Future Trends in Global Higher Education: The impact of the internet of things, artificial intelligence and virtual campus on campus based universities

Chair: Professor Mansoor Al Aali, President, Ahlia University
Getting Ready for the Virtual Intelligent Campus

Prof. Mansoor Alaali
President
Ahlia University
Kingdom of Bahrain
Ahlia University New Campus
Challenges of ... Higher Education in the 21\textsuperscript{st} Century

– 4\textsuperscript{th} and 5\textsuperscript{th} Industrial Revolutions
– Numerous knowledge sources
– Variety of Methods for getting and passing knowledge
– Gradual diminishing of classical legacy teaching and learning systems
– The concept of the Professor as a lecturer will evolve in unpredictable forms
Shape of ...
Future Higher Education

- Collaborative/Collective
- Empowering through alternative opportunities and multiple sources
- Knowledge-based and granular
- Technology-based
- Diverse
- New forms of governance
- New forms of operations/processes
Shape of ...
Future Higher Education

- Combination of:
  - Virtual campus
  - Intelligent tools-based learning
  - Physical campus
  - Many players
  - Many sources
  - Diminishing lecture-based
Campus Through...

- Distributed cognitive network
- Virtual academic staffing:
  - Virtual Professors
  - Local and International
- Virtual learning space/environment

Current Assessment of H.E. institutions

- QA
- Ranking
- Alumni follow-up
- Reputation Surveys
- Research Output

(1)

- Subjective
- Sample based
- Opinion based
- No real assessment from stakeholders
- No real measures of dynamism of curriculum
Confusion:
Universities have a daunting task of adapting to the rapid change in the job market and skills needed.

- How to teach?
- What to teach?
- When to teach?
- Where to teach?

- Where does a degree begin & end (BSc & MSc?)
- Should a degree have an end or should be updated like a license?
- Competition with Professional certifications
Future Degrees

- Granular rather than course blocks
- Granular assessments
- Variety of assessors
  - Work-related
  - Skills-related
  - Personal-related (confidence, commitment, interest, etc.)
  - Intellectual & academic-related

- Industry
- Society
- Academic
## Future Degrees

<table>
<thead>
<tr>
<th>Threatened:</th>
<th>Building blocks of knowledge:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Chapter</td>
<td>- Acquisition</td>
</tr>
<tr>
<td>- Course</td>
<td>- Build-up</td>
</tr>
<tr>
<td>- Degree</td>
<td>- Assessment</td>
</tr>
<tr>
<td>- Degree duration/length</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical and Virtual Supporters:</th>
<th>Different guides:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Professor</td>
<td>- Practical skills</td>
</tr>
<tr>
<td>- Industrialist</td>
<td>- Knowledge delivery</td>
</tr>
<tr>
<td>- Society experts (social)</td>
<td>- Intellectual &amp; Academic</td>
</tr>
<tr>
<td>- Governance of leadership</td>
<td></td>
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</tbody>
</table>
Future Considerations

- Classroom design (Physical/Virtual)
- Campus design (Physical/Virtual)
- Teaching methods (Virtual Learning)
- Educators
- Technology teaching support
- Smart web & intelligent tools
- Social Student Life
Future Considerations

- Student-University life
- Concept of the textbook
- Course design (granular/block)
- Lifelong learning assessment and degrees
- BSc, MSc and PhD .. time to replace these?
- Libraries (Virtual/Physical/Intelligent)
Major Anticipations (1)

– Length of degrees
– Quality Assurance for future courses and programmes
– Disappearing jobs and related education
– Titles of qualifications
– Role of Professors in teaching
Major Anticipations

- Campus shape and environment
- Virtual Reality for teaching and learning (creating artificial reality)
- Augmented Reality (presenting new information over the reality)
- Personalised learning trajectories
Conclusion

- University Campus shape, design and environment will slowly evolve, physically shrink but virtually grow
- Sematic and intelligent forms of knowledge will expand
- Roles of University Professors will change
Some Experiences of AI and Virtual Campus in Higher Education

Ari Visa
Professor, Dr. Tech.
Tampere University
Motivation to AI and Virtual Campus

- To cut expenses
- To improve quality
- To save working time
- To make distance studies possible
In Mathematics

Todennäköisyyslaskenta (luento-opetus, harjoitukset ja loppukoe, 26.8.-11.10.2019)

Tyyppityyppi / Opetus kurssin / Todennäköisyyslaskenta, syksy 2019 / Satukirjat / Satukirjat 4

Kysymys 1
Saatavaa muuttujaa $X$ on kertymäfunktio $F: R \rightarrow [0, 1]$,

$F(x) = \begin{cases} 0, & \text{kun } x < 0 \\ \frac{x^2}{2}, & \text{kun } 0 \leq x \leq 1 \\ 1, & \text{kun } x > 1. \end{cases}$

Määritä:

$P(X \leq 0.06)$

$P(X > 0.17)$

$P(0.27 < X \leq 0.61)$

Anna vastaukset neljän desimaalin tarkkuudella.

