# Non-repository Uses Of Moodle Through Mobile Access: Students' Usage Patterns And Perceptions

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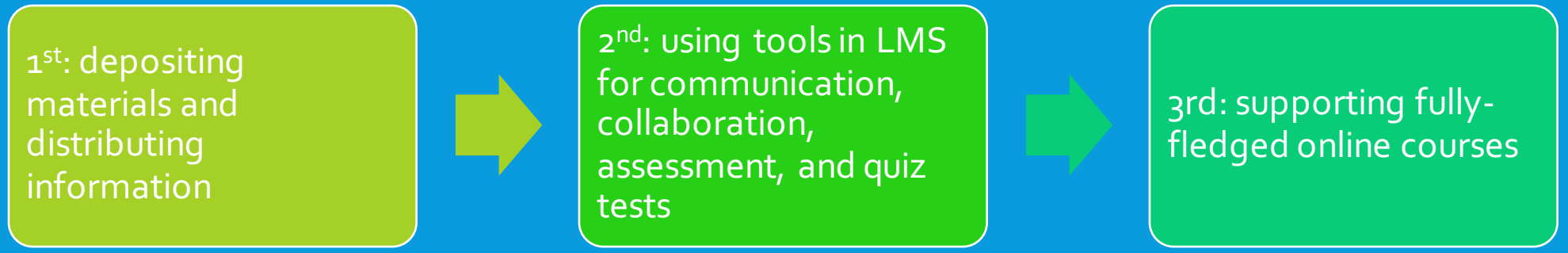
# LEARNING MANAGEMENT SYSTEMS

- LMS = a learning platform that can incorporate rich multi-media resources and a wide range of activities, e.g. databases, forums, quizzes & wikis
- Adopted by higher institutions around the world
- Moodle: registered in **1800+** sites in **120+** countries, in **60** languages (Hajjar, 2014)

# NON-REPOSITORY USES OF LMS

- Francis and Raftery (2005) defined three levels of LMS usage:




- E-learning platforms are often under-used (Nichols, 2008) → only as a **repository** of contents (Susana et al., 2015)
- LMS → **non-repository uses** are preferred
  - e.g. online quizzes, tests & short exercises; as a platform for interaction and collaboration (Cho et al., 2014)

# M-LEARNING AND LMS

- LMS: Moodle, Blackboard, SOUL, etc.
  - Widely adopted in higher institutions around the world
  - Moodle: 1800+ sites in 120+ countries, in 60 languages (Hajjar, 2014)
- Mobile learning (m-learning) facilitates teaching and learning (Rath, 2015)
  - Gaining more popularity (Peters, 2007)
- M-learning + LMS
  - An emerging research direction (Hu et al., 2016)
- Aim of current research:
  - To explore students' usage of and perceptions on mobile access to LMS **for non-repository purposes**

# METHODOLOGY

- A mixed method approach
- Participants = 316 undergraduate and postgraduate students (and 5 instructors) from 9 courses in 4 faculties at HKU
- Surveys and interviews (with both students and instructors) conducted at the END of the courses
- Data collection period: 1st Semester, 2015-2016

# METHODOLOGY

- Main instrument → questionnaire
  - "Experience of using LMS/Moodle of a course"
  - "Experience of using Moodle of the course **through mobile access**"
  - "Opinions on using LMS/Moodle of the course" [UTAUT Model]
  - "Opinions on using the course Moodle **through mobile access"**
- Follow-up semi-structured interviews
  - To elicit students' open-ended opinions on using Moodle through computer and mobile access

