

## Cognition and Handheld Devices

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CRN: 21143 - HUDK 6630B - 3 Credits - July 7 – Aug 17 (Summer B) – Tue/Thur - Time TBA

### Course Description

This course takes an in-depth look at the cognitive effects of the use of handheld devices. It also explores how these individual events affect the surrounding environment and society at large.

Rapid technological advancements have afforded increased technical power in the palm of our hands. With that power, various issues abound, ranging from personal to practical cognitive choices. Should I read an entire book or only an abstract on my handheld? Should I type a lengthy email response on my handheld device? Is a handheld appropriate for all or some types of course material? What occurs when I am mobile and engage in any or more of these types of activities? These and many others types of questions will be considered. Current and relevant topics include, but are not limited to, overload of information, distractions and social (lack of) presence. In this course, you will learn: (1) about the different cognitive affordances associated with handheld devices; (2) theoretical underpinnings for education delivered on handheld devices; (3) how to critically analyze practical handheld applications and their effectiveness. The course will provide you with a deeper understanding of cognitive implications that can be used on and with handheld devices.

### Course Purpose

The increasing availability and growing number of handheld devices, in conjunction with wireless networks, allows for an array of learning opportunities, but with constant innovations and changes, there is limited understanding of the cognitive configurations that abound with such educational opportunities.

The Cognition and Handheld Devices course seeks to determine how handheld devices (HDs), which include, but are not limited to, cellphones, personal digital assistants, and mobile gaming devices, is processed cognitively, on-the-go in different contexts, and could inform and enhance learning and teaching in various formal and informal settings.

Wireless handheld devices are flexible and economical while at times also connectable, accessible, and even wearable. The cognition and handheld device course has the potential to productively employ these characteristics for ubiquitous in-hand technology and learning. Technology and learning that is already unobtrusively threaded in the fabric of everyday practices. Participants will explore and use an array of available handheld devices, while paying close attention to the rich cognition inherent in interacting with these devices. Practical in-class demonstrations will also expose class participants to the multitude HD capabilities, and unpack the cognitive processes related to handheld computing.

Although the Cognition and Handheld device course is structured for face-face-in class instruction, it will also employ blended learning pedagogical principles with combinations of interactive online sessions, in-person interactive and hands-on demonstrations.

### **Prerequisites**

There is no prerequisite for this course. Regardless of your cognition or handheld experience, you will gain an understanding of the learning foundation, technology and theoretical considerations surrounding cognition and how it applies to handheld use.

### **Method of Evaluation**

#### **Assignments:**

- All assignments are due as indicated on the syllabus.
- Assessment rubrics are provided for the assignments.
- A final project will be required.
- Students will submit the assignments as indicated in the ClassWeb Outline.
- Students will present to the class the results of their work.
- Attendance is mandatory for presentations.
  
- Your assessment will be based upon the assignments, group work, attendance and final project.
- See Rubric Appendice

### **Course Instructor**

Dominic Mentor is a Fulbright doctoral student at Columbia University Teachers College, pursuing an EdD in Communication, Computing, and Technology in Education program within the department of Mathematics, Science & Technology. His research interests include issues in mobile communication and social connectedness, mobile portable communities, mLearning, computer assisted language learning, teacher technology training, hypermedia design, including online formative and summative assessment practices. After completing a Bachelors and Honours Degree in English at the University of the Western Cape, he served as teacher and contributor to learning materials for ESL publications as well as a series of modular textbooks. While completing his Masters at Stellenbosch University, he designed and launched an online computer assisted language learning program for ESL students in the Western Cape province of South Africa. While teaching in the Higher Education environment, he also serves as presenter in various teacher and research conferences as well as coordinating professional development computer technology workshops.

Nabeel Ahmad (na2189@columbia.edu) holds a doctorate in Instructional Technology and Media from Teachers College, Columbia University. His research focus is on how handheld

devices can be used in the workplace for learning. Nabeel holds degrees in business, technology and education and has worked in the financial and technology sectors developing e-learning and mobile learning solutions.

## **Grading Policies**

- Final grade is calculated from the grades on each assignment

Assessment rubrics provide the details of the minimum requirements for each assignment and how the assignment will be graded

We give out grades of "Incomplete" very rarely. Not having the final project/paper done by the end of class is not sufficient reason for an incomplete grade unless there are truly extenuating circumstances, usually supported by a physician's documentation.

The grade of Incomplete will be assigned only when the course attendance requirement has been met but, for reasons satisfactory to the instructor, the granting of a final grade has been postponed because certain course assignments are outstanding. If the outstanding assignments are completed within one calendar year from the date of the close of term in which the grade of Incomplete was received and a final grade submitted, the final grade will be recorded on the permanent transcript, replacing the grade of Incomplete, with a transcript notation indicating the date that the grade of Incomplete was replaced by a final grade. If the outstanding work is not completed within one calendar year from the date of the close of term in which the grade of Incomplete was received, the grade will remain as a permanent Incomplete on the transcript. In such instances, if the course is a required course or part of an approved program of study, students will be required to re-enroll in the course including repayment of all tuition and fee charges for the new registration and satisfactorily complete all course requirements. If the required course is not offered in subsequent terms, the student should speak with the faculty advisor or Program Coordinator about their options for fulfilling the degree requirement. Doctoral students with six or more credits with grades of Incomplete included on their program of study will not be allowed to sit for the certification exam.

