

# 고등교육에서의 학습분석 사례 및 그 의미와 전망

---

유비온 에듀테크 센터장 유인식

# 학습분석의 의미

# Horizon Report 2018

## Key Trends Accelerating Technology Adoption in Higher Education

Long-Term Trends: Driving Ed Tech adoption in higher education for five or more years

- > Advancing Cultures of Innovation
- > Cross-Institution & Cross-Sector Collaboration

Mid-Term Trends: Driving Ed Tech adoption in higher education for the next three to five years

- > Proliferation of Open Educational Resources
- > The Rise of New Forms of Interdisciplinary Studies

Short-Term Trends: Driving Ed Tech adoption in higher education for the next one to two years

- > Growing Focus on Measuring Learning
- > Redesigning Learning Spaces

## Significant Challenges Impeding Technology Adoption in Higher Education

Solvable Challenges: Those that we understand and know how to solve

- > Authentic Learning Experiences
- > Improving Digital Literacy

Difficult Challenges: Those that we understand but for which solutions are elusive

- > Adapting Organizational Designs to the Future of Work
- > Advancing Digital Equity

Wicked Challenges: Those that are complex to even define, much less address

- > Economic and Political Pressures
- > Rethinking the Roles of Educators

## Important Developments in Educational Technology for Higher Education

Time-to-Adoption Horizon: One Year or Less

- > Analytics Technologies
- > Makerspaces

Time-to-Adoption Horizon: Two to Three Years

- > Adaptive Learning Technologies
- > Artificial Intelligence

Time-to-Adoption Horizon: Four to Five Years

- > Mixed Reality
- > Robotics

A growing focus on measuring learning is an accelerating trend in educational settings, and analytics technologies are the cornerstone. This category of technologies encompasses a diverse array of tools and applications that turn data into information. Data are the currency of the digital economy driving the information age, in which finding ways to collect, connect, combine, and interpret data to more clearly understand learner capabilities and progress can fuel personalized and adaptive learning experiences.<sup>143</sup> In the past 20 years, measuring student learning has evolved from passive and latent metrics including semester/quarter grades, grade-level promotion, and graduation rates to interactive and real-time metrics that recommend adjustments to meet learners' needs and inform faculty decisions about curriculum and pedagogy.<sup>144</sup> Understanding how to use new data tools and developing analytic skills, including data literacy, computational thinking, and coding, is essential for faculty and students to advance the understanding and use of big data in educational settings.

# Definition of Learning Analytics

- for **individual learners** to reflect on their achievements and patterns of behaviour in relation to others
- to help **teachers and support staff** plan supporting interventions with individuals and groups
- for **functional groups** such as course teams seeking to improve current courses or develop new curriculum offerings
- for **institutional administrators** taking decisions on matters such as marketing and recruitment or efficiency and effectiveness measures

# Analytic outcomes

- **Prediction** purposes, for example to identify "at risk" students in terms of drop out or course failure
- **Personalization & adaptation**, to provide students with tailored learning pathways, or assessment materials
- **Intervention** purposes, providing educators with information to intervene to support students
- **Information visualization**, typically in the form of so-called learning dashboards which provide overview learning data through data visualisation tools

# 국내 고등교육 Learning Analytics의 현실

Information  
Visualization



Intervention



Personalization  
Adaptation



Prediction

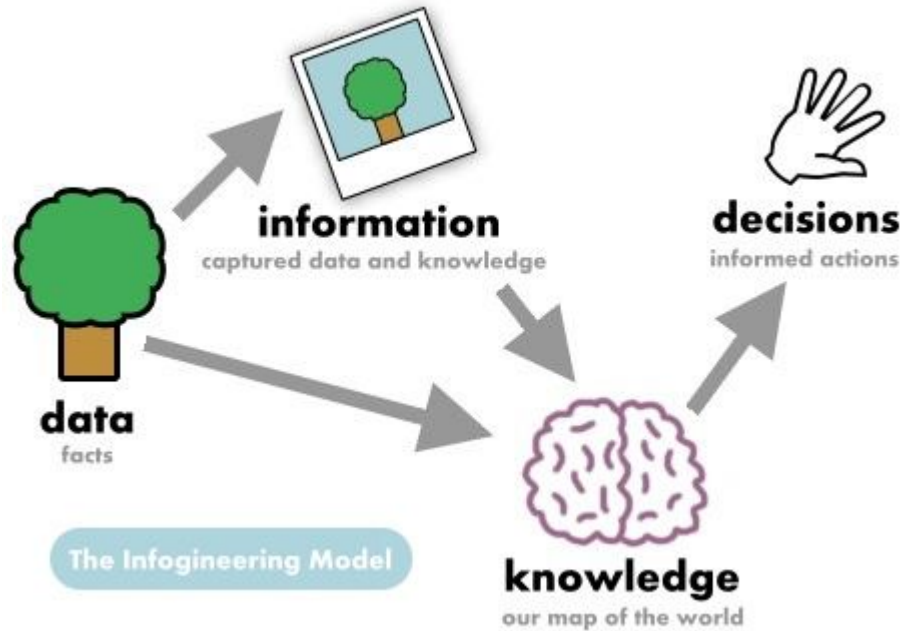
국내 고등교육  
LMSs



Why?



# Analytics : Data → Decision

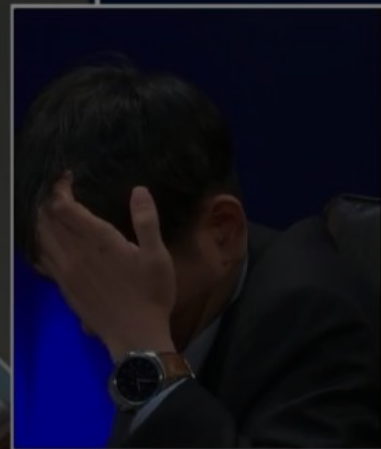




# AlphaGo

AI는 체스, 바둑과 같은 보드게임에서는 효과가 큰 반면  
복잡한 전략게임에서는 아직 효과를 발휘하지 못하고 있음

● ALPHAGO  
00:10:29



● LEE SEDOL  
00:01:00



# 학습분석



전략시뮬레이션 > 바둑 >  
체스



해외 vs. 한국

Prediction for what

8,000,000

That's how many students are currently  
enrolled in online courses today – in the  
U.S. alone.

Prediction for what

50%

That's the percentage of those 8 million students that will actually complete those courses.