# Distribution Of Moodle Activities Across Courses (Document Analysis)

| Moodle Activities | Social Sciences | Engineering | Education | | | | Humanities and Arts | | |
|---|---|---|---|---|---|---|---|---|---|
| | Course 1 | Course 2 | Course 3 | Course 4 | Course 5 (PG) | Course 6 (PG) | Course 7 | Course 8 | Course 9 |
| accessing resources | 72 | 83 | 27 | 37 | 62 | 38 | 175 | 136 | 68 |
| submitting assignments | 0 | 18 | 3 | 1 | 4 | 3 | 5 | 1 | 0 |
| taking tests | 0 | 13 | 2 | 9 | 3 | 1 | 0 | 15 | 0 |
| interaction | 1 | 4 | 13 | 5 | 14 | 11 | 8 | 3 | 1 |
| collaboration | 0 | 1 | 5 | 3 | 0 | 6 | 1 | 0 | 9 |
| Total | 73 | 118 | 45 | 52 | 83 | 59 | 189 | 154 | 78 |

# Frequency Of Using Moodle Through Mobile Access *Across Disciplines*

Ratings are based on a 7-point Likert-type scale: 1 – "never", 7 – "Several times a day".

WHY?

| Moodle activities | | Humanities and Arts | Education | Social Science | Engineering | Sig. Kruskal-Wallis |
|---|---|---|---|---|---|---|
| accessing resources | N | 56 | 94 | 72 | 94 | .000** |
| | Mean | 4.14 | 4.01 | 3.15 | 4.09 | |
| | Median | 4.00 | 4.00 | 3.00 | 4.00 | |
| | SD | 1.50 | 1.76 | 1.37 | 4.46 | |
| submitting assignments | N | 56 | 94 | 72 | 94 | .000** |
| | Mean | **2.34** | 2.09 | **1.56** | 3.06 | |
| | Median | 1.00 | 1.00 | 1.00 | 3.00 | |
| | SD | 1.83 | 1.69 | 1.20 | 1.67 | |
| taking tests | N | 56 | 94 | 71 | 94 | .000** |
| | Mean | 2.18 | 2.04 | 1.48 | **3.35** | |
| | Median | 1.00 | 1.00 | 1.00 | 4.00 | |
| | SD | 1.72 | 1.49 | 1.080 | 1.53 | |
| interaction | N | 56 | 94 | 72 | 93 | .000** |
| | Mean | 2.25 | **2.30** | 1.54 | 2.78 | |
| | Median | 2.00 | 2.00 | 1.00 | 2.00 | |
| | SD | 1.64 | 1.56 | 1.20 | 1.64 | |
| collaboration | N | 56 | 94 | 72 | 94 | .000** |
| | Mean | 2.20 | 2.13 | 1.53 | 2.70 | |
| | Median | 1.00 | 1.00 | 1.00 | 2.00 | |
| | SD | 1.72 | 1.60 | 1.17 | 1.57 | |

# Comparison On Moodle Activities

| Moodle Implementations | Social Sciences (Course 1) | Engineering (Course 2) |
|---|---|---|
| **Assignment submission** | • NO (Hard copy)<br>• Automatic email reminder | • Multiple Turnitin assignment links |
| **Test-taking** | • NO (no such assessment tasks) | • In-class short quizzes |
| **Interaction** | • NO | • Supplemented by Moodle<br>• Encouraged student-student / student-instructor communication through Moodle (e.g. Forums) |
| **Collaboration** | • NO (not required) | • Links of group Google Docs on Moodle |
| | | |
| **Instructors' opinions** | • Moodle = repository of resources<br>• Not familiar with some features/functions on Moodle<br>• Not always available to attend Moodle training workshops | • Comprehensive use of Moodle in spite of some inevitable backfire<br>• Need to look at effectiveness of some implementations |

