

# **BIG DATA & ARTIFICIAL INTELLIGENCE: STRATEGIC TECHNOLOGY TREND & SMART LEARNING ANALYTICS**

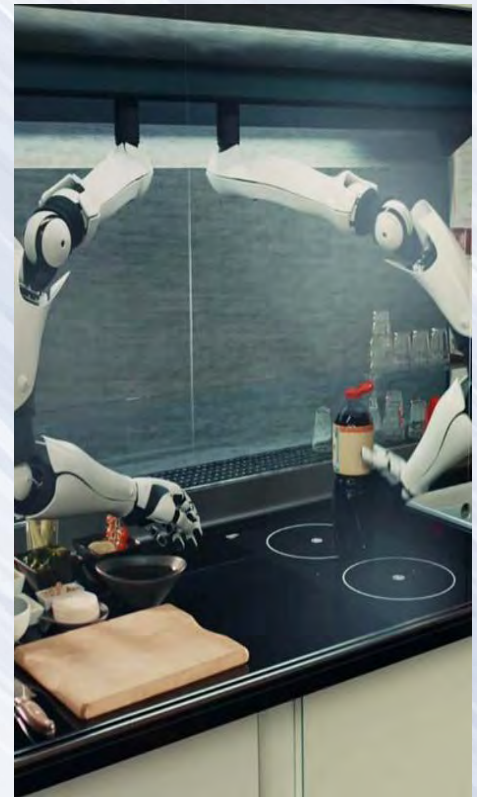
Salleh Abdul Rashid

Zuraidah Mohd Zain

**Zul Azhar Zahid Jamal**

Universiti Malaysia Perlis ( UniMAP )

# How technology is transforming the world



# OVERVIEW

- PART 1 - Terms, Basic Definitions and Terminologies
- PART 2 - Big Data in Higher Education Learning Institutions
- PART 3 - Big Data and AI in Malaysia
  - Learning Analytics in UniMAP

# BIG DATA



- Data sets – whether unstructured, semi-structured or structured - that are very large in size
- We create 2.5 quintillion bytes of data everyday

# BIG DATA

- When investigated, Big Data will uncover patterns, trends, correlations, and other information that are beneficial to a myriad of organisations.
- Big Data Analytics help industries make better and more informed decisions.
- Preventing diseases, battling crimes, and identifying business trends are some of the benefits accrued.



# ARTIFICIAL INTELLIGENCE (AI)

- Intelligence exhibited by machines as opposed to intelligence in human beings.
- Learning algorithms are created and fed into computers to enable the process of learning.



# ARTIFICIAL INTELLIGENCE (AI)



- AI deals efficiently the tasks of sorting, classifying, interpreting, and refining data.
- Data can now be turned into knowledge, which can then be acted upon.
- Big Data and Artificial Intelligence go hand in hand.

# **BIG DATA IN HIGHER LEARNING INSTITUTIONS**



# SOME EXAMPLES

## **Purdue University, Indiana, United States**

Identifies potential problems as early as the second week of term.

Users seek help earlier and more frequently.

Led to **12%** more B and C grades.  
**14% fewer** D and F grades.

## **University of Maryland, United States**

Students who obtain low grades use the VLE **40%** less than those with C grades or higher.

Used to identify effective teaching strategies which could be deployed on other modules.

## **New York Institute of Technology, New York, United States**

**74%** of students who dropped out had been predicted as at-risk by the data model.

## **The Open Universities Australia**

Analytics used to:

- » drive personalisation and adaptation of content recommended to individual students
- » provide input and evidence for curriculum redesign

## **Wollongong University, Australia**

SNAPP visualises participant relationships in online discussion forums in real time, as a network diagram. It helps facilitators to avoid dominating the conversation and encourage greater engagement with students who are less connected with their peers in the forum.

## **Edith Cowan University, Perth, Western Australia**

Created probability of retention scores for each undergraduate student - used to identify students most likely to need support.

# How universities are taking advantage of Big Data



- Universities identify qualified candidates, and then work towards making itself **most appealing**
- The data sources used are student test results, social media pages, school cameras, campus sensors, patterns of browsing of particular websites, mobile phone devices, and many more.