## **Method of Instruction**

The course periods are divided between reading discussions, handheld device examples, hands-on work and lectures.

Students will do individual work. They will use theoretical foundations relevant to mobile learning and present the results of their work.

ClassWeb or an equivalent Course Management System will form an integral part of the class. Students must develop proficiency with using the various aspects of ClassWeb.

## **Reading Requirements**

There is no textbook for this class. Required readings and their references are listed on ClassWeb.

It is your responsibility to check ClassWeb for readings and make personal copies, if needed. Each reading assignment should be completed before the class in which it will be discussed.

NOTE: Check ClassWeb often with regard to readings and other information. Class readings will be posted as "PDF" files on ClassWeb.

### **3 Credit course - Cognition and Handheld Devices**

The course will be offered as a 3 credit course. Students will also focus on the learning foundations of examining the theoretical foundation connection to learning and handheld devices, including their interfaces and capabilities. In addition, they will look at the practical uses of Cognition and Handheld devices for learning and functionalities. They will also pay close attention to design considerations while not losing sight of theoretical considerations. These candidates will also be looking at what to consider theoretically and pedagogically when investigating Cognition and Handheld devices. They will apply that knowledge to the conceptual design of a paper or project showing cognition and mobility at play. Candidates will thus be required to show the following proficiencies:

- Demonstrate knowledge on the connection between cognition and handheld devices
- Be able to determine and utilize appropriate cognition and handheld device literature
- Demonstrate an understanding of the relation between cognition and handheld devices
- Design activities exhibiting cognition on handheld devices

### **Responsibilities and Expectations**

- Students are responsible for their own learning
- Students may monitor their progress by reviewing the grade book
- Students are expected to be respectful of their class mates
- Students are expected to request help or clarification when they feel it is needed.

### **Information for Students with Disabilities:**

The College will make reasonable accommodations for persons with documented disabilities.

Students are encouraged to contact the Office of Access and Services for Individuals with Disabilities for information about registration (166 Thorndike Hall). Services are available only to students who are registered and submit appropriate documentation. As your instructor, I am happy to discuss specific needs with you as well.

### Course Outline

Session 1	July 8th	<p><b>Topic: Introduction and Course Objectives</b></p> <ul style="list-style-type: none"> <li>• Why is this course important</li> <li>• What is cognition and what defines a handheld</li> <li>• Motivations</li> <li>• Implications</li> <li>• Goals</li> </ul> <p>Who is this class designed for?</p> <p>Historical development</p> <p><b>Activities:</b> Students design a time line tracking the history of different types of handheld devices.</p> <p><b><u>Readings for Session 2</u></b></p> <p>Mentor, D. – Social Connectedness via mobile means through a socio-emotional and cognitive load theoretical lens</p> <p>Chayko, M. (2007). The Portable Community: Envisioning and Examining Mobile Social Connectedness. <i>International Journal of Web Based Communities</i>, 3 (4), Pages 373-385</p>
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<p>Session 2</p>	<p>July 13th</p>	<p><b>Topic: Social Connectedness</b></p> <ul style="list-style-type: none"> <li>• Social Theories</li> <li>• Collective Societal units</li> <li>• Association Transformation</li> <li>• Shared understandings constitutive of practices and norms</li> <li>• Tele-presence</li> <li>• Portable Communities</li> <li>• Public vs Private</li> <li>• Co-Presence</li> <li>• Connected Presence</li> <li>• Emotions and Technology on-the-go</li> </ul> <p><b>Practical Assignment Activity:- Observe people and notate their frequency of handheld device use.</b></p> <ul style="list-style-type: none"> <li>- Observe and notate the environments where they occur.</li> <li>- Note points of confusion and probable causes for it.</li> <li>- Upload your assignment notes to ClassWeb.</li> </ul> <p><b>- Be prepared to discuss your notes and findings at the next session.</b></p> <p><u>Readings for Session 3</u></p> <p>Holzinger, A., Graz, Nischelwitzer, A., Meisenberger, M.. 2007. Lifelong-Learning Support by M-learning: Example Scenarios.</p> <p>St. John, M., &amp; Dister, B. (2009). Wireless collaboration technology to support distributed teams. <i>Cognitive Technology</i>, 14(1), 4-13.</p>
<p>Session 3</p>	<p>July 15th</p>	<p><b>Topic: Physical Interactivity &amp; Interfaces</b></p> <ul style="list-style-type: none"> <li>• Different devices/capabilities</li> </ul> <p>Different interfaces (physical, keyboard, touch and operating - Symbian, BlackBerry, Mac, Windows, Palm, Java)</p>