# COMPUTER ACCESS VS. MOBILE ACCESS

| Moodle activities | | Humanities and Arts | | | Education | | | Social Science | | | Engineering | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PC | Mobile | Sig. Mann-Whitney | PC | Mobile | Sig. Mann-Whitney | PC | Mobile | Sig. Mann-Whitney | PC | Mobile | Sig. Mann-Whitney |
| accessing resources | N | 55 | 56 | .020* | 94 | 94 | .000** | 72 | 72 | .000** | 94 | 94 | .027* |
| | Mean | 4.80 | 4.14 | | 5.53 | 4.01 | | 4.50 | 3.15 | | 4.66 | 4.09 | |
| | Median | 5.00 | 4.00 | | 5.00 | 4.00 | | 4.00 | 3.00 | | 4.00 | 4.00 | |
| | SD | 1.22 | 1.50 | | 1.08 | 1.76 | | 1.02 | 1.37 | | .979 | 4.46 | |
| submitting assignments | N | 56 | 56 | .000** | 94 | 94 | .000** | 72 | 72 | .000** | 94 | 94 | .000** |
| | Mean | 3.57 | 2.34 | | **4.10** | **2.09** | | 2.31 | 1.56 | | 4.30 | 3.06 | |
| | Median | 3.00 | 1.00 | | 4.00 | 1.00 | | 2.00 | 1.00 | | 4.00 | 3.00 | |
| | SD | 1.52 | 1.83 | | 4.42 | 1.69 | | 1.47 | 1.20 | | .993 | 1.67 | |
| taking tests | N | 56 | 56 | .005** | 94 | 94 | .000** | 72 | 71 | .037* | 93 | 94 | .000** |
| | Mean | 2.95 | 2.18 | | 2.87 | 2.04 | | 1.83 | 1.48 | | 4.31 | 3.35 | |
| | Median | 3.00 | 1.00 | | 2.00 | 1.00 | | 1.00 | 1.00 | | 4.00 | 4.00 | |
| | SD | 1.71 | 1.72 | | 1.59 | 1.49 | | 1.31 | 1.08 | | .932 | 1.53 | |
| interaction | N | 56 | 56 | .003** | 94 | 94 | .000** | 72 | 72 | .074 | 94 | 93 | .198 |
| | Mean | 2.96 | 2.25 | | **3.81** | **2.30** | | 1.76 | 1.54 | | **3.06** | **2.78** | |
| | Median | 3.00 | 2.00 | | 4.00 | 2.00 | | 1.00 | 1.00 | | 3.00 | 2.00 | |
| | SD | 1.54 | 1.64 | | 1.37 | 1.56 | | 1.25 | 1.20 | | 1.57 | 1.64 | |
| collaboration | N | 56 | 56 | .121 | 94 | 94 | .000** | 72 | 72 | ..342 | 94 | 94 | .001** |
| | Mean | 2.59 | 2.20 | | **3.56** | **2.13** | | 1.71 | 1.53 | | 3.53 | 2.70 | |
| | Median | 2.00 | 1.00 | | 4.00 | 1.00 | | 1.00 | 1.00 | | 4.00 | 2.00 | |
| | SD | 1.75 | 1.72 | | 1.38 | 1.60 | | 1.27 | 1.17 | | 1.52 | 1.57 | |

# Unified Theory Of Acceptance And Use Of Technology

5 core constructs:

**1. Performance Expectancy**

"If I used Moodle of this course via mobile phones, my chances of getting a better grade would be higher."

**2. Effort Expectancy**

"Learning to operate the Moodle of this course via mobile phones was easy for me."

**3. Social Influence**

"In general, my department/faculty/university supported the use of Moodle of this course via mobile phones."

**4. Facilitating Conditions**

I had the resources necessary to use of the Moodle of this course via mobile phones.

**5. Behavioral Intent**

If a future course has a similar Moodle, I intend to actively use it via mobile phones.

