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Identifying Core Mobile Learning Faculty Competencies Based Integrated Approach: A Delphi Study

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Abstract

This study is based on the integrated approach as a concept framework to identify, categorize, and rank a key component of mobile learning core competencies for Egyptian faculty members in higher education. The field investigation framework used four rounds Delphi technique to determine the importance rate of each component of core competencies according to a consensus among the panelist experts. Out of 26 panelist participants, four core competencies findings emerged: (a) planning and designing, (b) assessment and evaluation, (c) technical support, and (d) teaching and learning. These competencies contained 90 specific key components distributed as 27 knowledge, 47 skills, and 16 attitudes.

Keywords: integrated approach, core mobile learning competencies, faculty members, higher education

1. Introduction

Rapidly progressing mobile technologies will be the lifelong platform of learning and the gateway to the knowledge age. The arguments around mobile learning (m-learning) are due to the one-dimensional outlook which focuses on "techno-centric" or "learner-centric" as an independent aspect to draw a concept framework of m-learning (Geddes, 2004; Sharples et al., 2007; Cheung & Hew, 2009; Taxter, 2009; Kissinger, 2012). Literature still classifying m-learning as informal learning, which is inconsistent with recent changes in mobile technologies such as protocols, operating systems and applications which provide students accessibility to deal with formal or informal educational systems according to learning contexts and their needs. This offers the opportunity of using m-learning as an important hybrid learning environment, by facilitating transition from formal to informal learning (Scheerns, 2009; Zhang et al., 2010). This trend is reaffirmed by some researchers considering that "the relationship between the context of learning and context of being" is unique to m-learning, which means that the learning process may occur in independent, formal, or socialized contexts (Frohberg et al., 2009, p. 313). Many forecasting studies showed the priorities of m-learning in higher education, which will play a big role in distance education of universities (Kurubacak, 2007; Hanganu, 2012). The growth rates of mobile phones in Africa and Middle East (AME) were the highest in the world (GSMA & Kearney, 2011). In the Middle East region, mobile penetration rates were expected to reach 125.5 % in 2015 (Cherrayil, 2010). Nearly half of college students worldwide got smart phones, most of them are inclined to use mobile devices for academic purposes (Alexander, 2011). In spite of the educational need and growth of m-learning technologies, the number of researches connected to theoretical and pedagogical aspects of m-learning still limited. This caused a lack of sustainable integration into formal educational contexts and the way to support and develop faculty skills when using m-learning (Cochrane, 2012; Peng, Su, Chou, & Tsai, 2009; Ekanayake & Wishart, 2014; Baran, 2014). Few studies and projects conducted to development faculty skills on m-learning system revealed the need for distinction between m-learning and mobile usage, as well as the necessity for exploring the pedagogical potentials of mobile technologies (Schuck et al., 2013; Bates & Martin, 2013).Yet, in AME region no systematic researches have been conducted on identifying m-learning competencies for faculty members in higher education, due to the lack of awareness among them and administrators about the add values from m-learning and the viability of Wireless/ handheld devices in the online program (Luvai, 2007; Altameem, 2011; Isaacs, 2012).

The current study aims to produce a list of core m-learning competencies for faculty members in higher education based on integrated approach. Most of the previous studies produced a list of competencies conducted with distance learning or web based learning as a formal learning environment for faculty members in higher education (Williams, 2000; Abdulla, 2004; Bailie, 2011). In addition the behavioral approach of the concept framework of identification competencies in the majority of previous studies considered these competencies as a set of skills and knowledge (Palloff & Pratt, 2003). This means a competency concept "sub-set of itself" (Deist & Winterton, 2005, p. 29). However the identification competency based the integrated approach (KSA approach) (Note 1); considered it as a complex combination of knowledge, attitudes, skills, and values displayed in the context of task performance (Kerka, 1998). The reasons behind that is identifying m-learning competencies to fill the need for coherence between technological and pedagogical aspects of mobile learning; field practices reflected positive changes in direction and attitudes among faculty members and students about using m-learning in higher education. Design m-learning competencies list according to this approach represented as a benchmarks for tracking the quality of m-learning system through indictors, describe what faculty should be known, do and aware when using these kind of learning environment . Few studies proposed models of how the competencies woven into integration by synthesis competencies lists as a sequence of what should online instructors doing before, during and/or after the course (Smith, 2005). The add values from using this approach fill the gap of m-learning training program directed by faculty competency in higher education. The list of m-learning competencies represent guidelines for policies and decision making for supporting using it in higher education of Egypt. This is the first study to use integrated approach as a concept framework of design a list of key components of core faculty competencies relevant to m-learning as a hybrid learning environments in higher education.