# Cases in LMS

## Blackboard



### · Blackboard Predict

- 목적: 학습위험 조기 진단
- 효과: 위험군 학습자 관리
- 효과: 교육과정 개선
- 데이터: SIS/ERP, 활동 데이터

### · X-ray Learning Analytics

- 목적: 학습 활동 관리
- 효과: 활동 관리, 교수 피드백
- 데이터: 활동 데이터

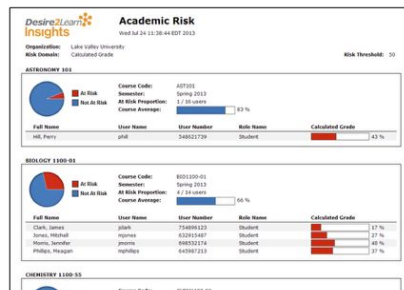
## Canvas



### · Course Analytics

- 목적: 학습관리
- 효과: 위험군 학습자 관리
- 데이터: 활동 데이터
- 산출: 학습빈도, 제출, 성적
- 기능: 자동 알림(Alert)

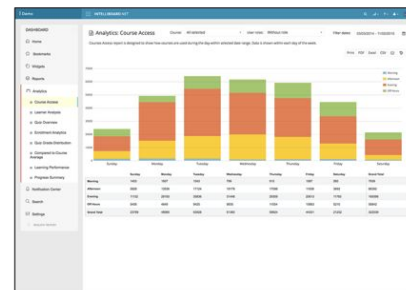
## Desire2Learn



### · Desire2learn Insights

- 목적: 예측분석
- 효과: 기관 수준 성과 측정
- 데이터: SIS/ERP, 활동 데이터
- 기능: “Advanced Analytics”
  - 학습활동 측정
  - 개인화학습 근거 데이터 제공
  - 교수활동 피드백

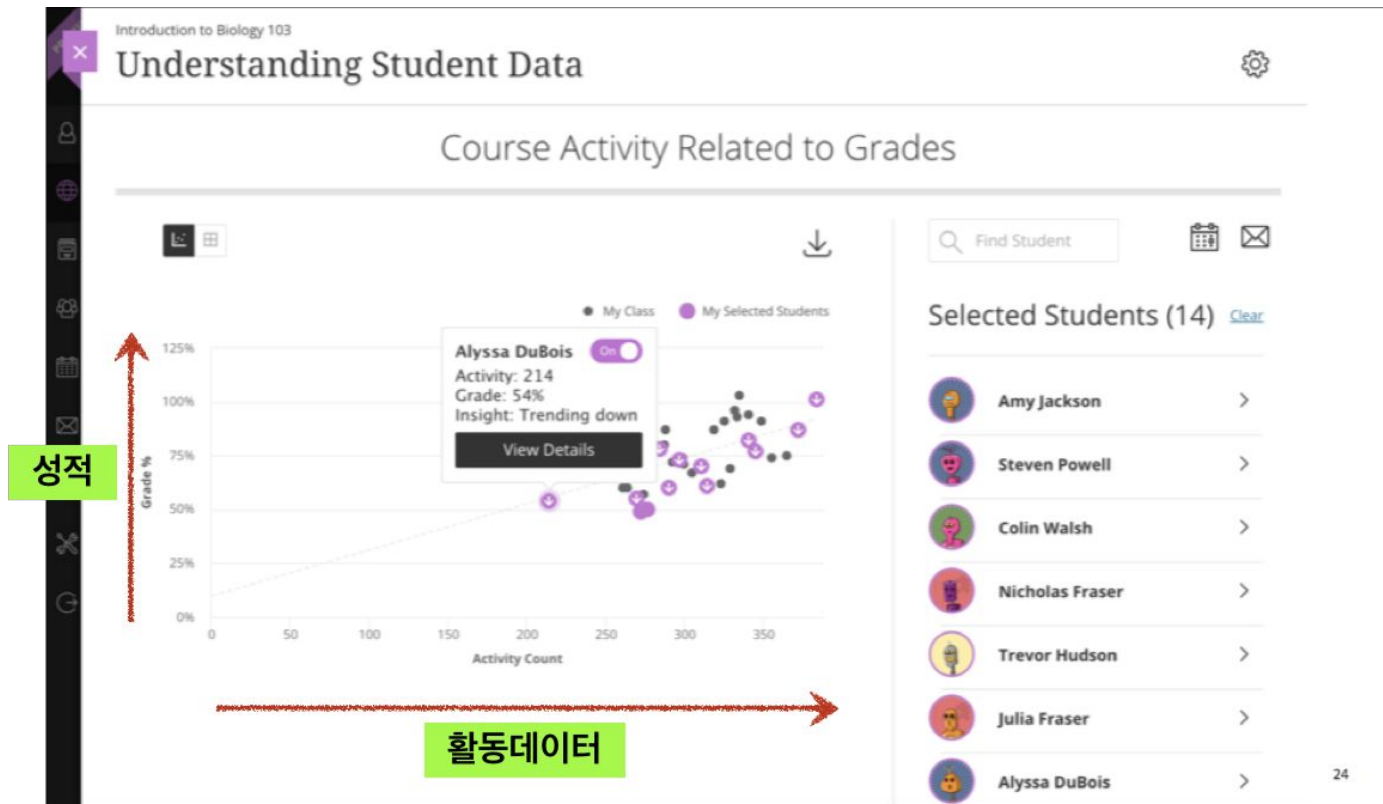
## Moodle Rooms\*



### · INTELLIBOARD

- 서드파티 분석도구
- Moodle, Totara
- 데이터: 활동 데이터
- 기능 및 산출
  - 학습빈도 측정
  - 위험군 학습자 관리
  - 학습자 대시보드 제공

# Blackboard x-ray



# Blackboard Predict

## · 학습자 분석 레포트

- 목적: 학습성과 예측
- 비교: 본인/동일 전공/대학 전체
- 기간별 로그인 횟수
- 기간별 인터랙션 횟수
- 기간별 제출 횟수
- 기간별 접속 시간

[비교] 로그인 횟수

x: 기간(월)

y: 로그인 횟수

[비교] 인터랙션 횟수

x: 기간(월)

y: 인터랙션 횟수

[범주]

본인, 동일 전공, 대학

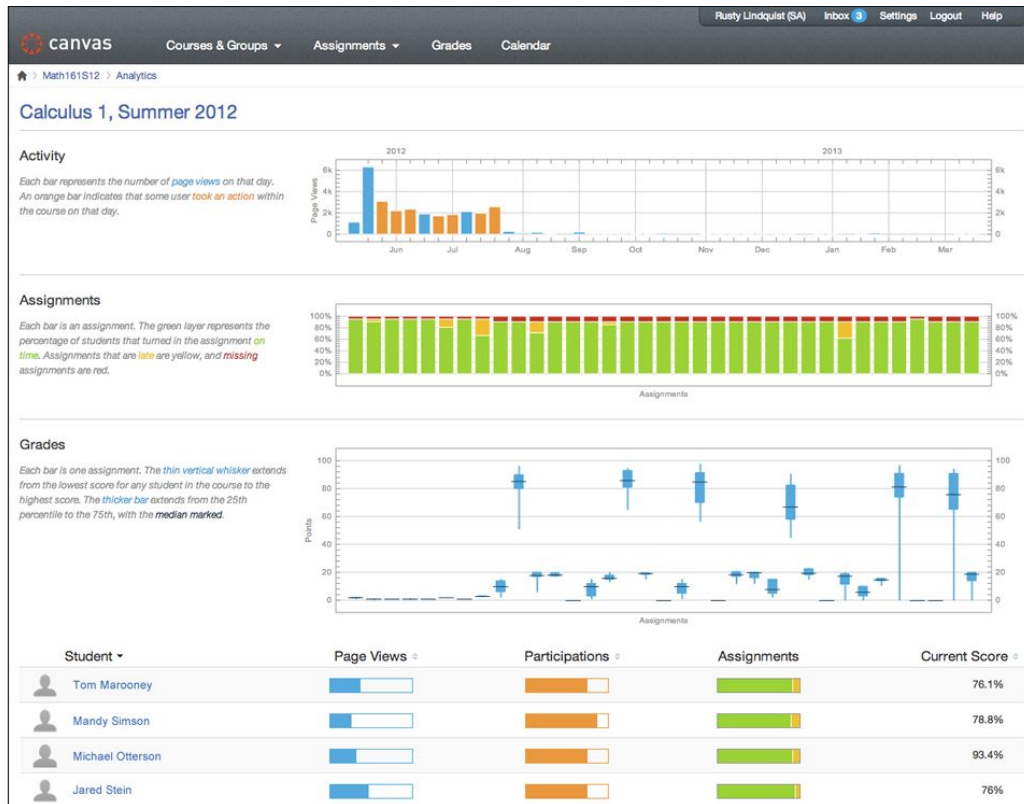
[제출]