# Opinions On Moodle Usage Through Mobile Access

| | | Humanities and Arts | Education | Social Science | Engineering | Sig. Kruskal-Wallis |
|---|---|---|---|---|---|---|
| **Performance Expectancy** | N | 54 | 92 | 67 | 93 | .001** |
| | Mean | 3.74 | 3.36 | 3.48 | 4.00 | |
| | Median | 4.00 | 3.50 | 3.75 | 4.00 | |
| | S.D. | 1.29 | 1.30 | 1.15 | 1.11 | |
| **Effort Expectancy** | N | 54 | 94 | 67 | 93 | .084 |
| | Mean | 3.73 | **3.55** | 3.66 | 3.98 | |
| | Median | 4.00 | 3.86 | 4.00 | 4.00 | |
| | S.D. | 1.28 | 1.25 | 1.08 | 1.12 | |
| **Social Influence** | N | 54 | 93 | 67 | 93 | .002** |
| | Mean | 3.83 | 3.27 | 3.43 | 3.89 | |
| | Median | 4.00 | 3.25 | 4.00 | 4.00 | |
| | S.D. | 1.26 | 1.24 | 1.08 | 1.10 | |
| **Facilitating Conditions** | N | 54 | 94 | 67 | 93 | .017* |
| | Mean | **3.85** | 3.53 | **3.74** | **4.05** | |
| | Median | 4.00 | 4.00 | 4.00 | 4.00 | |
| | S.D. | 1.40 | 1.18 | 1.14 | 1.15 | |
| **Behavioral Intent** | N | 54 | 94 | 67 | 93 | .020* |
| | Mean | **3.85** | 3.41 | 3.61 | 3.98 | |
| | Median | 4.00 | 4.00 | 4.00 | 4.00 | |
| | S.D. | 1.40 | 1.33 | 1.23 | 1.13 | |

# Factors Affecting Moodle Usage Through Mobile Access

- "How would **students' opinions on Moodle usage through mobile access** influence the corresponding **access frequencies**?"

**Assignment submission** on Moodle through mobile access

| Construct | Coefficient | S.D. | Sig. |
|---|---|---|---|
| Performance Expectancy | .519 | .178 | **.004**** |
| Effort Expectancy | -.117 | .201 | .561 |
| Social Influence | .490 | .187 | **.009**** |
| Facilitating Conditions | -.185 | .187 | .322 |
| Behavioral Intent | -.213 | .160 | .186 |
| $R^2$ | .149 | | |

**Test-taking** on Moodle through mobile access

| Construct | Coefficient | S.D. | Sig. |
|---|---|---|---|
| Performance Expectancy | .581 | .165 | **.000**** |
| Effort Expectancy | -.284 | .186 | .128 |
| Social Influence | .537 | .173 | **.001*** |
| Facilitating Conditions | -.091 | .173 | .600 |
| Behavioral Intent | -.233 | .148 | .117 |
| $R^2$ | .200 | | |