# How universities are taking advantage of Big Data

- With Big Data, the university does not have to depend on the results of one examination only to make a decision on whether or not the candidate is qualified to enrol.
- Rather, with Big Data, it can now use a collection of information sources from the candidates' many years of schooling, allowing for more accurate prediction of the candidates' academic performance in university.
- This way, the likelihood that the university produces more excellent graduates is increased accordingly.

# How universities are taking advantage of Big Data

- Universities track students' learning habits such as time spent online, types of online websites frequented, participation in online forums, etc.
- All this data is studied to strategize on how to keep students academically abreast, which will assure a higher probability of academic success.



# How universities are taking advantage of Big Data

- When the lecturer sees a large number of failures, an investigation is performed to improve standard of teaching, content of the subject, etc.
- The university continuously gauge students' understanding and adjust teaching strategies to be more in line and relevant.



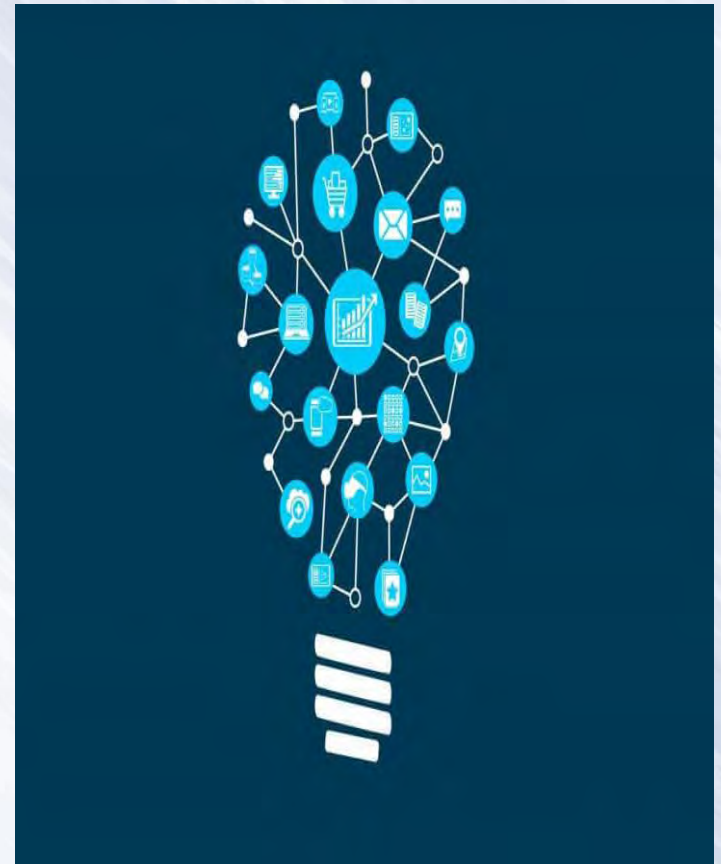
# How universities are taking advantage of Big Data



- The university creates customized learning programmes, thus letting the student to study at his/her own pace
- The university usually goes for 'blended learning' (combination of online & offline learning) to fulfil every student's learning needs

# How universities are taking advantage of Big Data

- Predictive analytics allows for insight into future student outcomes. Hence, employers can select students so that they acquire just the right amount of training and education matching their specific industry needs before graduation



# How universities are taking advantage of Big Data

Running scenario analysis and acting on the results in terms of curriculum evaluation save the university an enormous amount of money, time, and reputation.

	Range of possible futures (due to external drivers)				Present statistics derived from	
	A	B	C	D	reanalysis data	observations
0 (no adaptation)	<b>Baseline Scenarios</b>				<b>Reference Scenarios</b>	
<b>Strategic Adaptation Options</b>	I	<b>Alternative Future Scenarios</b>				
	II					
	III					
	IV					



# How universities are taking advantage of Big Data

- Actual data of post-graduation student performance predicts the performance of future graduates, hence helping potential students make informed decisions to choose the right university.



