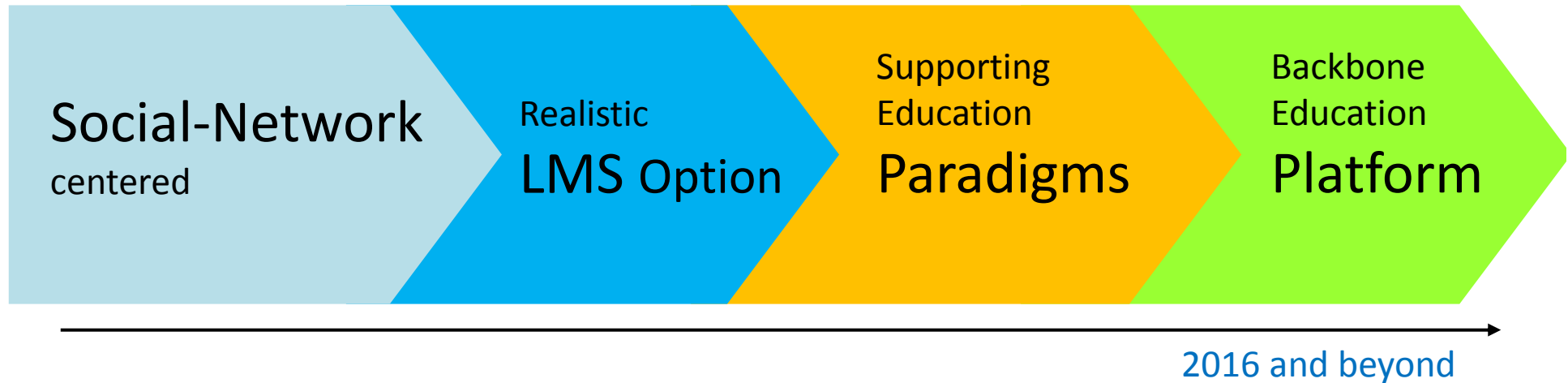
} Student-centered



- Efficiency in Course Management
- Feedbacks from real (& decent amount of) users
- Campus-wide Roadshows & Workshops
- Customer Supports (Call Center / FB Page)



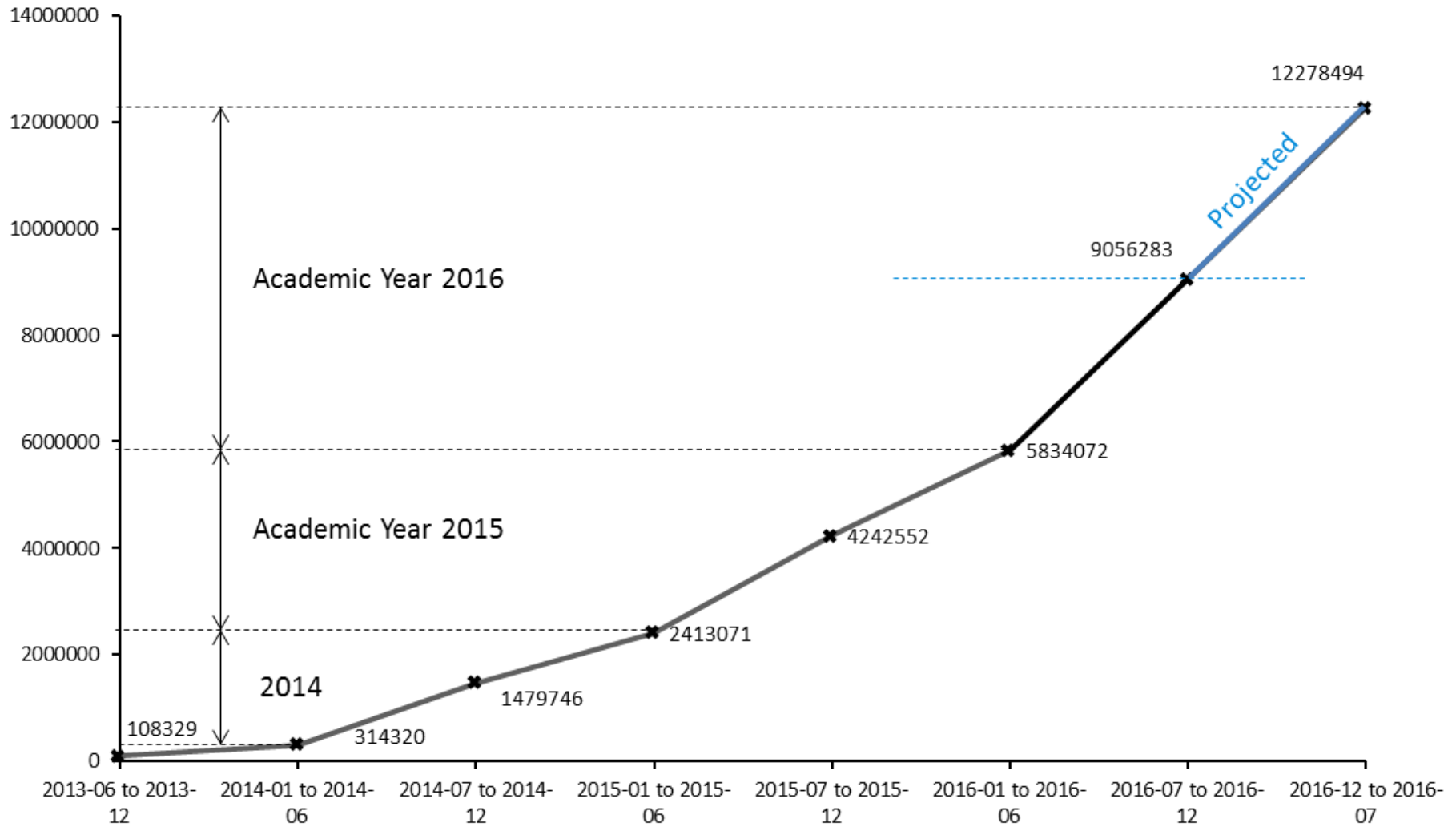
- Development in sync with Teaching/Learning techniques
- Platform for Classroom researches
- Larger variations of users



- Expansion beyond LMS
- Inter-operation with other systems
- Challenges in Big-Data Analytics
  - Learning Analytics
  - Curriculum Analysis / Researches
  - Unsupervised Learning Recommendation
- Outcome-based
  - E-portfolio
  - Accreditation
- Blended Learning
  - Online Courses
  - Video Services
  - Active Learning

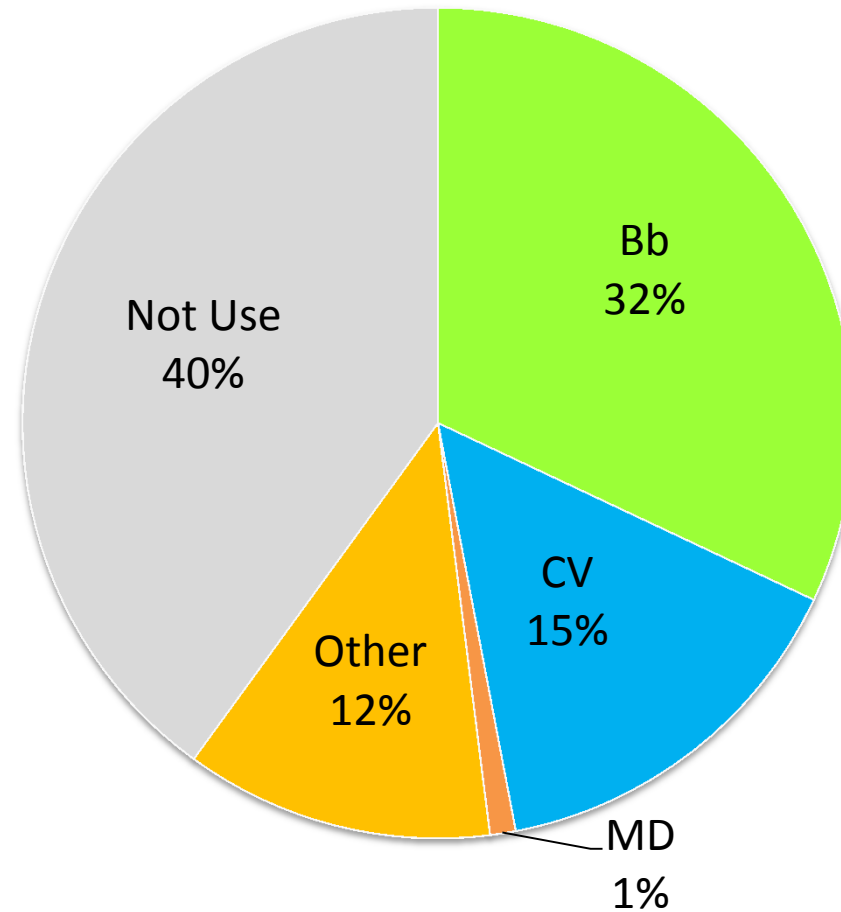


# Current Status



# Chula 2016

Data from CU  
Learning Innovation  
Center



## myCourseVille in Chula Engineering

- Highly-encouraged
- ~70% of courses
- 100% of undergrad students



From **“Learning Management System”**  
to **“Education Platform”**



as: “Learning Management System”  
“Knowledge Aggregator/Publishing”  
“Teaching/Learning Tools”  
“Online Course Platform”  
“Distance Learning Channel”  
“Learning Analytics”