2. Literature Review

2.1 Mobile Learning Conceptualizations

Mobile devices occupy a significant part of our nowadays life (Pettit & Kukulska-Hulme, 2007). The tablet technology offers a wide variety of applications that have the potential to enrich the learning experience (Hamshire & Crumbleholme, 2012). Some researchers pointed a lack of a standardization in the term and suitable contents, methods and assessment activities of m-learning, so it still immature as a term of educational technology domain (Pea & Maldonado, 2006; Taxler, 2007). Literature classify m-learning definitions into two main sets, the first one focused into technological aspect which consider it as a form of existing distance learning (d-learning), electronic learning (e-learning), and learning situation Practices without limits of affixed location (Gergiev et al., 2004; Naismith et al., 2004; Geddes, 2004). Second set of definition moved away from "techno centric" and went back to the learners, contexts and the unique mobile practices in education as a way to make deep understanding authentic learning, learner-centric and contexts of experiences (Sharples et al., 2007; Cheung & Hew, 2009; taxter, 2009; Kissinger, 2012). Other researchers tried to categorize the perspectives of m-learning domain as Winter (2006) who summarized four main perspectives of m-learning: (a) techno centric which m-learning is primarily seen as learning supported by mobile devices, and the focus is on the technology; (b) m-learning is seen as an extension or a subset of e-learning, and m-learning research is primarily part of e-learning research; (c) mobile devices which are uses for just to complement and augment formal education; and (d) m-learning (student-centered) it is about mobility and context. Moreover Luvai and Motiwalla (2007) suggested framework integrated the ideas of mobile technology and e-learning into m-learning environments based on active content delivery, personalized, collaborative, constructive and conversational learning models. As a guide line about faculty roles in m-learning systems Roschelle and Pea (2002) suggested that wireless internet learning devices could be uses for computer supported collaborative learning where the teacher becomes a guide or coach and learners take the initiative in their learning. Furthermore, wireless devices are tools make faculty flexible for extending the learning process beyond the classrooms and homes to the remote places like airports or trains as informal learning environments (Virvou & Alepis, 2005; Khaddage & Lattemann, 2013). Design principles of m-learning promote engagement and self-directed learning and staff plays the role of facilitator, provide an environment to integrate all learning activities assess formatively, support the notion of seamless learning (Zhang et al., 2010). The main features of m-learning are in supporting learning object management system (LOMS); which allow instructor, student and experts participate collaboratively in the cycle of design, development, sharing, editing, reusing and evaluation of learning object as a form of lessen or courses activities. Some researchers indicated that m-learning materials should use two types of advance organizers, the expository advance organizers to allow learners to store the general framework; and comparative advance organizers to allow them to use existing knowledge to make sense of and take in the new materials (Ausubel, 1974; Ally, 2004a). With the same context, the learner control of learning situation is the heart of instructional design of m-learning system which should contain intelligent agents to determine what the learner did in the past and adapt the interface for future interaction with the learning materials; a course or lesson will comprise a number of learning objects which are sequenced to form an instructional event for a lesson or learning session (Ally, 2004b; McGreal, 2004; Lai, Khaddage, & Knezek, 2013). Beside that m-learning, help learners to be independent and increase self-motivation (Che et al., 2009). Also Valk, Rashid and Elder (2010) referred to the benefits from m-learning in development of educational processes and introducing effective teaching methods based learning theories. Additionally, Hargis et al. (2013) showed the views of faculty members who received training on iPads and found that iPads supported student-centered teaching.

2.2 Competency Identification Based Integrated Approach

Some researchers described competency as a "fuzzy concept" (Arnaud & Lauriol, 2002, p. 12). Boak (1991) argues that "competency" in the American sense complements 'competence' as uses in the UK occupational standards. Other researchers pointed what should be considered to define a competency like Cheng and hung (2004) who refer to several aspects when define competency, for example performance of work or anything specified independently to achieve a certain goal, determine skills, knowledge and motivation to achieve the goal as a basic components of competencies. Literature have focused on three main approaches identifying competency, the behavioral, functional and multi-dimensional or integrated approach which called KSA approach (Weinert, 2001). The integrated approach considers competency as a complex combination of knowledge, attitudes, skills, and values displayed in the context of task performance (Kerka, 1998). Deist and Winterton (2005) explained a typology of competency according to integrated approach to include four aspects as follow: a) conceptual which included cognitive, knowledge and understanding; b) operational aspect as functional, psycho-motor and applied skill; c) attitudes; d) meta competency which concerned with facilitating the acquisition of the other substantive issues. The benefits from organize the list of m-learning competencies based on this approach transit further upgrade of this list from just delete and add components separately according recent changes in m-learning domain, to systemic upgrade based on the relative relationship between these components.