[시간]



# Canvas

- 강좌 학습활동 관리
  - 기간별 학습활동(Activity)
  - 기간별 제출(Assignments)
  - 활동별 성적 분포(Grades)
  - 학습자별 목표 달성율





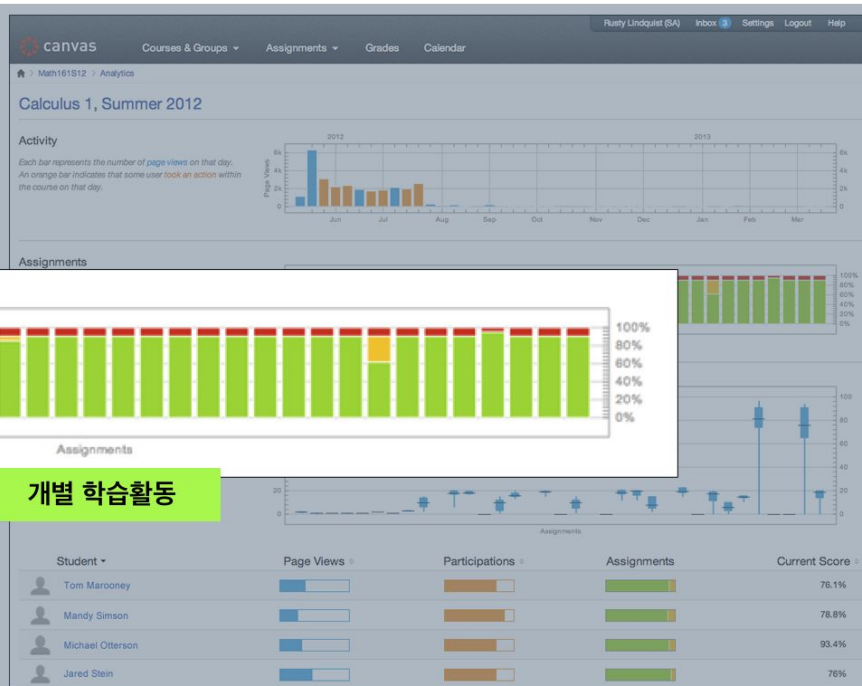
# Canvas

## 강좌 학습활동 관리

녹색: 완료  
노랑: late  
빨강: miss

## 학습자별 목표 달성률

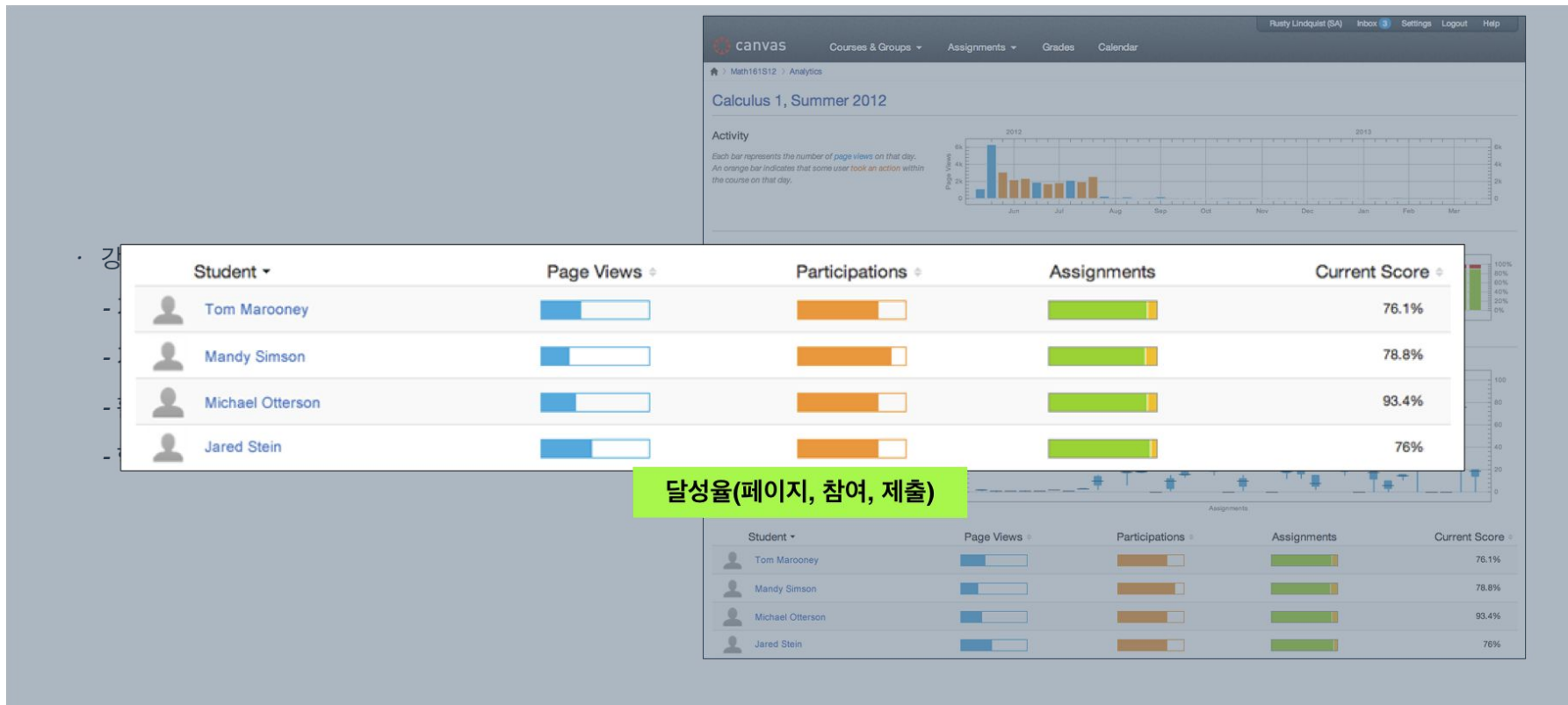
## 개별 학습활동



# Canvas



# Canvas



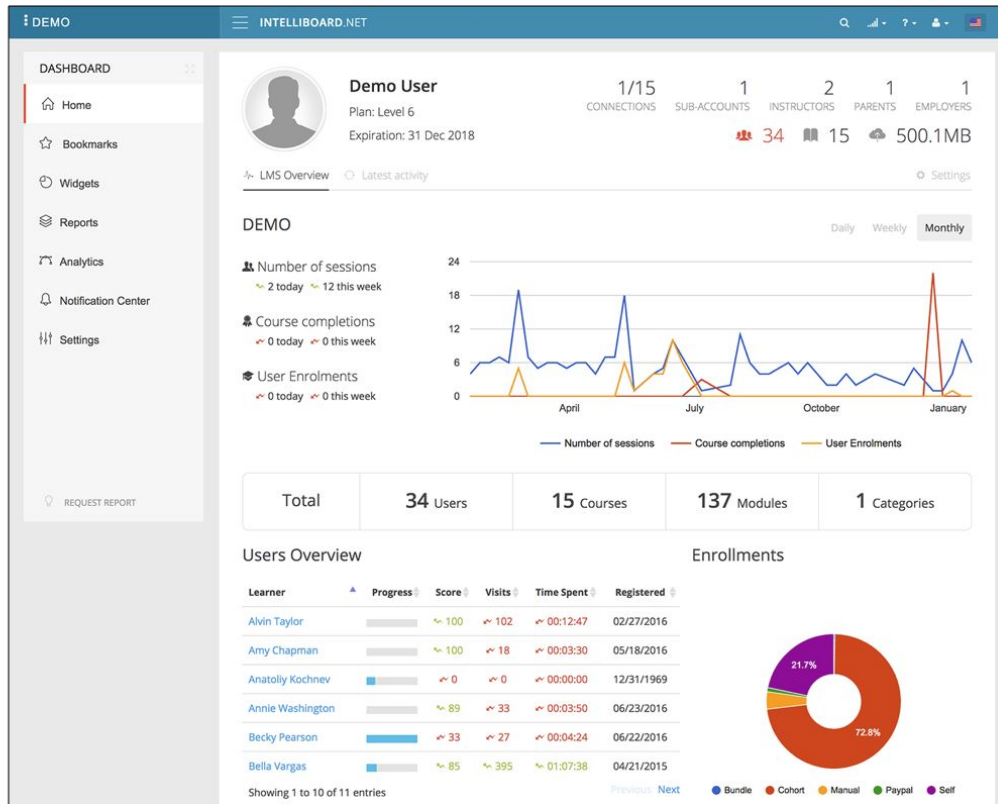
# Moodle Intelliboard

- *LMS Overview*(시스템 개요)

- 유저 등록 수
- 코스 완료 사용자 수
- 전체 세션 수

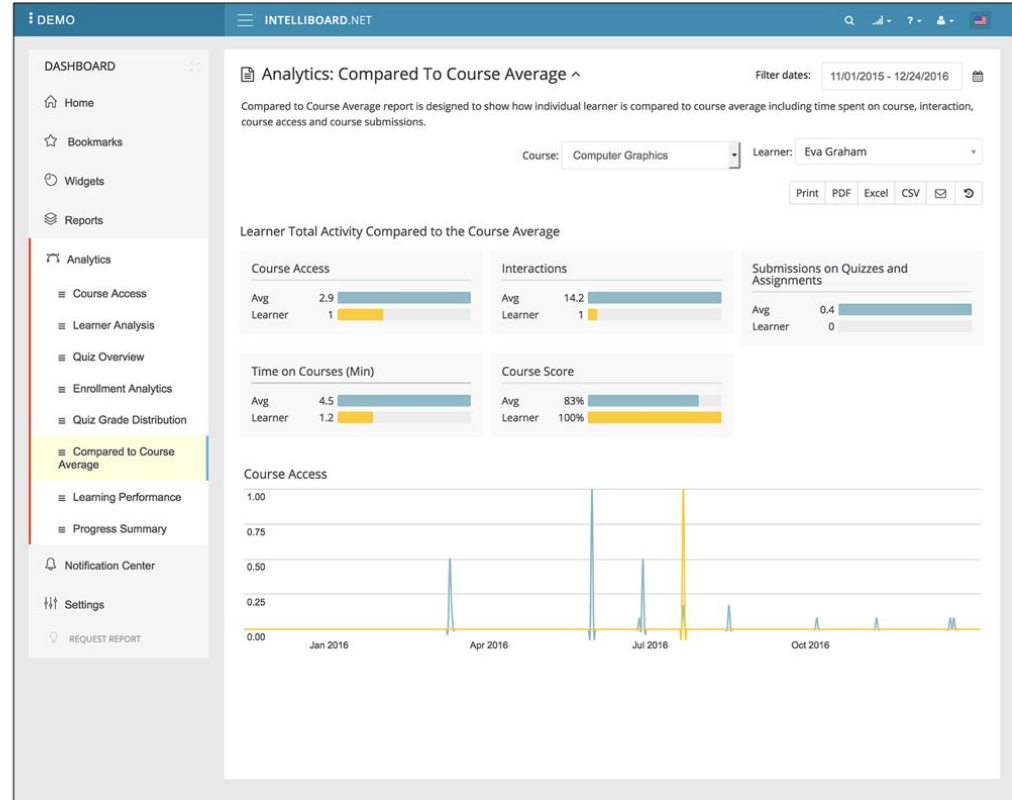
- *User Overview*

- Progress
- Score
- Visit
- Time Spent



# Moodle Intelliboard

- *Track & Improve Learners Engagement*
  - *Course Contents Access*
  - *Course Access*
  - *Progress Summary*



# Moodle Intelliboard

- *Identify at-risk Learner*
  - *Learner Progress*
  - *Status Summary*
  - *Past Due Assignments*
  - *Compared to Course Average*
  - *Activity Status Detail*

**DEMO** INTELLIBOARD.NET

**DASHBOARD**

- Home
- Bookmarks
- Widgets
- Reports**
  - Learner reports**
    - Learning Progress
    - Success Report**
    - Sitewide Learner Progress
    - Login Statistics
    - Learner Engagement
    - Overdue Users
    - Learner Overview
  - Course reports
  - Activity reports
  - Instructors