# my CourseVille

Learning Management System

my CourseVille [Log Out](#) [?](#)

My Courses Evaluation Center Activity Feeds Register Account

Discrete Structure  
2110200 (2015/1)

Course Home > Student roster > Portfolio

Previous Next

Course Menu

2110200 (2015/1)

**Total Course Point**

|         |       |       |      |
|---------|-------|-------|------|
| Average | SD    | Max   | Min  |
| 61.05   | 16.30 | 94.09 | 7.03 |

Full Points = 100  
Number of Data Points = 119

| Range   | Number of Students |
|---------|--------------------|
| >=90    | 2                  |
| [80,90) | 16                 |
| [70,80) | 20                 |
| [60,70) | 26                 |
| [50,60) | 31                 |
| [40,50) | 11                 |
| [30,40) | 9                  |
| [20,30) | 1                  |
| [10,20) | 2                  |
| <10     | 1                  |

|                | Points obtained | from         | % counted within group |
|----------------|-----------------|--------------|------------------------|
| Calculations   | 52.2            | / 90         | 15.00                  |
| Technique      | 9.43            | / 15         | 15.00                  |
| and Trees      | 12              | / 30         | 15.00                  |
| Theory         | 10.6            | / 15         | 15.00                  |
| m              | 31.33           | / 40         | 40.00                  |
| ing Techniques | 32              | / 40         | 33.33                  |
| s and Trees    | 32              | / 40         | 33.33                  |
| er Theory      | 30              | / 40         | 33.33                  |
| <b>Total</b>   | <b>66.06</b>    | <b>/ 100</b> |                        |

Grade Letter

Attendance

my CourseVille [Log Out](#) [?](#)

My Courses Evaluation Center Activity Feeds Register Account

Discrete Structure  
2110200 (2015/1)

Course Home > Course Admin

Manage / Administer my course

Create / Manage Course Items

my CV Course Materials

Assignments Announcements

Discussion Topics Clone Items

Scheduling / Attendance

JAN Create/Manage Schedules Attendance Check

Download Attendance

Classroom Tools

Course Admin

Grading

Score/Grade Input

Create/Manage Itemized Scores

Download Scores

Export Grade Letters for REG.CHULA

Students

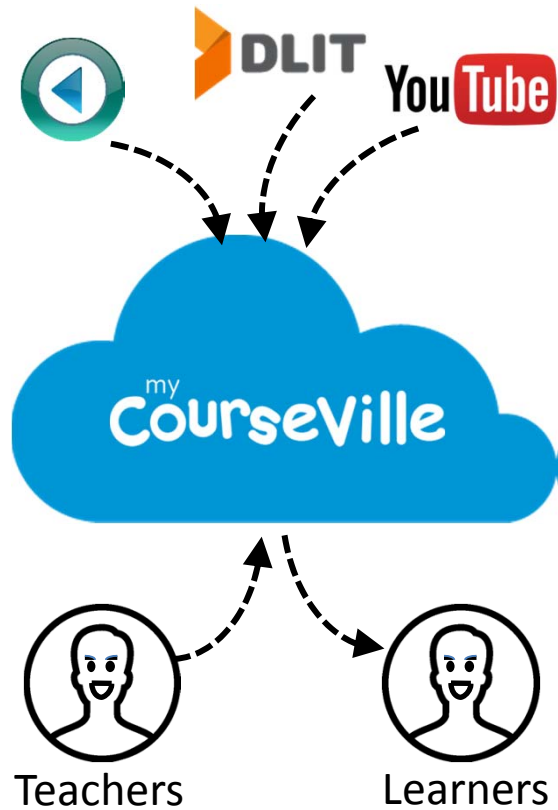
Registration

Manage Groups Course Evaluation

Student Analysis Correlation Analysis

# my CourseVille

Learning Content Aggregator



Search for YouTube Playlists

By Keywords  By Playlist ID

Keyword

Channels

Search results for "Web Design" (397204 playlists)

Add the playlists you want to the course. Close this dialog when you're done.

|   |                                   |   |                                       |
|---|-----------------------------------|---|---------------------------------------|
|   |                                   |   |                                       |
| <p>Web Design Bangla Tutorial All- IT BARI</p>          | <p>web design (Arabic)</p>        | <p>Web Design</p>                       | <p>Photoshop Web Design Tutorials</p> |
|   |                                   |   |                                       |
| <p>Learn Web Designing Free in Hindi within 14 days</p> | <p>Web Design Bangla Tutorial</p> | <p>CS506-Web Design and Development</p> | <p>Website Design using GIMP</p>      |

ค้นหา



ห้องเรียน DLIT

**คลังสื่อการสอน**

การพัฒนาวิชาชีพครู

คลังข้อสอบ

ห้องสมุดดิจิทัล

About Us

หน้าหลัก > [คลังสื่อการสอน](#)

## คลังสื่อการสอน (DLIT Resources)

เลือกกลุ่มสาระฯ ระดับชั้น พบ DLIT วิดีโอที่ผลิตใหม่ (สั้นๆ เข้าใจง่าย ตรงหลักสูตรฯ) และสื่อประเภทต่างๆ ที่รวบรวมมาไว้ที่นี่ ได้แก่ วิดีโอ, แผนการจัดการเรียนรู้, สื่อ Learning Object และอื่นๆ คุณครูสามารถเปิดฉาย และ/หรือ ดาวน์โหลดไว้ใช้ประกอบการสอนได้ หากสื่อการสอนที่ต้องการได้ง่ายๆ กดเลือกกลุ่มสาระฯและชั้น เพื่อกรองข้อมูลคลังสื่อการสอนที่ต้องการ

เลือกกลุ่มสาระฯการเรียนรู้

ภาษาไทย

คณิตศาสตร์

วิทยาศาสตร์

สังคมศึกษา

ภาษาอังกฤษ

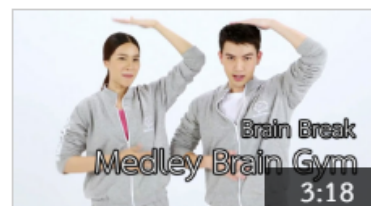
DLIT Resources คลังสื่อการสอน DLIT (177)