# Factors Affecting Moodle Usage Through Mobile Access

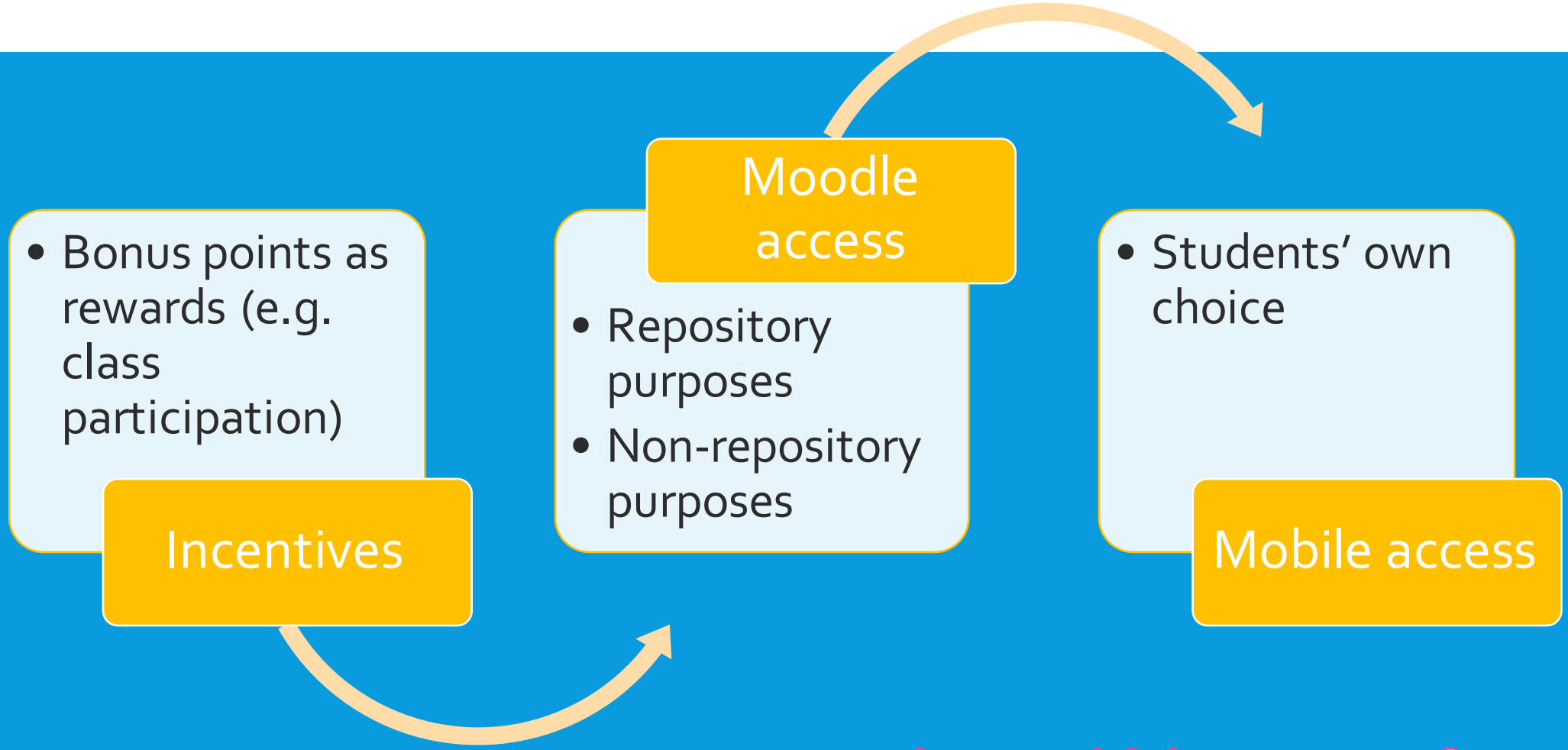
**Interaction** on Moodle through mobile access

| Construct | Coefficient | S.D. | Sig. |
|---|---|---|---|
| Performance Expectancy | .454 | .160 | **.005**** |
| Effort Expectancy | -.240 | .181 | .187 |
| Social Influence | .438 | .167 | **.009**** |
| Facilitating Conditions | .161 | .168 | .339 |
| Behavioral Intent | -.216 | .144 | .134 |
| $R^2$ | .210 | | |