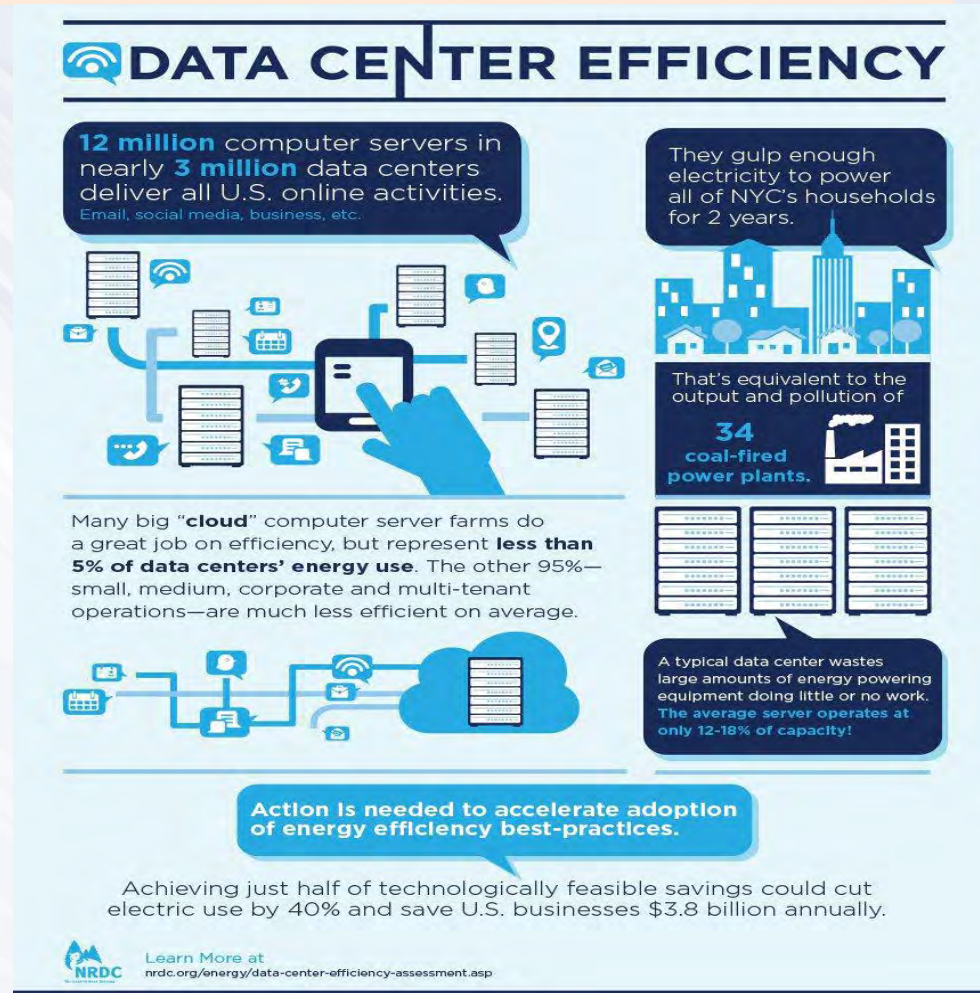
# How universities are taking advantage of Big Data



- Each staff member has a digital footprint – eg. teaching competency data, research competency data, salary, etc.
- All this are used to build the best ecosystem that produces the finest quality of work.

# How universities are taking advantage of Big Data

- Real-time data obtained from various devices used in the campus are collated to construct models of energy consumption
- These models track, forecast, and optimise campus energy utilisation with a view to reducing campus electricity bills