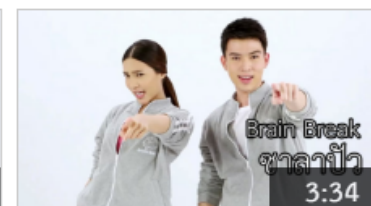
Brain Break ตอน 20 : Take Five



Brain Break ตอน 19 : Dum Dum Dah Dah



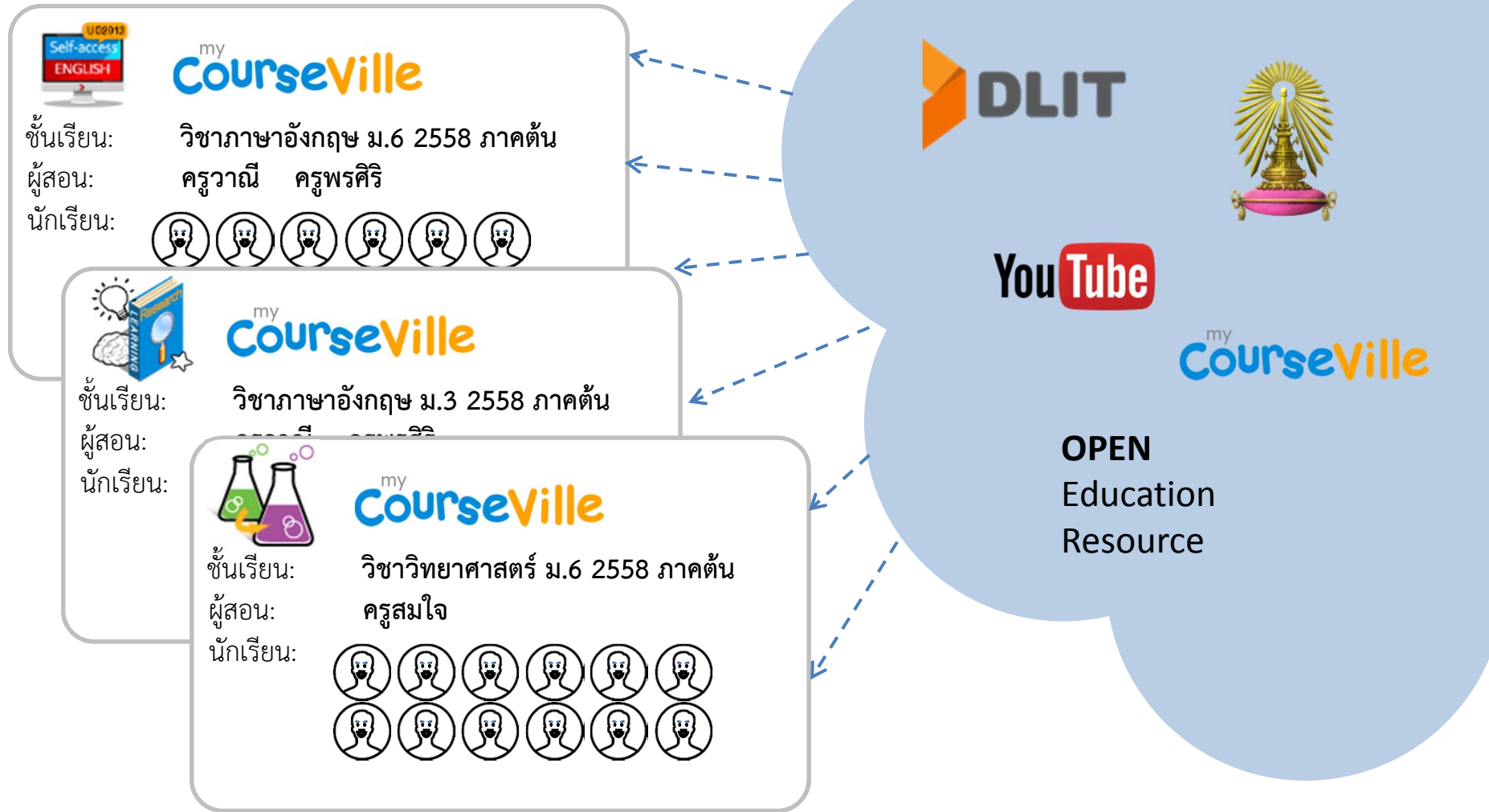
Brain Break ตอน 18 : Medley Brain Gym



Brain Break ตอน 17 : ซาลาเปา



# Content Aggregation









# Analysis Tools & Visualization

## YouTube Playlist

Course Home > Video Playlists

**Video Playlists (Beta)**

cvtest01 (2013/2)

This page lets you select YouTube playlists and suggest them to students in this course.

+ Add a playlist

- คณิตศาสตร์ ม.4-6 เล่ม 1  
DLIT Classroom ห้องเรียน DLIT  
2%
- รายการช่างคิดช่างทำ  
Chula Engineering  
37%
- "ช่างคิดช่างทำ" ตอนที่ 20: แบบจำลองการกรองแบบติดค้ำในชั้นกรอง  
100%
- "ช่างคิดช่างทำ" ตอนที่ 19: "เล่นน้ำ" เครื่องมือตรวจสอบคุณภาพน้ำสำหรับเกษตรกรยุคใหม่  
9%
- "ช่างคิดช่างทำ" ตอนที่ 18: การพยากรณ์การกุดเงินจากตู้เอทีเอ็ม  
52%
- "ช่างคิดช่างทำ" ตอนที่ 17: การประมาณค่าสิ่งดึงออกของ Suction Caissons  
76%


"ช่างคิดช่างทำ" ตอนที่ 20: แบบจำลองการกรองแบบติดค้ำในชั้นกรอง

|  |  |      |
|--|--|------|
|  | อดิวงศ์ สุขาโต<br>Atiwong Suchato                            | 100% |
|  | 0001112223334<br>มนุษย์ไฟฟ้า สีน้ำเงิน<br>Denji Blue         | 0%   |
|  | 115700000000-4<br>มนุษย์ไฟฟ้า สีแดง<br>Denji Man Red         | 99%  |
|  | 123456789-<br>น้ำเงิน ชาดีโจรสลัด<br>Gokai Blue              | 0%   |
|  | 5031372021<br>ภัทรา ทองประเสริฐ<br>Pattra Thongprasert       | 0%   |
|  | 5431227021<br>ณิชา เตมียาสถิต<br>Nutch Temiyasathit          | 0%   |
|  | 54312snail<br>เสนล เทอโบ<br>Snail Turbo                      | 0%   |
|  | 5470271021<br>ปวันรัตน์ มีชัย<br>Pawanrat Meechai            | 0%   |
|  | 5470271022<br>ณัฐประภา รัตนวิมล<br>Nuttaprapa Rattanawimon   | 0%   |
|  | 5631371921<br>อินทัช มาศวงษ์ปกรณ์<br>Intouch Marsvongpragorn | 0%   |

# Analysis Tools & Visualization


## E-books

**Course Bookshelf**



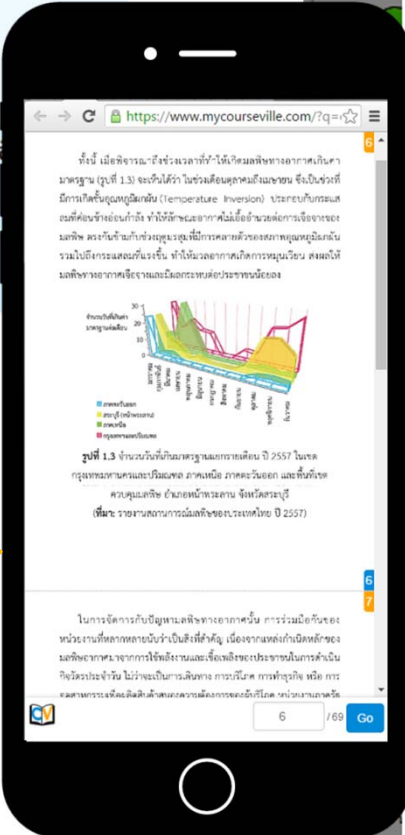
**การจัดการมลพิษอากาศและเสียงดัง 1**  
รศ. ดร.พิสุทธิ์ เทียมมงคล

Read Progress



**การจัดการมลพิษอากาศและเสียงดัง 2**  
รศ. ดร.พิสุทธิ์ เทียมมงคล

Read Progress















Read E-books in LMS

**อากาศ และเสียงดัง**

การจัดการมลพิษอากาศและเสียงดัง 1  
รศ. ดร.พิสุทธิ์ เทียมมงคล

Reading Progress

|   |                                   |      |
|---|-----------------------------------|------|
|    | อดิวงค์ สุขาโต<br>Atiwong Suchato | 20%  |
|    | CV000659                          | 64%  |
|    | CV000660                          | 36%  |
|    | CV000872                          | 3%   |
|   | CV000873                          | 13%  |
|  | CV000874                          | 49%  |
|  | CV000875                          | 100% |
|  | TRCN5610082                       | 4%   |
|  | TRCN5610150                       | 100% |
|  | TRCN5710001                       | 99%  |
|  | TRCN5710002                       | 74%  |
|  | TRCN5710003                       | 99%  |



# Analysis Tools & Visualization

## Lecture Re-runs

2110200 DISCRETE STRUCTURE: Basic Counting Techniques, Binomial Coefficients, Combinational Proof, Generalized Permutations and Combinations, Principle of Inclusion and Exclusion, Recurrence Relation (1)  
(2015-11-05)  
83 minutes 0 seconds



# my CourseVille

Active Learning Tools



Student Randomizer



Countdown Timer



Instant Q

| Check All                           | ID               | Name              |
|-------------------------------------|------------------|-------------------|
| <input checked="" type="checkbox"/> | 1711000021๓๓๗7   | Ultra Seven       |
| <input checked="" type="checkbox"/> | 5331240021๓๓๗๗๗๗ | Thanoot Tharathum |

Countdown for 10 min 0 sec

Do you think it works well?