**Collaboration** on Moodle through mobile access

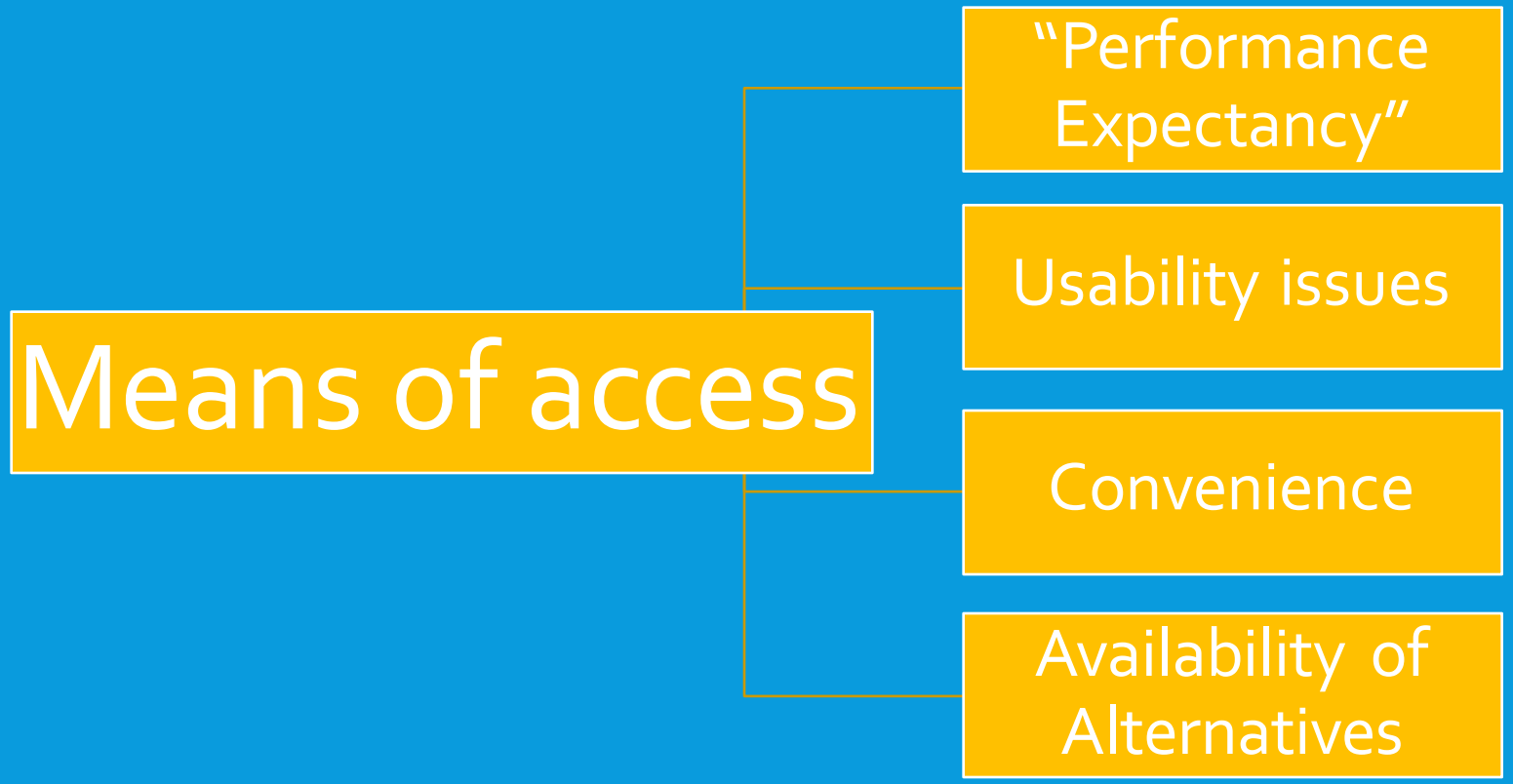
| Construct | Coefficient | S.D. | Sig. |
|---|---|---|---|
| Performance Expectancy | .428 | .161 | **.008**** |
| Effort Expectancy | -.259 | .182 | .157 |
| Social Influence | .526 | .169 | **.002**** |
| Facilitating Conditions | .128 | .169 | .451 |
| Behavioral Intent | -.280 | .145 | .055 |
| $R^2$ | .187 | | |

# SUMMARY OF INTERVIEWS (1)




Then, which means of access?