Kysymys 2
Saatavaa muuttujaa $X$ arvojoukko on $\{6, 7, 8, 9\}$. Satunnaismuuttujan pisteetodennäköisyydetuota finktion tiedetään saavan seuraavat arvot: $p_X(6) = 0.28$, $p_X(7) = 0.17$, ja $p_X(8) = 0.31$.

Mikä todennäköisyyskelpo saattamaa muuttujaa $X$ saa arvon 9?

Anna vastauksen tarkka arvona.

Vastaus: [ ]
In Computer Science

Course

1. Course arrangements, Setting Up Tools (gt)
2. HTML & CSS
3. JavaScript
   Fri, Sep 13 2019, 2 p.m. – Thu, Sep 26 2019, 11:59 p.m.
   Late submissions are allowed until Fri, Dec 13 2019, 11:50 p.m. but points are only worth 1%. 200 points required to pass the module.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Category</th>
<th>Submissions</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 JavaScript and jQuery Questionnaire</td>
<td>Online exercises</td>
<td>4/10</td>
<td>100 / 100</td>
</tr>
<tr>
<td>3.2 JavaScript Arrays and Functions</td>
<td>Online exercises</td>
<td>5/10</td>
<td>100 / 100</td>
</tr>
<tr>
<td>3.3 JavaScript Objects</td>
<td>Online exercises</td>
<td>4/10</td>
<td>100 / 100</td>
</tr>
<tr>
<td>3.4 jQuery Link Decoration</td>
<td>Online exercises</td>
<td>9/10</td>
<td>10 / 100</td>
</tr>
</tbody>
</table>

4. JavaScript and Ajax
   Opens Fri, Sep 27 2019, 2 p.m.

5. WETO peer-review exercises in Period2
   Opens Thu, Oct 22 2019, 2 p.m.

6. Lectures and videos
   0 / 0

Assignment

Assignment
Group formation
Conclusion

• It is not clear if automation will cut costs, improve quality or increase throughput
• The accessibility has improved
Developing an Innovative and Interdisciplinary Applied Artificial Intelligence degree, differently!

Professor Zahir Irani
Pro-Vice-Chancellor (Academic, Innovation and Quality)
University of Bradford, UK

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Future Trends in Global Higher Education:

• **Project Brief:**
  Develop an Innovative and Interdisciplinary Applied Artificial Intelligence degree, differently.

• **Project Team:**
  Me (sponsor), Prof Ugail, Dr Sivarajah, Faculty AI Leads.

• **Market Differentiator:**
  a. Applied (not CS in nature), b. Project based, c. AI Techniques, Problem Solving, ethics, d. Interdisciplinary and, e. Pedagogy

• **Development Principles:**
  Market insight, CDIO scaffolding, Co-created with students and corporates – market driven but employer focused.
Future Trends in Global Higher Education:

How do universities prepare graduates for jobs that don’t yet exist?

Most children today will work in jobs that haven’t been invented. They need their education system to keep up.

The Jobs Landscape in 2022

Emerging roles, global change by 2022

- Data Analysts and Scientists
- AI and Machine Learning Specialists
- General and Operations Managers
- Software and Applications Developers and Analysts
- Sales and Marketing Professionals
- Big Data Specialists
- Digital Transformation Specialists
- New Technology Specialists
- Organisational Development Specialists
- Information Technology Services

Top 10 Emerging

- 133 Million

Declining roles, global change by 2022

- 75 Million

Top 10 Declining

1. Data Entry Clerks
2. Accounting, Bookkeeping and Payroll Clerks
3. Administrative and Executive Secretaries
4. Assembly and Factory Workers
5. Client Information and Customer Service Workers
6. Business Services and Administration Managers
7. Accountants and Auditors
8. Material-Recording and Stock-Keeping Clerks
9. General and Operations Managers
10. Postal Service Clerks

Future Trends in Global Higher Education:

Principles that distinguish our Group based, relationship based programme:

- Market insight and Energy driven by like-minded people
- Developed with disruption in mind
- Co-created structure and content
- Spin *in-and-out* development (anti-disciplinary)
- Cultivate potential of industry partners
- Anchor to Strategic Priorities (Advanced Healthcare, Innovative Manufacturing, Sustainable Societies)
- ‘Badge’ with micro-credentials (ideally digital)
- Curriculum framework and placement opportunities
- Advisory Board