- Yes
- No
- OK
- I don't know
- I don't care
- Ah ha

On-Air

Do you like it ??????

- YES
- NO
- I am not sure

OS with NO CHOICE <a>LINK</a>

| Response     | Count | Percentage |
|--------------|-------|------------|
| Yes          | 3     | 43%        |
| No           | 2     | 20%        |
| OK           | 1     | 14%        |
| I don't know | 0     | 0%         |
| I don't care | 0     | 0%         |
| Ah ha        | 1     | 14%        |

# my CourseVille

Online-Course Platform



CU.MOOC.0001 (2016/2)  
Survival Thai

**Survival Thai**

**01 Introduction**  
Lesson 1 : Introducing oneself  
Lesson 2 : Pronouns  
Lesson 3 : Saying goodbye and thank you

**02 Social manner**  
Lesson 4 : Ordering food  
Lesson 5 : Making apologies, making requests, asking permission, and forbidding

**03 Time & place**  
Lesson 6 : Time and date  
Lesson 7 : Making appointment  
Lesson 8 : Directions and traveling  
Lesson 9 : Question words and Yes/No questions

**04 Daily life**  
Lesson 10 : Seasons and weather  
Lesson 11 : Color terms  
Lesson 12 : Body  
Lesson 13 : Health and illnesses  
Lesson 14 : Hobbies

Login with Facebook  
to join the course

If you have already joined this course, you may access the course directly at [www.myCourseVille.com](http://www.myCourseVille.com)



This **Survival Thai** course aims at teaching the Thai language and culture at a basic level to students and those who are interested. It consists of 14 lessons classified into 4 groups, with a focus on the spoken language used in everyday life.



CU.MOOC.0001 (2016/2)  
Survival Thai

Course Progress:

# 9.5%

อติวงศ์ สุชาติ [Log out](#)

[Joined as Instructor](#)

Not you? Log out of all Facebook apps on this device.



This **Survival Thai** course aims at teaching the Thai language and culture at a basic level to students and those who are interested. It consists of 14 lessons classified into 4 groups, with a focus on the spoken language used in everyday life.

Each lesson presents vocabulary, a role-play conversation and an explanation by the instructor. A simplified phonetic

## Course Outline

| # | Topic   | Materials | Progress |
|---|---|-----------|----------|
| 0 | Introduction to the sound system of Thai language |           | 45%      |

## Course Outline

| #  | Topic   | Materials | Progress |
|----|---|-----------|----------|
| 0  | Introduction to the sound system of Thai language                             |           | 45%      |
| 1  | Lesson 1: Introducing oneself   |           | 98%      |
| 2  | Lesson 2: Pronouns  |           | 0%       |
| 3  | Lesson 3: Saying goodbye and thank you  |           | 0%       |
| 4  | Lesson 4: Ordering food   |           | 0%       |
| 5  | Lesson 5: Making apologies, Making requests, Asking permission and Forbidding |           | 0%       |
| 6  | Lesson 6: Time and date   |           | 0%       |
| 7  | Lesson 7: Making appointment  |           | 0%       |
| 8  | Lesson 8: Directions and traveling  |           | 0%       |
| 9  | Lesson 9: Question words and Yes-No questions                                 |           | 0%       |
| 10 | Lesson 10: Seasons and weather  |           | 0%       |