  - Site reports
  - Custom Built Reports
- Analytics
- Notification Center
- Settings
- REQUEST REPORT

**Reports: Success Report** Filter dates: 01/01/2016 - 12/31/2016

Search for: [ ] All selected All selected CSV Excel PDF Print

Learner	Course Name	Started	Progress	Letter	Completed Activities	Score	Status	Visits	Time Spent
Eva Graham	Web Design	05/17/2016	<div></div>	F	4	0	Completed on 07/08/2016	12	00:02:37
Bella Vargas	History - Free online courses	05/17/2016	<div></div>	A	6	100	Incomplete	8	00:01:53
Scott Reed	Web Design	06/22/2016	<div></div>	F	0	0	Incomplete	2	00:01:05
Mason George	Languages Online for Free	02/28/2016	<div></div>	F	0	0	Incomplete	0	00:00:00
Joanne Olson	Web Design	06/22/2016	<div></div>	F	0	0	Incomplete	0	00:00:00
Brett Sullivan	History - Free online courses	06/07/2016	<div></div>	A	11	100	Incomplete	25	00:07:37
Esther George	Computer Graphics	05/17/2016	<div></div>	A	10	100	Incomplete	26	00:07:10
Lucas Miller	Free Online Architecture Courses	03/01/2016	<div></div>	A	6	100	Incomplete	15	00:03:07
Lucas Miller	Law Courses	06/23/2016	<div></div>	F	4	33	Incomplete	24	00:06:51
Lucas Miller	Computer Graphics	02/26/2016	<div></div>	A	10	100	Incomplete	33	00:06:37