		<p>Relation and impact to mLearning</p> <p><b>Applications</b></p> <p>Practical uses and why they work/don't work</p> <p><b>Activity: Students recall and record their emotions experienced during an engagement with a hand-held device and a community.</b></p> <p><u>Readings for Session 4</u></p> <p>Van Merriënboer, J. J. G., Kirschner, P.A., &amp; Kester, L. (2003). Taking the load off a learners' mind: Instructional design for complex learning. <i>Educational Psychologist</i>, 38(1), 5-13.</p>
Session 4	July 20th	<p><b>Topic: Cognitive load theory</b></p> <ul style="list-style-type: none"> <li>• Information overload</li> <li>• Element Interactivity</li> <li>• Bio-behavioural</li> <li>• Temporal Influence on Mobile Communication</li> <li>• Split Attention</li> <li>• Redundancy</li> <li>• Selecting-Organizing-Integrating Theory</li> <li>• Dual Coding</li> <li>• Dynamic Language</li> </ul> <p><b>Assignment Activity:</b> Choose a facet of a handheld device (size, screen, keyboard, etc) and create a progressive historical time-line on this aspect from a cognitive load theoretical perspective (i.e. examine the limitations of each iteration and the associated improvements).</p> <p><u>Readings for Session 5</u></p> <p>Kong, S. C., Lam, S. Y., and Kwok, L. F. 2005. A cognitive tool in handheld devices for collaborative learning: comprehending procedural knowledge of the addition of common fractions. In <i>Proceedings of The 2005 Conference on Computer Support For Collaborative Learning: Learning 2005: the Next 10</i></p>

		<p><i>Years!</i> (Taipei, Taiwan, May 30 - June 04, 2005). Computer Support for Collaborative Learning. International Society of the Learning Sciences, 341-345.</p> <p>Didi. 2009. Interface Design as Cognitive Engineering.</p>
Session 5	July 22nd	<p><b>Topic: User Interface Design</b></p> <p><b>Applications</b></p> <p>Practical uses and why they work/don't work</p> <p><b>Assignment Activity:</b> Select a handheld device application (email, calendar, contacts, alarms, games, browsers, google maps, etc.) and unpack the screen and physical interface in terms of design and usability.</p> <p><b>Mid-term Assignment Guidelines</b></p> <ul style="list-style-type: none"> <li>• Conceptual design</li> </ul> <p>Design a learning activity for a handheld device</p> <ul style="list-style-type: none"> <li>• Theoretical/learning basis</li> </ul>
Session 6	July 27th	<p><b>Mid-term Presentations</b></p> <p><u>Readings for Session 7</u></p> <p>Dawe, M. 2007. Understanding handheld device requirements for young adults with cognitive disabilities</p>
Session 7	July 29th	<p><b>Topic: Cognitive Load and Technology</b></p> <ul style="list-style-type: none"> <li>• Interface (HCI)</li> <li>• OS'es</li> <li>• General Applications</li> <li>• User defined Applications</li> <li>• Device (Physical Engagement)</li> </ul>

		<ul style="list-style-type: none"> <li>• Constantly Changing Technology</li> </ul> <p><u>Readings for Session 8</u></p> <p>Ahmad, N. (2008). Examining the Effectiveness of a Mobile Electronic Performance Support System in a Workplace Environment.</p>
Session 8	Aug 3rd	<p><b>Topic: Just-in-time Information and Situated Cognition</b></p> <ul style="list-style-type: none"> <li>• Just-in-time vs just-in-case</li> <li>• Performance support vs learning</li> <li>• Contextual information</li> <li>• Interacting with your environment</li> </ul> <p><u>Readings for Session 9</u></p> <p>Chinnery, G. 2006. Going to the MALL: Mobile Assisted Language Learning. Language Learning &amp; Technology 10(1). 9-16.</p> <p>Svoboda, E. 2009. Cellphonometry: Can Kids Really Learn Math From Smartphones?</p>
Session 9	Aug 5th	<p><b>Topic: Learning Subject Matter via Handhelds</b></p> <ul style="list-style-type: none"> <li>• Language</li> <li>• Mathematics</li> </ul> <p>Final expectations &amp; rubrics</p>

		<p><u>Readings for Session 10</u></p> <p>Huizenga, J., Admiraal, W., Akkerman, S., Dam, T. 2007. Cognitive and Affective Effects of Learning History by Playing a Mobile Game.</p> <p>Adkins, S. 2007. The US Market for Handheld and Mobile Game-based Learning Products: 2007-2012 Forecast and Analysis</p>
Session 10	Aug 10th	<p><b>Topic: Cognition and Handheld Games</b></p> <ul style="list-style-type: none"> <li>• Content</li> <li>• Services</li> <li>• Tools</li> </ul> <p><u>Readings for Session 11</u></p> <p>Review conferences and journals for mobile learning for areas of interest</p>
Session 11	Aug 12th	<p><b>Topic: Furthering Your Knowledge of Cognition and Handheld Devices</b></p> <p>Review studies of different age groups of mobile users and the reported effects on their cognitive processing</p> <p>Look at how different audiences use mobiles and its effect on cognition</p> <p>Review final presentations</p>
Session 12	Aug 17th	<p><b>Final Presentation</b></p>

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