# my CourseVille Learning Analytics



myCourseVille · December 2016

Analysis Tools  
&  
Visualization

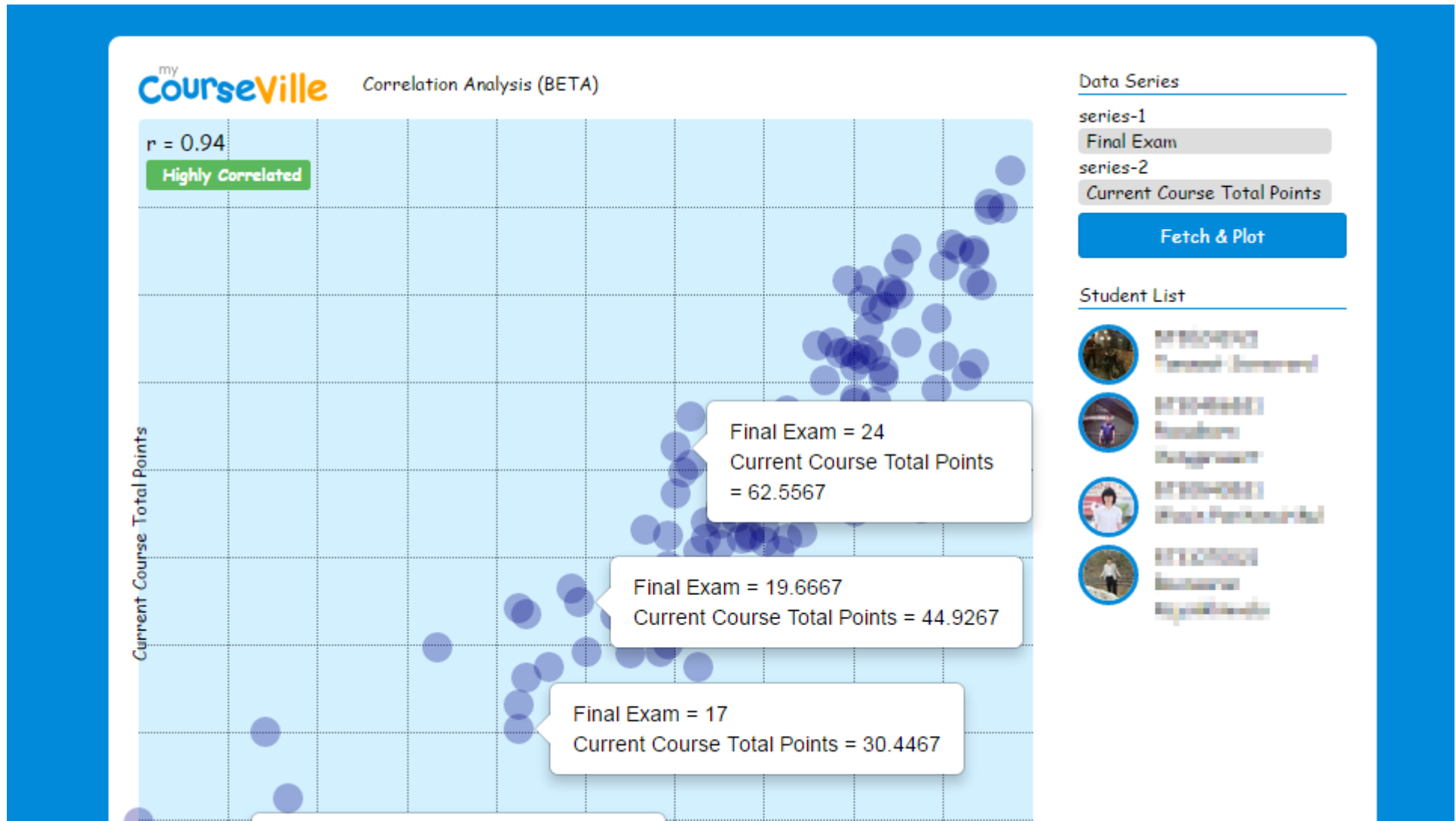
Features with Machine Intelligence

AI & Data Analytics Research

Data Gathering

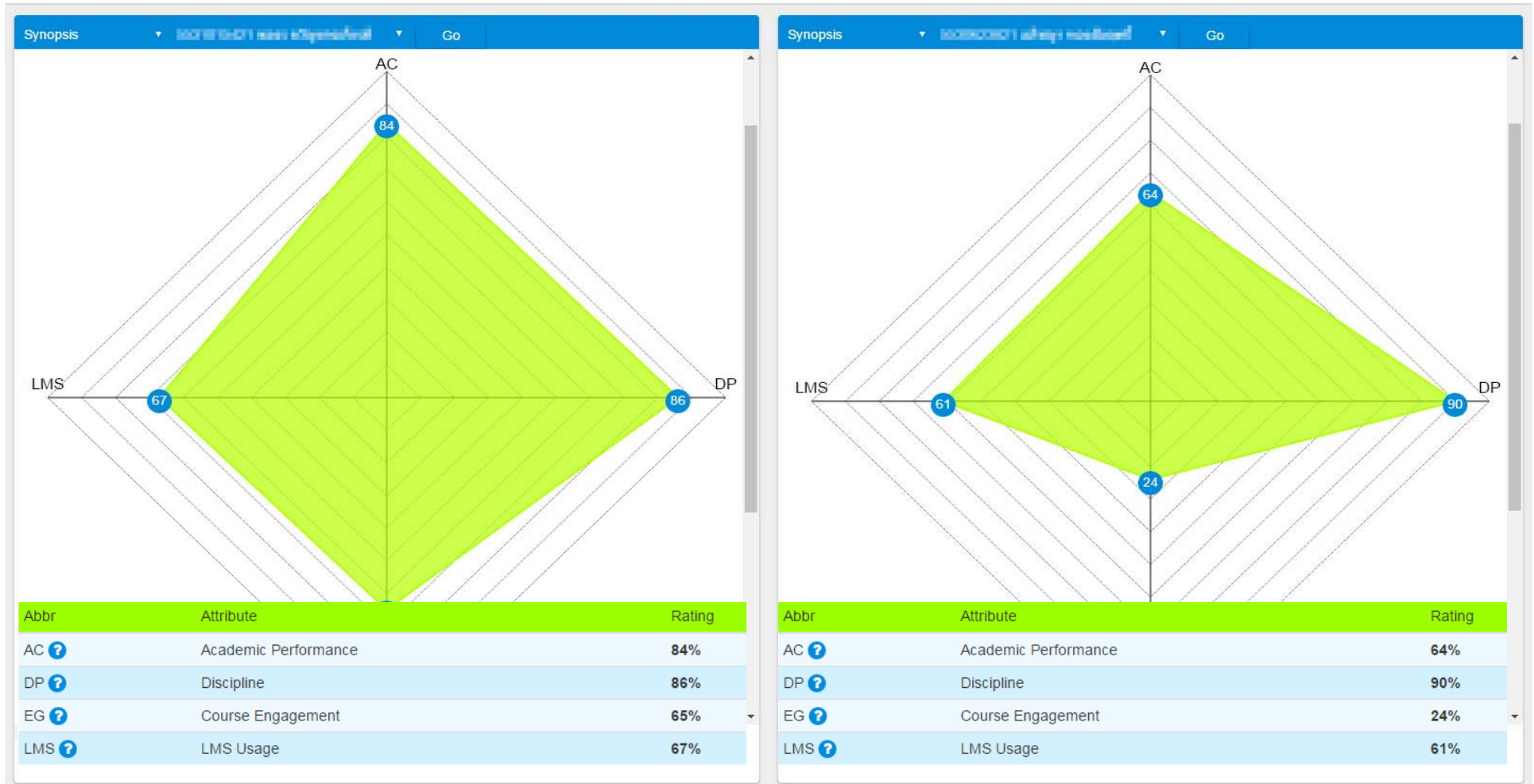
# Analysis Tools & Visualization

## Correlation Analysis



# Analysis Tools & Visualization

## Student Traits



# Toward Machine Intelligence in Education

Published and Ongoing Research Works with myCourseVille

Learner's Performance



Learner's Performance vs.  
Activities in LMS

Academic Patterns



Course Periodic Behavior  
Modelling

Real Curriculum Coverage



Inferring Coverage of  
Knowledge Units from LMS  
Course Materials



ICSESS 2016, Beijing, China

August 26-28, 2016

# Prediction of Student Achievement From Learning Management System Behaviors Using Supervised Learning

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*Abstract— To improve the quality of teaching, teachers must understand how students learn. Such objective can be best achieved through the analysis of students' behavior, using learning analytics tools. These tools employ data mining or machine learning algorithms to reveal patterns from a given set of data, usually big data, and can further serve as a predictor as documented in many researches in the past. In this paper, we describe the development of a predictor that can predict students' performance using their behavior from a Learning Management System (LMS). We utilized supervised learning technique, Support Vector Machine (SVM) in particular, to uncover the meaning of the data collected through Chulalongkorn University's LMS, called Courseville. We analyzed its log files to extract the features that reflect students'*

*to have some new features such as open, social, personal, flexible and learning analytics [5].*

*Learning analytics is defined as collecting traces that learners leave behind and using those traces to improve learning [6]. It is one of the most interesting areas in education. There are many researches that develop advanced learning analytic tools in order to improve learning environment in various points of view. Examples include the development of tools that can analyze weekly behavior of the system and predict the activities occurring in LMS. This predictor not only assists teacher with an insight into student's nature but also lets system maintainer know when the LMS will likely to receive high traffic [7]. Another example is the development of an*

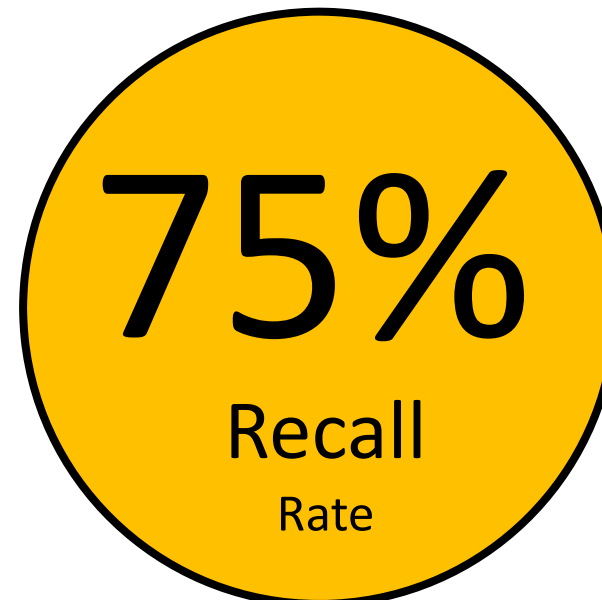
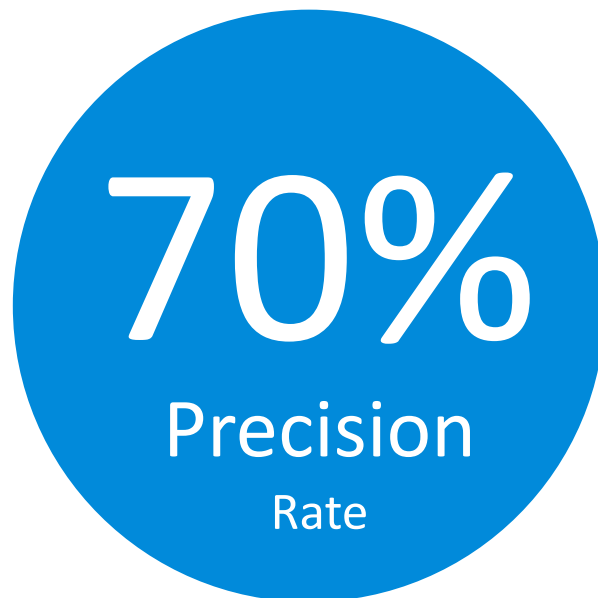
# Learner's Performance vs. Activities in LMS

## Results

33 prediction features

170 students (Train: 85, Eval:85)

SVM with Gaussian Kernel



EDUCON 2016, Abu Dhabi, UAE  
April 10-13, 2016

# Course Periodic Behavior Modelling and Its Application in LMS Activity Prediction

Nutchra Temiyasathit, Proadpran Punyabukkana, Atiwong Suchato  
Department of Computer Engineering  
Faculty of Engineering, Chulalongkorn University  
Phayathai Road, Pathumwan  
Bangkok, Thailand, 10330

Email: nutchatemi@gmail.com, proadpran.p@chula.ac.th, atiwong.s@chula.ac.th,

**Abstract**—The use of technology in education has risen so rapidly that many of the e-learning tools have become a great source for data gathering. In response to the growth, learning analytics are developed to extract the meaning from extensively large datasets and optimize learning opportunities for learners. Understanding users' behaviors is one of the key factors that can help educational institutes improve their curriculum design or non-instructional intervention. This paper, therefore, explores LMS's user behaviors through the study of courses' periodic behaviors. It assumes that there is a weekly pattern in most college-level courses where classes meet on a weekly basis, and that the pattern is reflected through the number of daily activities the courses produce. Courses that share similar weekly patterns are grouped into the same cluster using an unsupervised clustering algorithm. The knowledge obtained from the clustering can be used to describe the pattern in other courses. This paper continues to demonstrate one of course periodic modelling's applications by proposing a method to predict the activities that occur in an LMS. As a result, the weekly pattern found in each course, when aggregated, can represent the weekly behavior of the overall system. It can also predict the future trend of activities with correct shape and accuracy within the range of 82-86 percent.