10 Showing page 1

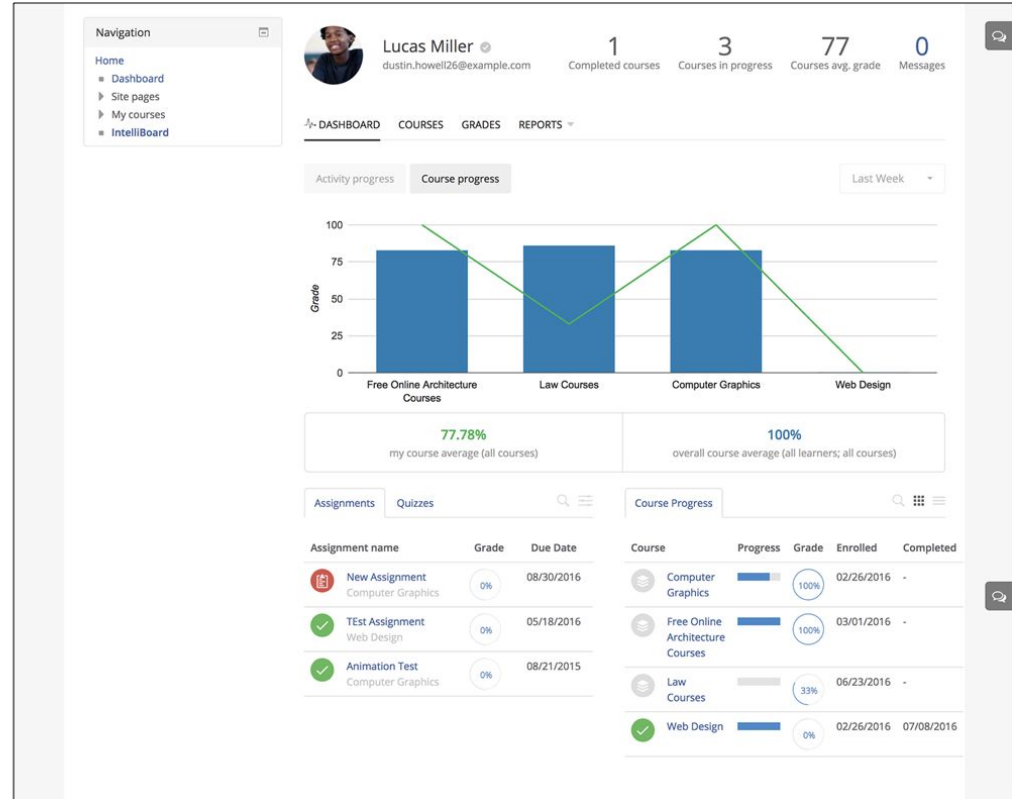
Current Grade Goal Grade Class avg

Previous Next

Talk to us

# Moodle Intelliboard

- *Enabled Learner Self Management*
  - *Course Average Comparison*
  - *Assignment/Quiz Completion*
  - *Course Progress*
  - *Activity Participation*
  - *Correlations and Grades*