# **Big Data in Malaysian Higher Learning Institutions and UniMAP**

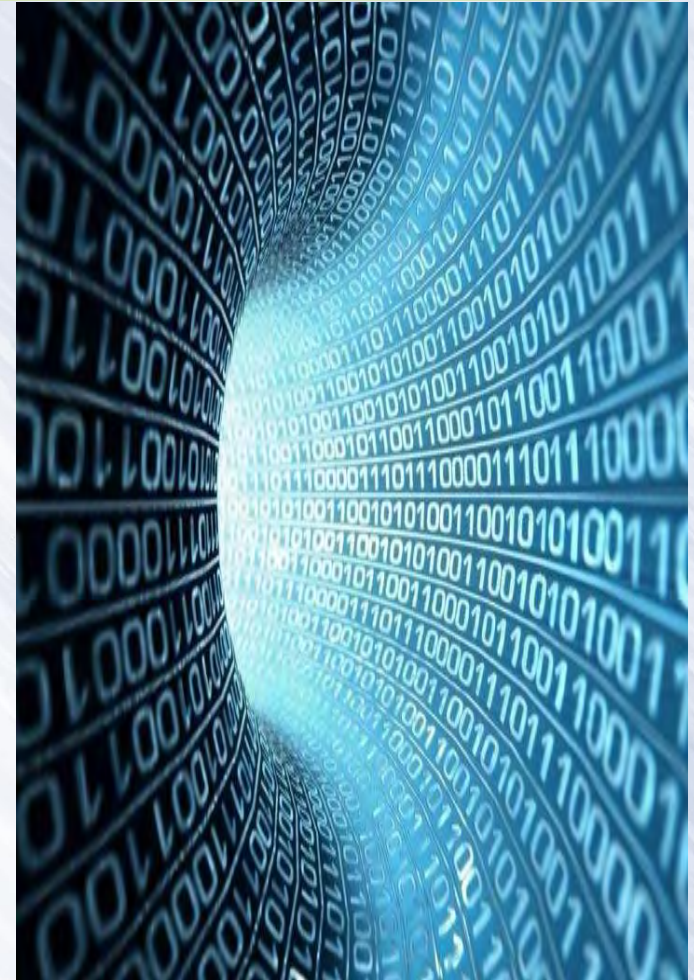
# Big Data in Malaysian Higher Learning Institutions and UniMAP

- Billions of Ringgit have been poured into developing the best ICT infrastructure since 2 decades ago, enabling the harnessing of Big Data easier.



# Big Data in Malaysian Higher Learning Institutions and UniMAP

- UniMAP uses a range of staff information (age, family statistics, and previous academic achievements, salary scale, promotion undertakings, number of leaves entitled and taken, research accomplishments, teaching successes, etc) to make decisions in the running of the university.
- However, the data is not yet linked in a way that will enable more informed decision-making to be carried out.



# Big Data in Malaysian Higher Learning Institutions and UniMAP

- We also work on a myriad of **student data** – accomplishments prior to entry into university, academic history, economic status, family standing, on-going learning progress, final academic achievements, etc



# Big Data in Malaysian Higher Learning Institutions and UniMAP

- We started e-learning about 15 years ago
- From more than 1200 courses we offer, 600 are available online – making for a blended learning package





# E-LEARNING LAB UniMAP User

## Visitor Counter



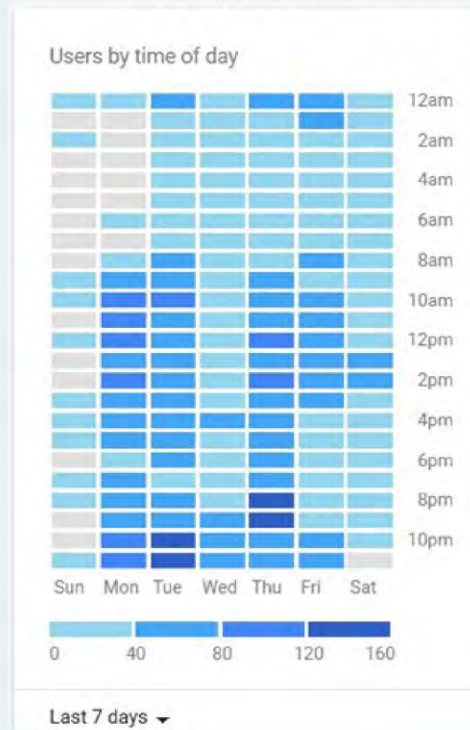
Users - 2,460  
Number of Sessions per User - 2.08  
Avg. Session Duration - 00:06:51