**Keywords**—LMS, course periodic behavior, clustering, activity prediction

Learning Management System (LMS) and Massive Open Online Course (MOOC). An educational institute might host an LMS to establish a communication channel between instructors and students and to assist learning in physical classroom. In contrast, an institute who targets mass education delivery might be more interested in building a MOOC platform.

Due to the amount of data these tools produce, researchers are able to analyze and discover many insights that can help them understand the nature of their education systems better. In other words, while a widespread use in e-learning tools create big data, big data is also a driver behind the rapid growth of e-learning tools; and consequently there is more development of learning analytics to extract value from large dataset [2]. In fact, the term *Learning Analytics* has been introduced to describe such study. Learning Analytic, as defined by [3], is 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. One of the main goals of learning analytics is to understand users' – or students' – behaviors to the extent that educators can adapt their teaching environment to accommodate such behaviors or to solve any existing problems.

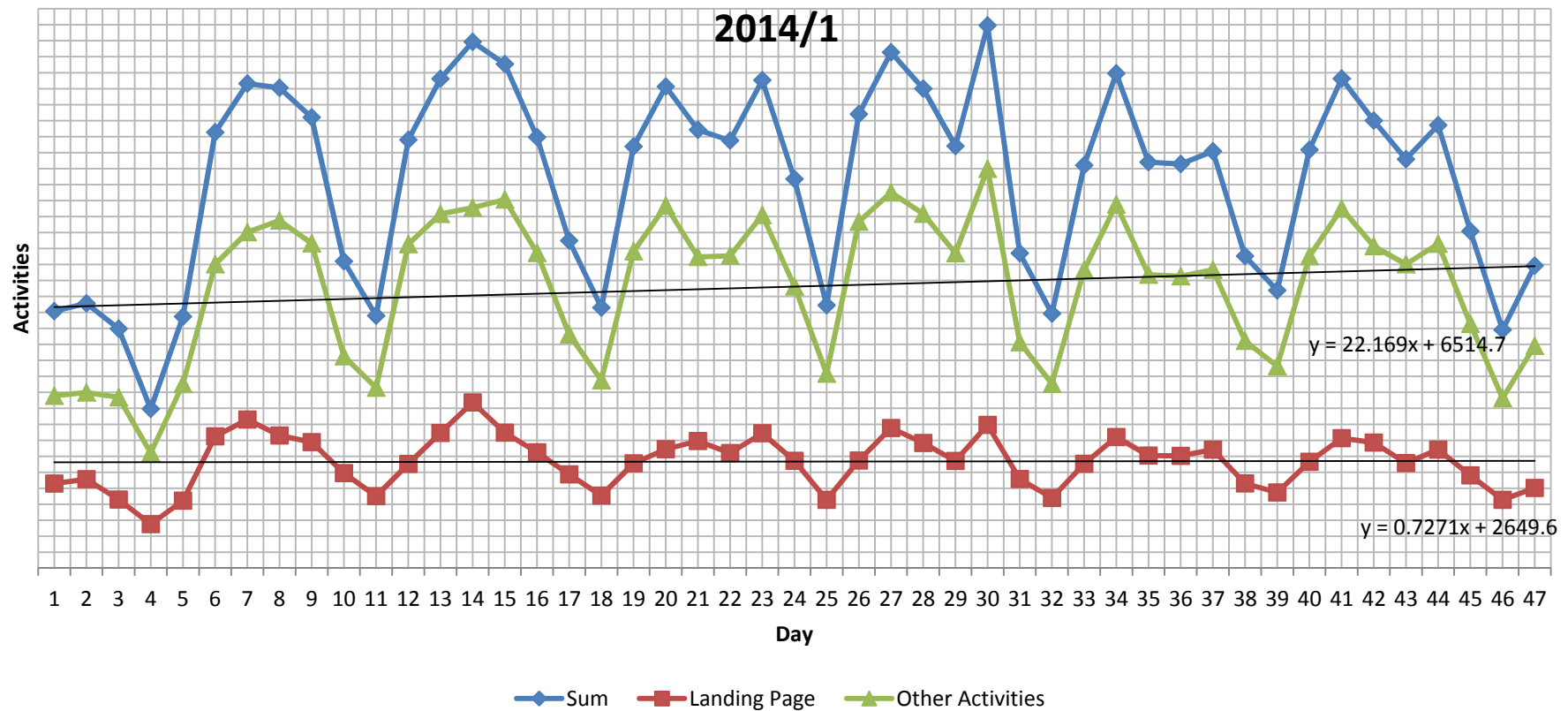
Traits of user behaviors could be found in the activity logs

## I. INTRODUCTION



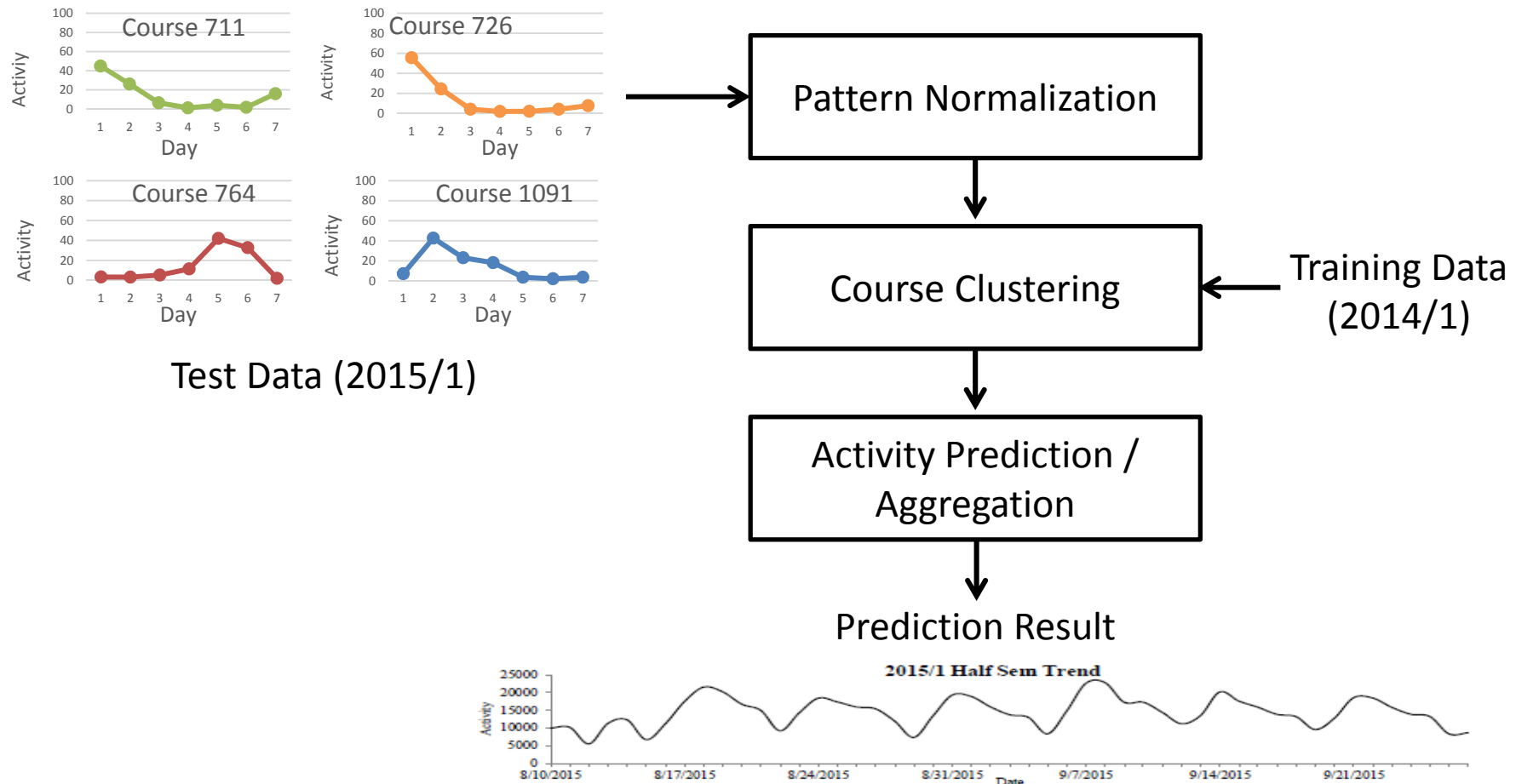
# Course Periodic Behavior Modelling

Observation (Training Set)