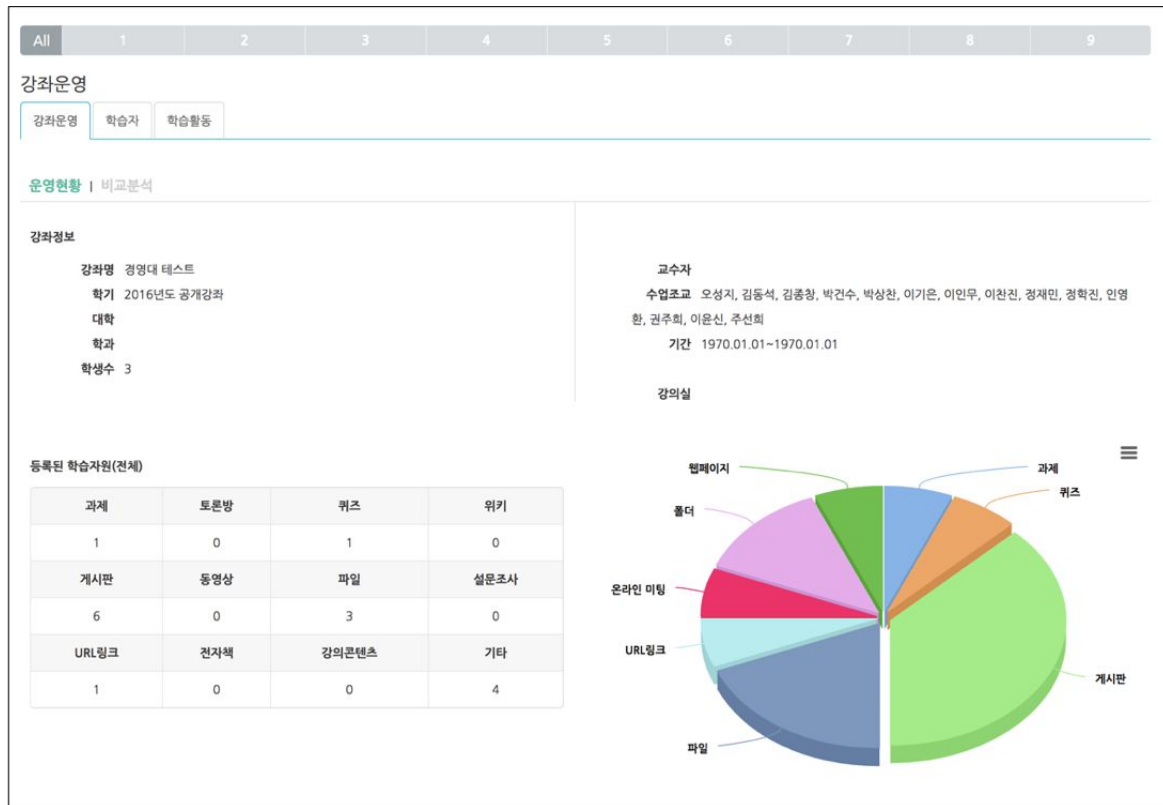
# COURSEMOS - KAIST





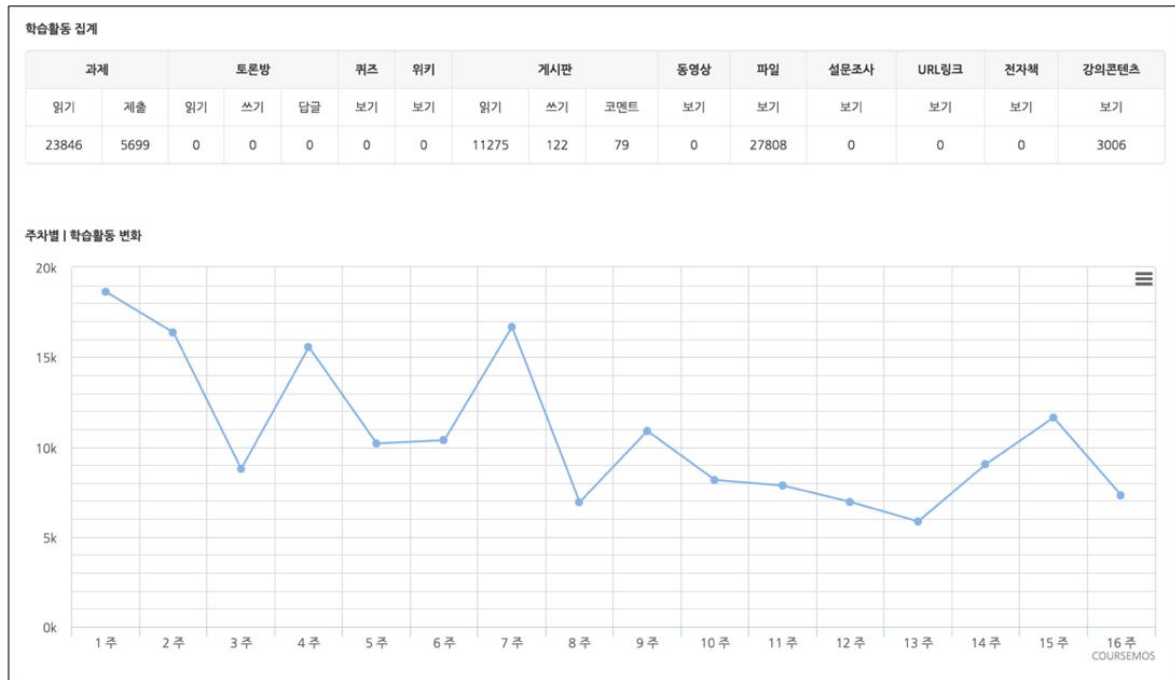
# COURSEMOS - KAIST

- 강좌정보
- 학습자원 한눈에 보기



# COURSEMOS - KAIST

- 학습활동 집계
  - 활동별 액션
  - 기간(주차)별 인터렉션



# COURSEMOS - KAIST

- 주차별 학습자원
- 주차별 학습활동(인터랙션)
- 의도

$f(\text{학습자원}) = \text{학습활동}$



# COURSEMOS - KAIST

## 과거 학기와 비교

- 등록된 학습 자원 수
- 해당 기간 전체 인터렉션 수

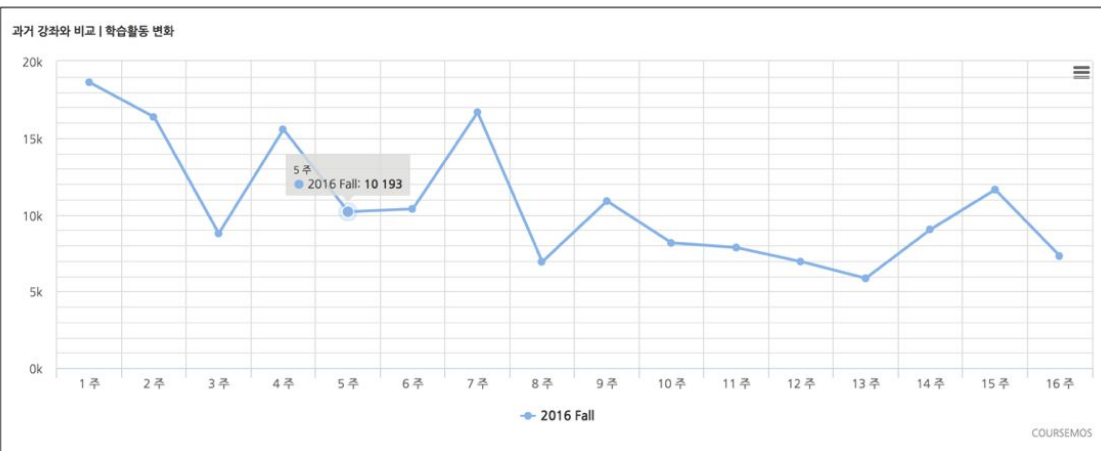
과거 강좌와 비교 | 학습자원 등록

	과제	토론방	퀴즈	위키	게시판	동영상	파일	설문조사	URL링크	전자책	강의콘텐츠	기타	합계
2016 Fall	12	0	0	0	3	0	26	0	0	0	1	24	66

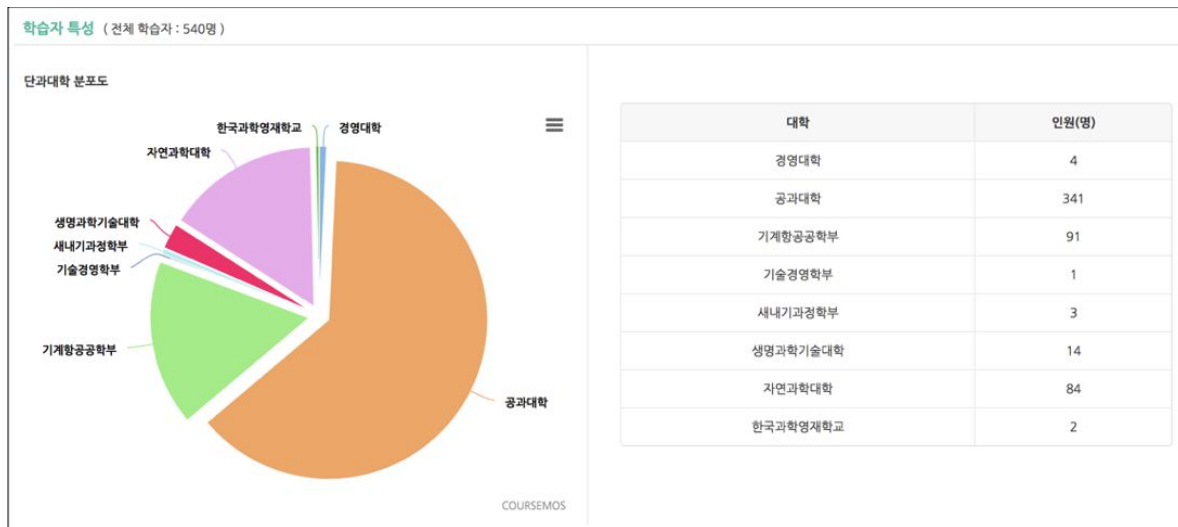
과거 강좌와 비교 | 학습활동 집계

	과제		토론방			퀴즈	위키	게시판			동영상	파일	설문조사	URL링크	전자책	강의콘텐츠
	읽기	제출	읽기	쓰기	답글	보기	보기	읽기	쓰기	코멘트	보기	보기	보기	보기	보기	보기
2016 Fall	23846	5699	0	0	0	0	0	11275	122	79	0	27808	0	0	0	3006



# COURSEMOS - KAIST

- 학습자 특성
  - 단과대학, 학과(전공)
  - 학년 데이터 없음(한계)
- 의도
  - 교수활동 위한 학습자 파악



Prediction for what

**Dropout Rate**  
in USA

Prediction for what

# 취업(대학평가)

in Korea

현재 대학에 대한 평가의 기준은 학생의 학업 성취도가 아닌 취업관련 역량에

목표를 두고 있음

학습분석은 교육부나 학교의 주요 관심사항이 아님

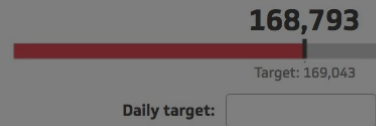
오프라인 대학은 온라인 학습분석에 대한 무관심

온라인 대학은 학습활동보다는 진도율 중심적

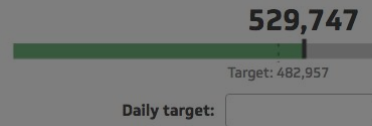
# 학습분석에 대한 미래 전망



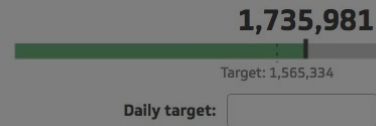
## Users



## Sessions



## Pageviews



How do your users (visitors), sessions (visits) and pageviews metrics for https://www.skynet.com compare to your targets over the last 30 days?

## Google Analytics Audience Metrics



How have your users (visitors), sessions (visits) and pageviews metrics trended for https://www.skynet.com over the last 30 days?