Sessions - 5,116  
Pages / Session - 8.62

New Users - 1,368  
Page Views - 44,087  
Bounce Rate - 23.03%

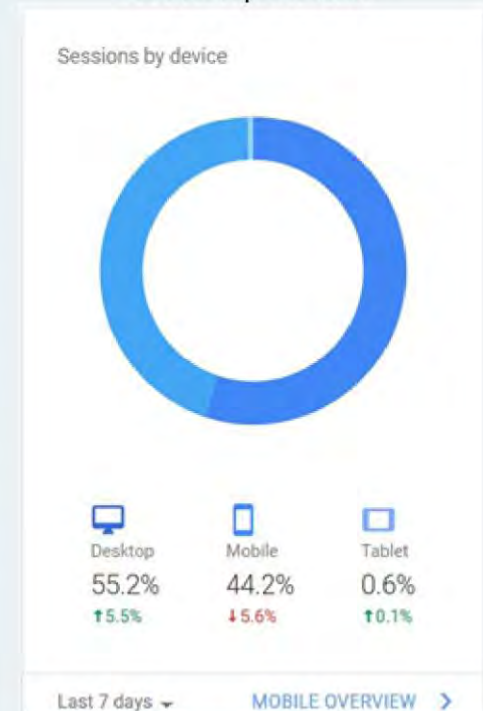
**Returning Visitor - 54.5%**  
**New Users - 45.5%**

## Users highest visit



Tuesday - 8.00 pm - 10.00 pm  
Thursday - 8.00 pm - 9.00 pm

## Users Top Devices



Desktop - 55.2%  
(↑ 5.5%)

Mobile - 44.2%  
(↓ 5.6%)

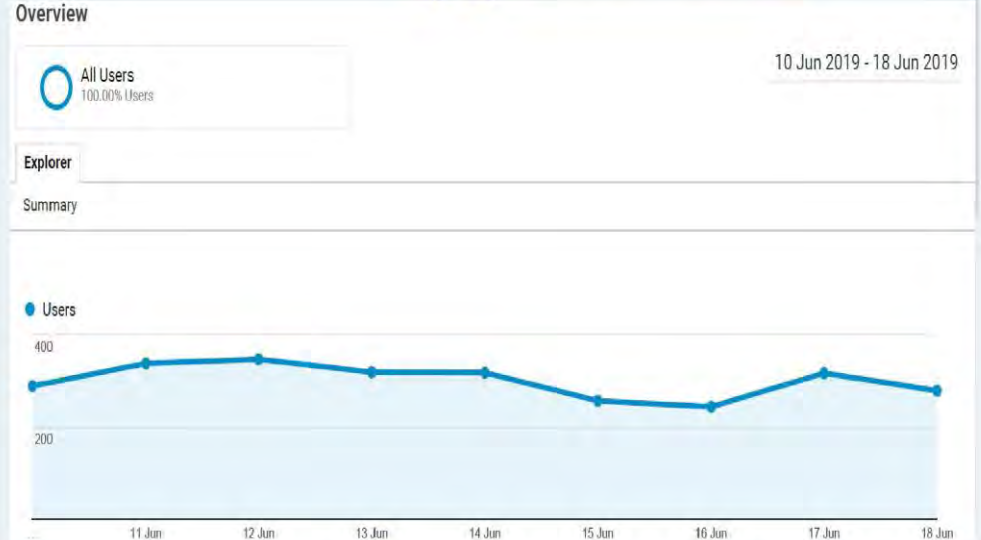
Tablet - 0.6%  
(↑ 0.1%)