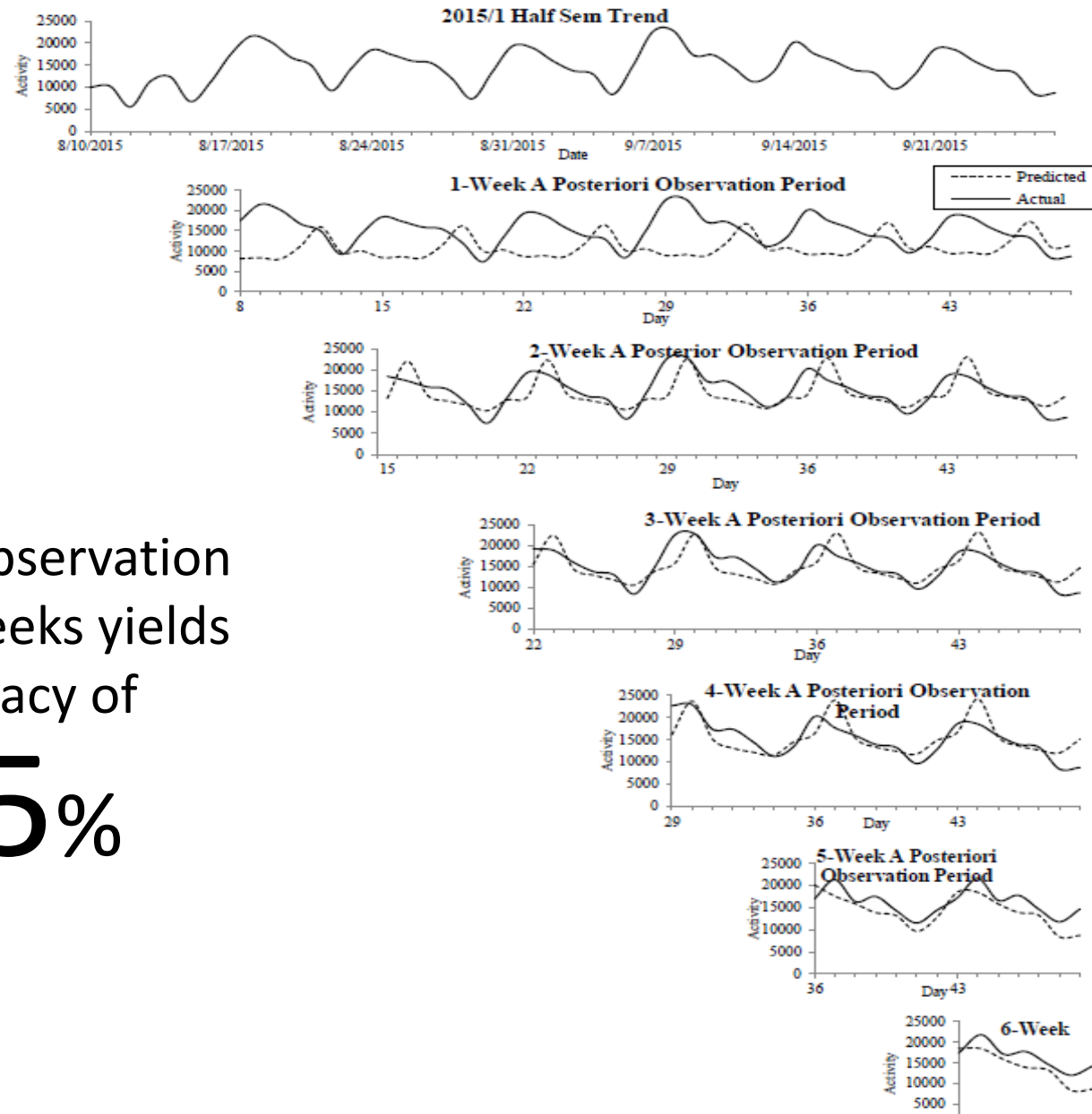


N Temiyasathit, P Punyabukkana, A Suchato, "Course periodic behavior modelling and its application in LMS activity prediction", 2016 IEEE Global Engineering Education Conference (EDUCON), 1164-1174

# Course Periodic Behavior Modelling



N Temiyasathit, P Punyabukkana, A Suchato, "Course periodic behavior modelling and its application in LMS activity prediction", 2016 IEEE Global Engineering Education Conference (EDUCON), 1164-1174



my  
**Courseville**  
Learning Analytics

- A posteriori observation period of 3 weeks yields the best accuracy of

**84.35%**

N Temiyasathit, P Punyabukkana, A Suchato, "Course periodic behavior modelling and its application in LMS activity prediction", 2016 IEEE Global Engineering Education Conference (EDUCON), 1164-1174

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# Understanding Knowledge Areas in Curriculum through Text Mining from Course Materials

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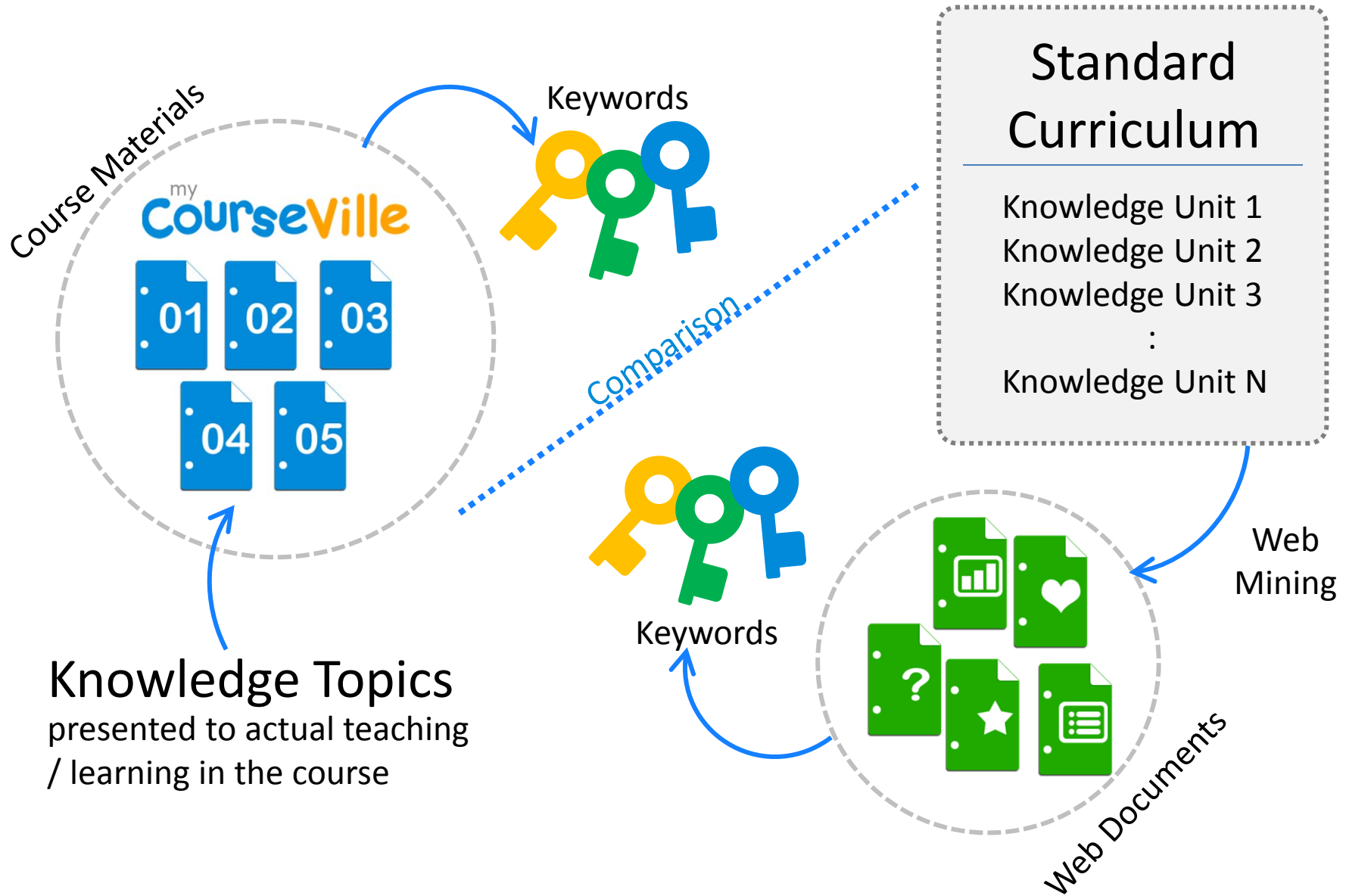
**Abstract**—Curriculum analysis is attracting widespread interest in educational field. There are two main approaches: (i) human-based and (ii) text-based assessments. Although an evaluation by teachers and learners are widely used, it is inconvenient and time-consuming. Also, the results absolutely rely on individual attitude. The text-based approach aims to directly evaluate the course syllabus; however, there is only a course description in the syllabus, so this cannot really express the actual course contents. In this paper, we present an automatic text-based curriculum analysis that straightforwardly assesses entire course materials. Our approach employs a well-known text-mining technique that extracts keywords using TF-IDF. The analysis is based on keywords from the course materials matching to the keywords from online documents, which is similar to the domain expert. Moreover, a new measurement is proposed to quantify associations between course materials and online documents using amounts of matching keywords. The experiment was conducted on materials of three subjects collected from five top universities mapping to the latest Computer Engineering Curricular Guideline (CE2016). The results illustrate significant relations among courses from different universities and CE2016. To further analyze the courses, each of them are visualized using radar charts.