## Google Analytics Traffic Channels

Channel	Sessions	Previous Period	Change	Trend
Organic Search	305,822	126,267	75.0% ▲	
Display	71,880	74,730	-30.5% ▼	
Direct	71,381	38,198	35.0% ▲	
Paid Search	56,366	30,693	32.7% ▲	
Referral	11,253	5,608	45.0% ▲	

Which traffic channels have been generating the most traffic for https://www.skynet.com over the last 30 days?

## Google Analytics Goals

Goal	Completions	Conversion Rate	Previous Period	Change	Trend
------	-------------	-----------------	-----------------	--------	-------

## Bounce Rate (Avg)



## Pageviews (Avg)



## New Sessions



## Time on Site (Avg)



How has https://www.skynet.com performed over the last 30 days?

## Google Analytics Sessions by Device Type



What percentage of sessions on https://www.skynet.com over the last 30 days were using mobile devices?

## Google Analytics Web Sessions by Region

Top Regions	Sessions
United States	5,104
United Kingdom	4,498
Canada	1,359



The image features a funnel shape on a dark teal background. The top of the funnel is filled with various icons representing different aspects of technology and data: a smartphone, a lightbulb, a YouTube play button, a globe, a laptop, a box, a CD, a microphone, a briefcase, a game controller, a SIM card, a target with an arrow, a cloud, a camera, and several gears. Two large, light gray arrows point downwards from the top of the funnel towards the center. In the center of the funnel, the text 'xAPI' is displayed in a large, white, sans-serif font. Below this, two lines of Korean text are written in a smaller, white, sans-serif font. At the bottom of the funnel, there is a gray signpost with the text 'XAPI' in a large, bold, black, sans-serif font.

# xAPI

데이터의 포맷을 정의하는 수준  
데이터의 의미해석이 가능한 수준까지 표준화 x

**XAPI**



---

**아직 첩첩산중(疊疊山中)**

하지만....