# COURSE-hit

Most Frequently Viewed Course

# DEVICE

Most Frequently Used Devices



Page	Page Views	Unique Page Views	Avg. Time on Page	Entrances	Bounce Rate	% Exit	Page Value
	503	198	00:03:16	39	48.72%	32.60%	US\$0.00
	% of Total: 1.96%	% of Total: 1.20%	Avg for View : 00:00:57	% of Total: 1.00%	Avg for View : 25.07%	Avg for View : 15.18%	% of Total: 0.00%
	(25,664)	(16,477)	(244.43%)	(3,897)	(94.32%)	(114.72%)	(US\$0.00)
/elearning/course/view.php?id=23	503 (100.00%)	198 (100.00%)	00:03:16	39 (100.00%)	48.72%	32.60%	US\$0.00 (0.00%)

Device Category	Acquisition			Behavior			Conversions		
	Users	New Users	Sessions	Bounce Rate	Pages/Session	Avg. Session Duration	Goal Conversion Rate	Goal Completions	Goal Value
	1,680	573	3,897	25.07%	6.59	0:05:17	0.00%	0	US\$0.00
	% of Total: 100.00%	% of Total: 100.88%	% of Total: 100.00%	Avg for View : 25.07%	Avg for View : 6.59	Avg for View : 0:05:17	Avg for View : 0.00%	% of Total: 0.00%	% of Total: 0.00%
	(1680)	(568)	(3897)	(0.00%)	(0.00%)	(0.00%)	(0.00%)	(0)	(US\$0.00)
1. Desktop	996 (59.22%)	265 (46.25%)	2,483 (63.72%)	18.28%	7.43	00:06:17	0.00%	0 (0.00%)	US\$0.00 (0.00%)
2. Mobile	668 (39.71%)	297 (51.83%)	1,375 (35.28%)	37.16%	5.14	00:03:36	0.00%	0 (0.00%)	US\$0.00 (0.00%)
3. Tablet	18 (1.07%)	11 (1.92%)	39 (1.00%)	30.77%	3.69	00:02:16	0.00%	0 (0.00%)	US\$0.00 (0.00%)

# BROWSER

## Most Frequently Used Browser



Browser	Acquisition			Behavior			Conversions		
	Users	New Users	Sessions	Bounce Rate	Pages/Session	Avg.Session Duration	Goal Conversion Rate	Goal Completions	Goal Value
	% of Total : (1,680)	% of Total : (568)	% of Total : (3,897)	Avg for View : (0.00%)	Avg for View : (0.00%)	Avg for View : (0.00%)	Avg for View : (0.00%)	% of Total : (0.00%)	% of Total : (US\$0.00)
1. Chrome	1,318 (78.45%)	373 (65.10%)	3,212 (82.42%)	23.38%	6.87	00:05:26	0.00%	0 (0.00%)	US\$0.00 (0.00%)
2. Safari	117 (6.96%)	66 (11.52%)	253 (6.49%)	31.62%	5.37	00:04:40	0.00%	0 (0.00%)	US\$0.00 (0.00%)
3. Firefox	70 (4.17%)	22 (3.84%)	152 (3.90%)	17.76%	6.50	00:06:55	0.00%	0 (0.00%)	US\$0.00 (0.00%)
4. Andriod Webview	69 (4.11%)	62 (10.82%)	74 (1.92%)	62.67%	2.73	00:01:52	0.00%	0 (0.00%)	US\$0.00 (0.00%)
5. Opera	27 (1.61%)	8 (1.40%)	80 (2.05%)	31.25%	4.71	00:05:01	0.00%	0 (0.00%)	US\$0.00 (0.00%)
6. Edge	25 (1.49%)	6 (1.05%)	55 (1.41%)	23.64%	7.64	00:04:32	0.00%	0 (0.00%)	US\$0.00 (0.00%)
7. Safari (in-app)	18 (1.07%)	16 (2.79%)	19 (0.49%)	73.68%	1.74	00:00:16	0.00%	0 (0.00%)	US\$0.00 (0.00%)
8. Samsung Internet	18 (1.07%)	4 (0.70%)	30 (0.77%)	26.67%	5.17	00:02:27	0.00%	0 (0.00%)	US\$0.00 (0.00%)
9. UC Browser	8 (0.48%)	8 (1.40%)	8 (0.21%)	50.00%	2.88	00:01:50	0.00%	0 (0.00%)	US\$0.00 (0.00%)
10. Internet Explorer	5 (0.30%)	3 (0.52%)	8 (0.21%)	50.00%	3.88	00:04:40	0.00%	0 (0.00%)	US\$0.00 (0.00%)