CoCreate @Bradford
Future Trends in Global Higher Education:

CoCreate @Bradford

Co-creation workshop that included:

IBM  Microsoft  SAS  Certified by The Next Minds  City of Bradford Metropolitan District Council  Bupa  Amazon  SAP
Future Trends in Global Higher Education:

Programme Learning Outcomes:

To be eligible for an award, students will be able to:

1. Describe the nature, scope and potential for AI applications along with the underpinning concepts and principles

2. Define user requirements as part of user centred design of AI solutions

3. Evaluate AI applications

4. Design, implement, test and evaluate AI applications

5. Apply AI to analyse a range of different data sources

6. Work effectively as part of a team
Future Trends in Global Higher Education:

### Fundamentals
- Design, Test and Evaluate AI Solutions
- Fundamentals of AI and Data Analytics
- AI Methods and Models 1
- AI Methods and Models 2

### Intermediate
- CDIO Subject Project
- Data Science for AI
- Discipline Specific AI
- Safe AI - Ethics, legal and governance
- Personal and professional skills

### Advanced
- CDIO Industry capstone
- Advanced machine learning
- Entrepreneurship, Creativity and Innovation
- Neural Networks and Fuzzy Systems*
- Financial and Project Management*
- AI for Games*
- Data Visualisation*

*Optional
Future Trends in Global Higher Education:

Projects will be grouped into one of three themes:

1. Bradford Challenge: Projects supplied by local companies

2. Industrial Strategy: Data revolution, Ageing society, Clean growth (low carbon) and Future of Mobility.

3. UN SDGs: Any of the 17 UN SDGs

Sample Project Title:

- Financial fraud analysis using AI techniques
- The ethics of using AI for skills-based hiring
- AI for optimising digital advertising campaigns
- AI applications for tackling food security
- Impact of AI application for small businesses
- Optimizing road gritting, cleaning and maintenance routes
- Using blockchain to prevent fraud and replication
Preparing Universities for the Upcoming AI Innovations

Dr M M Ramya
Professor
Centre for Automation & Robotics
Hindustan Institute of Technology & Science
India
Impact of AI Solutions

- AI solutions are slowly making a profound impact on our daily lives:
  - social media to speech recognition
  - radiology to retail
  - warfare to writing articles
  - coding to customer service
  - robotics to route optimization
AI for University

- Automate Administrative Tasks
- Student Acquisition
- Personalized Learning
- Smart Campus
- Predictive Analytics
- Moving beyond classroom
- Improving the ability to teach
Key areas that AI is Influencing in Universities

- **Student acquisition:** With personalized assistance around the clock, AI can help institutions achieve higher enrollment and retention rates.

- **Learning and instruction:** Faculty members could have more time to engage with students while AI helps with grading and supplying basic resources for students.

- **Student affairs:** With AI, students could receive resources such as tutoring or advising based on their previous and predicted academic performance.

- **Institutional efficiency:** AI could use information from multiple campus systems to guide administrative decisions and tailor curricula toward employers’ hiring needs.
Man Vs Machine Intelligence

Things Human are good at

- Creativity and reasoning
- Personal Connections
- Innovation and Flexibility

Things AI is good at

- Pattern Recognition
- Making data driven decisions
- Prediction
Oxford Dictionary definition of ‘explainable’:

- A statement or account that makes something clear, a reason or justification given for an action or belief
Challenges in AI solutions for Academia

None of the AI systems are actually explainable!!
Explainable AI (XAI)

Explainability of complex machine learning models is crucial

Trust

Justification

Derive robust Insights
Today

1. Training Data
2. Machine Learning Process
3. Learned Function

User
- Why did you do that?
- Why not something else?
- When do you succeed?
- When do you fail?
- When can I trust you?
- How do I correct an error?

XAI

1. Training Data
2. New Machine Learning Process
3. Explainable Model
4. Explanation Interface

User
- I understand why
- I understand why not
- I know when you succeed
- I know when you fail
- I know when to trust you
- I know why you erred
Making XAI innovations a reality

- XAI tasks require massive amounts of data, universities should begin to aggregate and maintain their data
  - adoption of a data lake architecture
  - create robust machine-learning models capable of making far more accurate predictions to benefit Universities
Competitions on XAI solutions

It is both fascinating and rewarding to find ways to put our technological capacity to use improving the offerings of higher education institutions.
• Goal of all these incremental improvements is to make a difference in the lives of students, empowering them to earn their degrees and achieve their long-term goals

• Lets work together and build together, and as we do that, the real solution will begin!!
Discussion