한국 고등교육에서의 학습분석의 진정한 의미를 재정의 하고  
작은 것으로 부터 시작하자

# 거시점 관점의 대안

Information  
Visualization



Intervention



Personalization  
Adaptation



Prediction

LMS



Drop Rate  
Management

# 거시적 관점의 대안

Information  
Visualization



Intervention



Personalization  
Adaptation



Prediction

역량관리

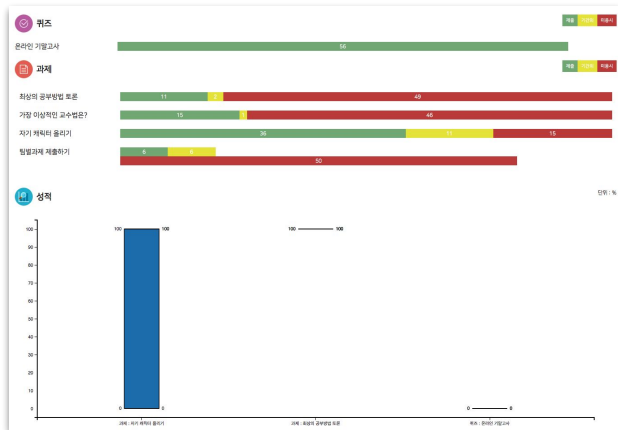
LMS

비교과 활동

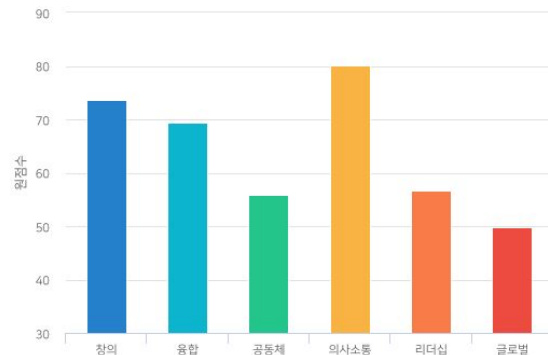


진로, 취업, 창업  
역량 관리

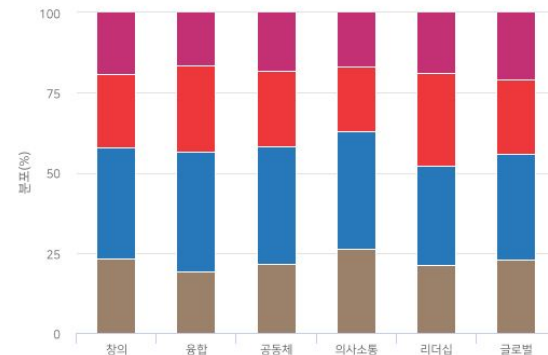
# 거시적 관점의 대안 : Beyond LMS



역량별 평균 원점수

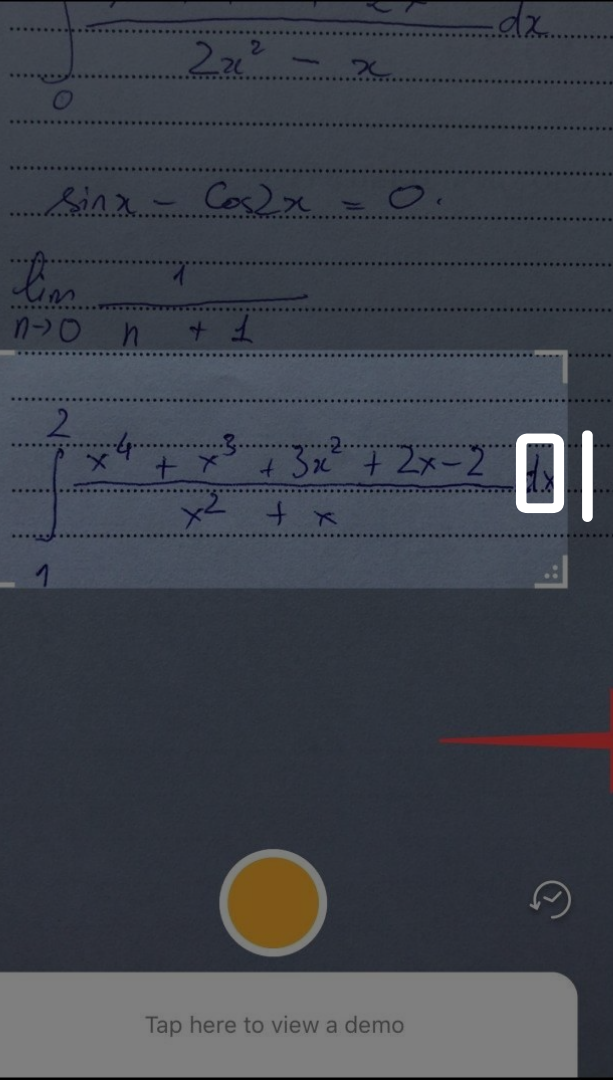


수준별 분포현황

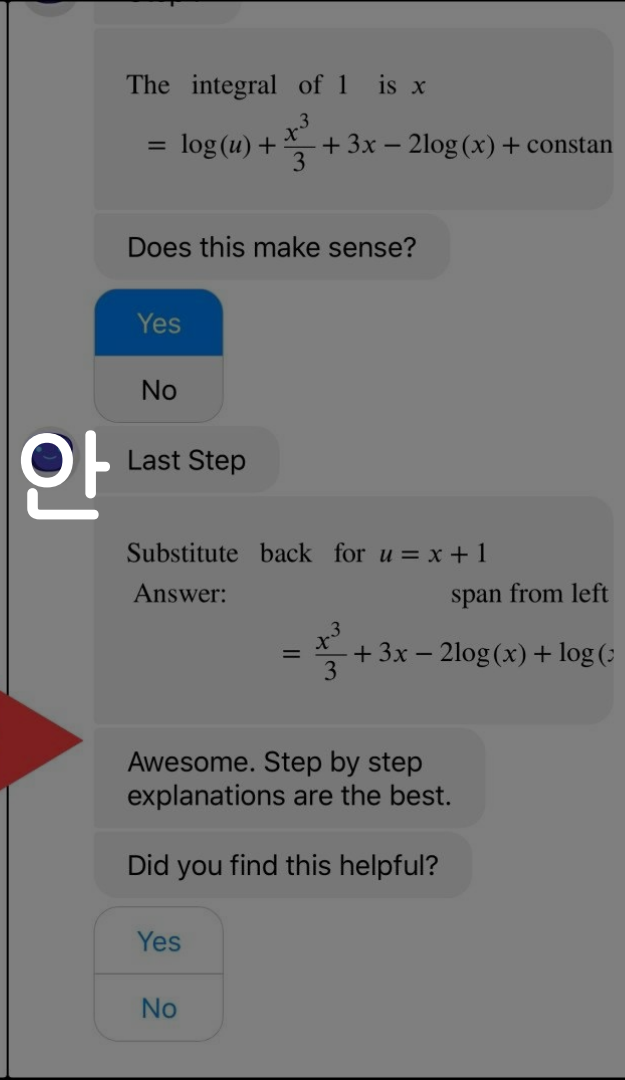
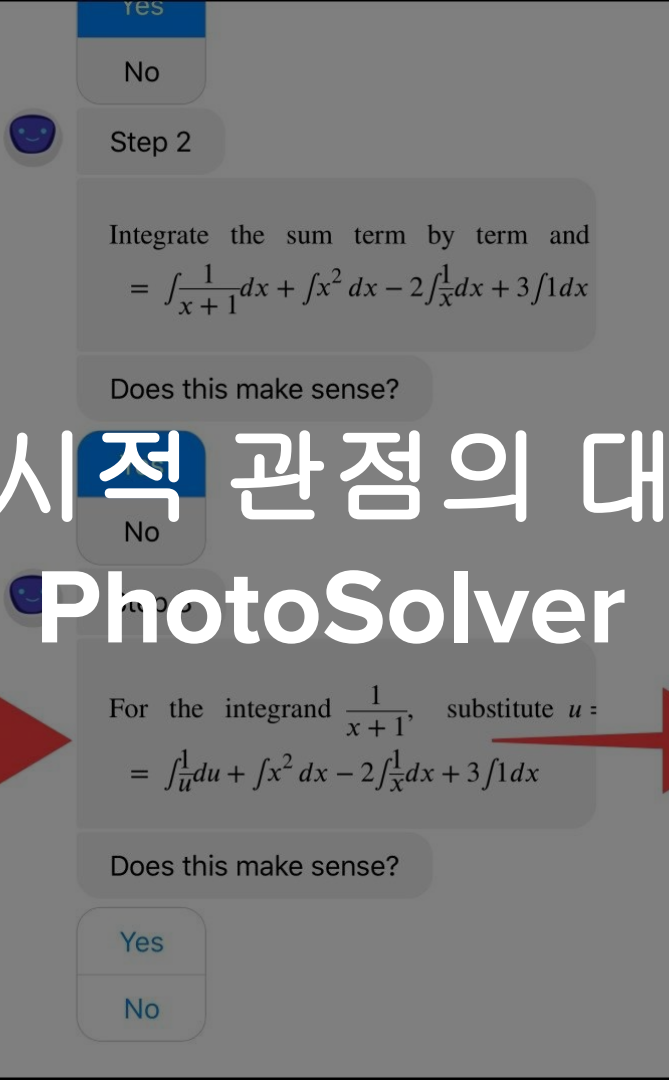


역량	평균 원점수	탁월	우수	보통	미흡
창의	73.68 (11.13)	1,164명 (19.08%)	1,408명 (23.07%)	2,122명 (34.78%)	1,408명 (23.07%)
융합	69.34 (10.06)	1,002명 (16.42%)	1,652명 (27.07%)	2,273명 (37.25%)	1,175명 (19.26%)
공동체	55.89 (8.20)	1,118명 (18.32%)	1,432명 (23.47%)	2,234명 (36.61%)	1,318명 (21.60%)
의사소통	80.08 (10.63)	1,032명 (16.91%)	1,227명 (20.11%)	2,237명 (36.66%)	1,606명 (26.32%)
리더십	56.71 (8.70)	1,156명 (18.94%)	1,765명 (28.92%)	1,893명 (31.02%)	1,288명 (21.11%)
글로벌	49.77 (10.62)	1,269명 (20.80%)	1,423명 (23.32%)	2,017명 (33.05%)	1,393명 (22.83%)





# 미시적 관점의 대안 PhotoSolver



Create a Class



Overview

Student Progress

Curriculum Closeup

Assignments

Curriculum  
Algebra 1Students  
23Since  
Feb 2014

KnowRe Alg

KnowRe Alg 2

KnowRe Geo

KnowRe P-Alg

Partner A1

Partner A2

Partner GEO

Partner PA

Period 1

Period 2

Summer School 1

Summer School Class 1

The davehjo's

The davehjo's A2

The davehjo's PA

Class Total ★ 1026 🏆 114373

Class Code MFB43ZL

Invite Students

## Achievement Score Distribution ⓘ

Class Size

23 Students



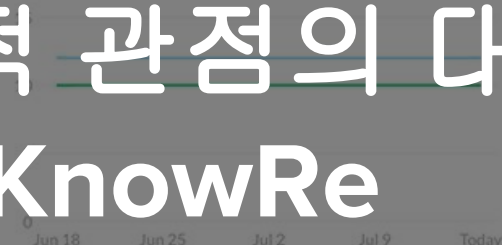
## Achievement Trend ⓘ

Avg Achievement

10 ▲ 0

Avg % Completed

12 ▲ 0



## Work Completed ⓘ

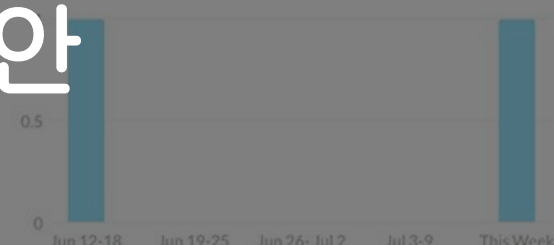
Probs Solved This Wk

1 ▲ 1

Total 1943

Avg Probs Solved This Wk

0 ▲ 0

미시적 관점의 대안  
KnowRe

## Students ⓘ

1 Request(s) to join a class

Name	Curriculum Progress	Achvmt (%)	Complt (%)	Problems Solved This Week	Total Problems Solved	Last worked on	Last Seen	Assgnmts Avg	Assgnmts
Jay Woo	<div>Deny Accept</div>								
, Alex	<div>&gt; <div></div></div>	35 ▲ 0	50 ▲ 0	0 ▲ 0	349	Lesson 4-4	Apr 26	0	
Cheung, Joanna	<div>&gt; <div></div></div>	0 ▲ 0	0 ▲ 0	0 ▲ 0	0	-	-	0	