# MAIN WEBSITE - PAGEVIEW

## Web Site Data Analysis



- Page Views -  
25,664

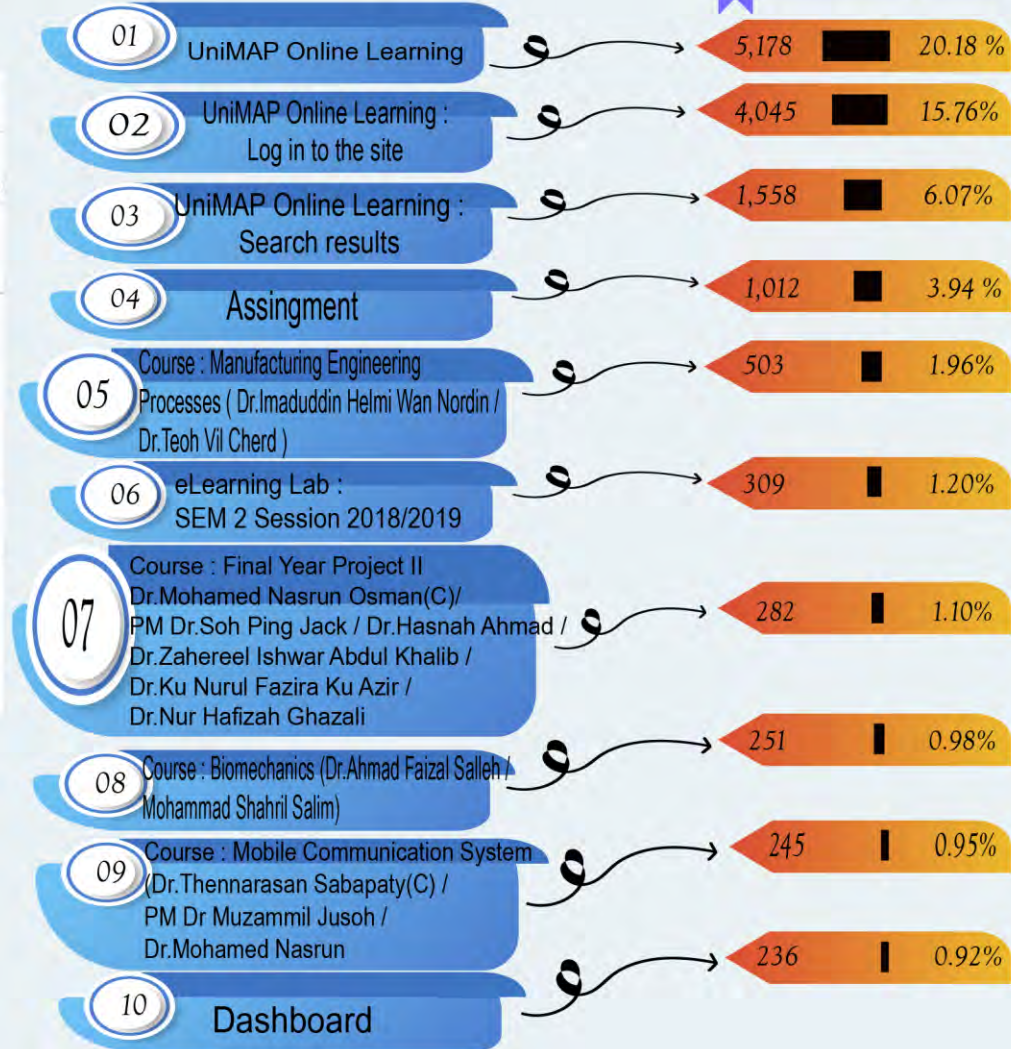
- Avg. Time on Pages -  
00:00:57

- Unique Page Views -  
16,477

- Bounce Rate -  
25.07%

- % Exit -  
15.18%

Page Views % Page Views





**THANK YOU**