**Keywords**—curriculum analysis; curriculum evaluation; course content analysis; keyword extraction; TF-IDF

The well-known institution of educational society named “ACM Education Board and the IEEE Computer Society’s Education”, which have been working to establish curricular guideline for over 40 years, has released Computer Engineering Curricula CE2016 in October 2015 [9] to be a guideline for Undergraduate Degree Programs in Computer Engineering. In the guideline, 13 Knowledge Areas (KAs) were defined as related areas of computer engineering as shown in Table I. Moreover, each KA was divided into many sub topics termed Knowledge Units (KUs); the number of KUs corresponding to each KA is varied with extent of the KA. A number of researchers concentrated to examine the guideline document for various objectives. Sekiya, et al., tried to map linkages between two different guidelines and also between guideline and course syllabi [1] whereas Marshall quantified differences of structure among the guideline series [6].

TABLE I. KNOWLEDGE AREAS OF COMPUTER ENGINEERING IN CE2016

| ID | Abbreviation | Knowledge Area                         |
|----|--------------|--|
| 01 | CAE          | Circuits and Electronics               |
| 02 | CAL          | Computing Algorithms                   |
| 03 | CAO          | Computer Architecture and Organization |
| 04 | DIG          | Digital Design                         |



**Knowledge Topics**  
presented to actual teaching  
/ learning in the course

# Inferring Coverage of Knowledge Units from Course Materials

## Sample Results

Course materials  
collected from

**5**

institutes

- Chulalongkorn University
- University of Cambridge
- MIT
- Carnegie-Mellon University
- Stanford University



Knowledge Units defined by the  
**Association for Computing Machinery  
(ACM)**

Selected equivalent  
courses in

**Computer  
Networks**  
and  
**Operating  
Systems**





Knowledge Units defined by the  
**Association for Computing Machinery  
(ACM)**

**Computer Networks**

| Knowledge Units              |
|------------------------------|
| Authentication               |
| Computer Networks            |
| Data communications          |
| Local and wide area networks |
| Network and web security     |
| Network applications         |
| Network architecture         |
| Network management           |
| Network protocols            |
| Performance evaluation       |
| Wireless and mobile networks |

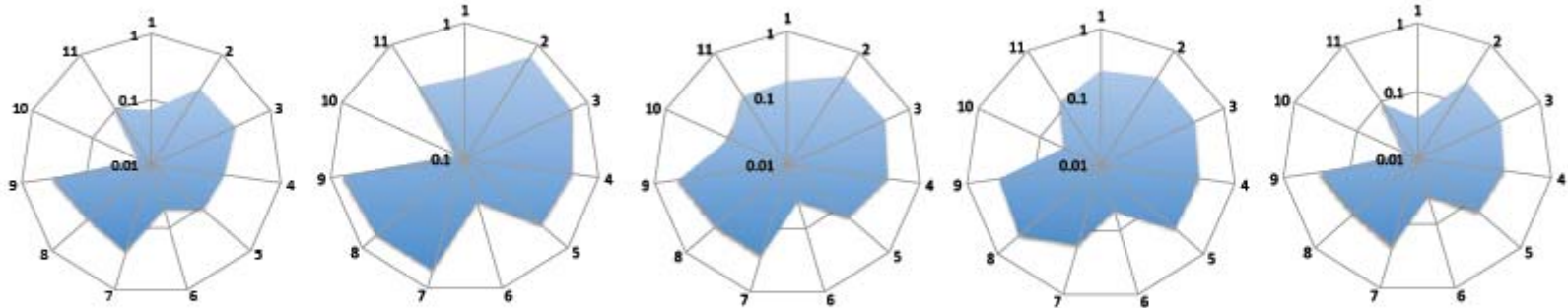
**Operating System**

| Knowledge Units                      |
|--------------------------------------|
| Additional emerging technologies     |
| Applied emerging technologies        |
| Conceptual emerging technologies     |
| Managing system resources            |
| Operating systems for mobile devices |
| Real-time operating system design    |
| Scheduling algorithms                |
| Support for concurrent processing    |
| Support for virtualization           |
| System performance evaluation        |
| System Resource Management           |

# Inferring Coverage of Knowledge Units from Course Materials

## Sample Results

Computer  
Networks



Cambridge

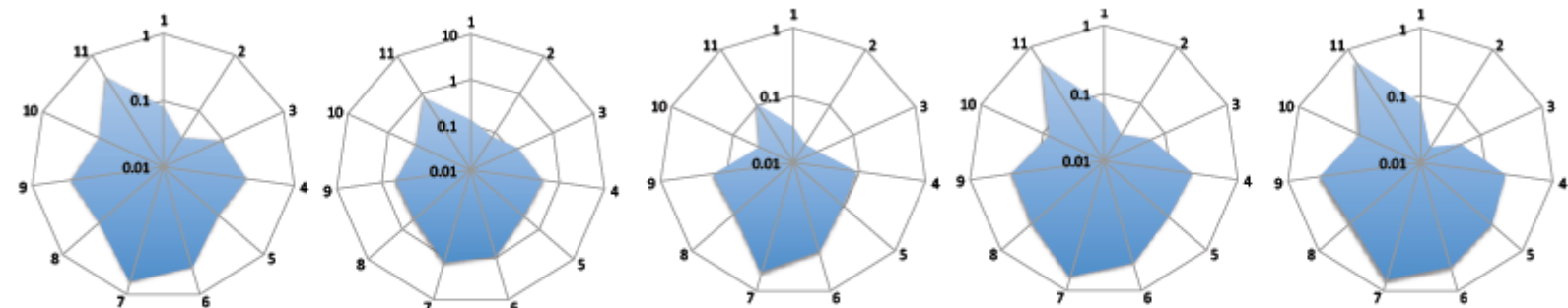
CMU

MIT

Stanford

CU

Operating  
Systems



Cambridge

CMU

MIT

Stanford

CU



- Online Course Platform
  - Life-long Learning
  - Blended Learning
- Outcome-based
  - E-portfolios of students / Curricular / Courses
  - Accreditations
- Learning Analytics