# SUMMARY OF INTERVIEWS (2)



# SUMMARY OF RESULTS

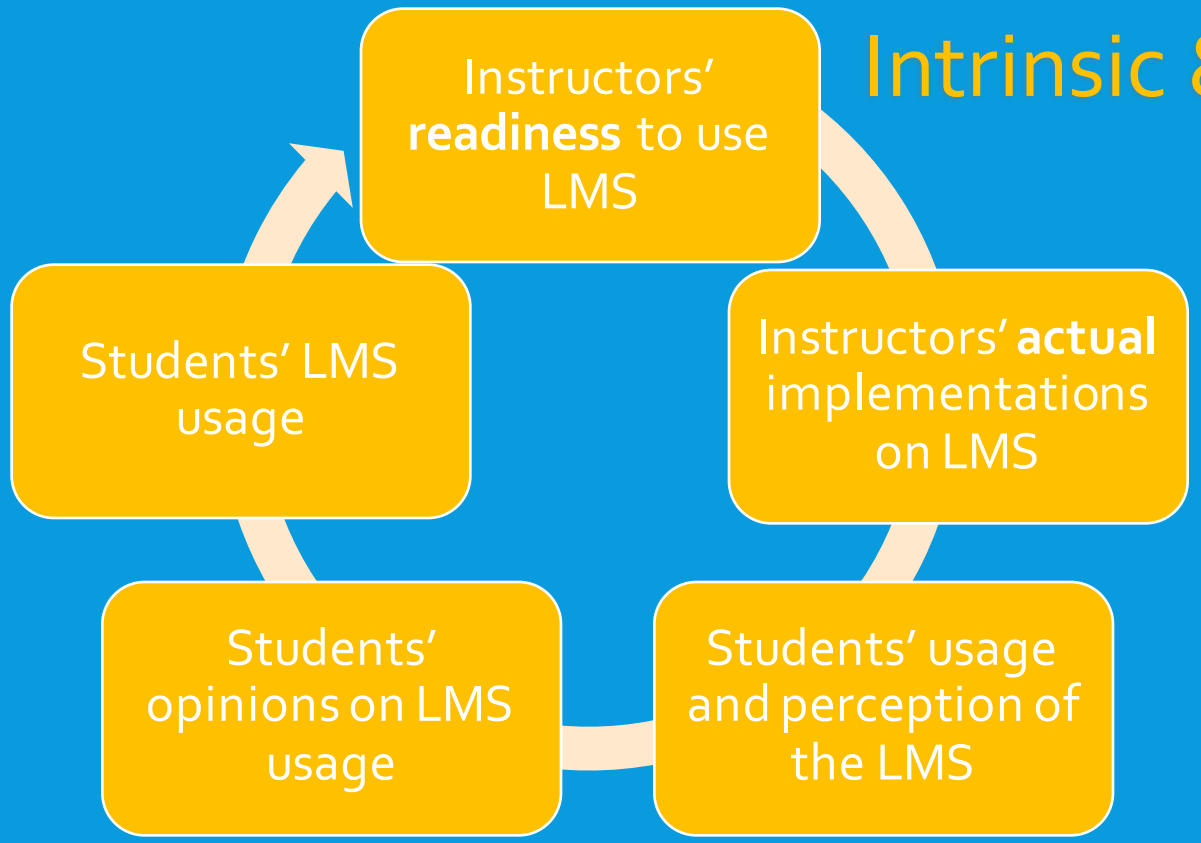
- Students' usage of Moodle for **non-repository uses** through mobile access was not as frequent as computer access
  - remained between the 1st and 2nd levels of LMS usage in Francis and Raftery's model (2005)
- *Performance Expectancy* and *Social Influence* tended to affect students' frequency of mobile access to non-repository Moodle activities
- Choice of means of access to Moodle also depends on other factors, e.g. usability issues; availability of the **alternative means** (i.e. computer)

# SUGGESTIONS

- Instructors (or the instructional team) fully utilize Moodle to facilitate their courses (both repository and non-repository uses)
- **Performance Expectancy**: students need to grasp how Moodle activities are helpful for achieving learning outcomes
- **Social Influence**: Instructors, departments/faculty, University need to advocate & encourage the use of Moodle*
- To make the mobile version of Moodle easier to use (e.g. usability, a native Moodle App, etc.)
- **Convenience**: important for mobile access → to create simplistic and low-stake activities

# DISCUSSION

- Successful implementation of web-based learning systems (e.g. LMS) is related to academics' readiness to use the systems (Condie and Livingson, 2007)




Intrinsic & Extrinsic factors!

# FUTURE WORKS

- To employ Structural Equation Model (SEM) for further investigating which factor (in UTAUT) possesses larger connections with usage (Intent / Actual)
- To add Moodle log files as a data source for objectivity (e.g. Moodle access frequency)
- To compare data between this round (2015-2016) and a previous round (2014-2015)

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# THANK YOU!

Please feel free to give us any suggestions or comments!


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