A research trend of identification mobile learning competency based integrated approach provides opportunity to face the lack of integration between pedagogical and technological aspects of mobile learning. Bailie (2006) recommended that further study of how faculty competency is influenced by the changes in technology is strongly encouraged, also "a follow-up" study should be completed at 5-and 10-year intervals to consider whether the identified competency list has changed as a result of advancements in pedagogical approach, practitioner and consumer interests, and online staff development initiatives. Varvel (2007) suggested that technologies, incoming faculty, student needs, and curriculum are always changing, so as the competencies should be updated. Most of previous studies produced (e-learning) or online competencies lists for faculty members in higher education based on behavioral approach which constructed and design it as a sorting list by using different ways as Delphi techniques to define, categorize and ranked these competencies according perceptions of experts, online university faculty and students (Williams, 2000; Abdulla, 2004; Shank, 2004; lee & Hirumi, 2004; Bailie, 2011). The notion behind using integrated approach to identify mobile learning core competencies list is to emerge it into coherent design by determine experts opinions consensus for each key components (KSA) of core competency and combine it according to importance rate through a series of investigations based on Delphi techniques.

3. Participants

Current study was conducted during 2013-2014 academic year. Selecting study sample required surveying the online instruction experts CVs which posted on websites and official social networking at universities of Egypt and Middle East region. The general criteria of selecting appropriate participants as the panelist experts are as follow: (a) obtained a doctorate degree and have experience at least 3 years of work in the field of e-learning system; (b) has experiences and activities of working with formal or informal e-learning environments; (c) worked as staff in departments of education technology in education colleges, software engineering in computer science colleges, and deanships of e-Learning , d-learning and community services in higher education; (d) knowledge and skills of design and delivery learning material via mobile applications . Fifty-seven experts have been selected according to these criteria, and only 26 experts were responding positively to the researcher e-mail invitation for participation as panelist experts of the current investigation framework.

4. Methods

In the case of studies that focus on identifying competencies, the Delphi technique is uses to clarify, update established competency lists to support related future development (Egan & Akdere, 2005). It is used for forecasting and issue identification, prioritization based on social judgment analysis (Okoli & Pawlowski, 2004). The Delphi technique, mainly developed by Dalkey and Helmer (1963) at Rand Corporation in the 1950s, it was widely accepted method for achieving convergence of opinion concerning real-world knowledge solicited from experts with certain topic areas. The notion of Delphi technique "two heads are better than one, or…n heads are better than one" (Dalkey, 1972, p. 19). As noted by Helmer (1994), a Delphi study is a reliable method for investigating the formation of a group judgment, the exploration of ideas, and the production of suitable information for decision making. Furthermore, this technique provides survey tools for facilitating consensus among experts who had special knowledge to share, but who were not always in contact with each other (Adler & Ziglio, 1996). Common surveys try to identify "What is" where the Delphi technique attempts to address "What could/should be" (Miller, 2006). There was little agreement about the size of panelist experts in the Delphi studies (keeney et al., 2001). Most of researchers recommend 10-18 experts on a Delphi panel, and some studies indeed uses panels that fall with this range (Okoli & Pawlowski, 2004). Action management frameworks when we using Delphi technique based on two methods, The first one is brainstorming through informal meeting, where panel of expert responded to inductive and deductive open-ended questions (McGuire & Cseh, 2006). The second methods asked participants to respond individually to a specific content in a structured of close end questionnaire (Rossouw, Hacker, & Devries, 2011). Information and Communications technologies (ICT) provides facilities and save time in all Delphi processes specifically in designing and distributed survey tools among participants, collect responses or feedback and storage data. Some researchers suggested modified Delphi technique, the main features of it in the first round which begins with panelists being offered a set of pre-determined items from various sources including the findings of previous studies, reviews of contemporary literature, or interviews with content experts, also the statistic model or formulation to identify and ranking competencies (Bailie, 2011). Therefore, the action framework of Delphi technique in the current research showed in Table 1. The first round targeted production initial list of competencies by designing it as an open-end questionnaire include items represented suggested competencies and key component (KSA) based on reviewed literature which related to the characteristics and attributes of m-learning environments, also conducted studies which determined a list of faculty competencies in e-learning and d-learning as references guides, after that we asked participants individually to clarify and add competency statements and key components which related to each competency during virtual brainstorming meetings. In the second round we collect all panelist experts responses which appears in the first round and prepare a closed-end questionnaire included all proposed items and uses a five-point Likert scale (1 = very important, …, 5 = very unimportant) to rate experts perceptions for each competency. We write off competency statement which does not included (KSA) or only has one component because that is not compatible with competency concept integrated approach. To raise the outcomes from Delphi technique we estimated validity and reliability of close—end questionnaire as a measure tools of Delphi techniques, by Appling it with a pilot sample of (6) experts to determine validity according to Cronbach coefficient. Validity coefficient was (0.731) which is acceptable for using questionnaires as measuring tools. Internal consistency reliability of questionnaire determined by Kudser-Richardson equation, estimated value founded (0.752). Internal consistency reliability of questionnaire which determined by using Kudser-Richardson equations showed estimated value (0.752) which mean acceptance reliability level. In round three we calculate mean score for each item based on individual responses of panelist experts. In round four criteria of considering competency as a core one based on rated point 1 or 2 of at likart scale by at least 90% of participants'. The combination between key components in one list for each competency based on panelist experts consensus. Categorizing, and ranking these key components required two processes as followed: (1) make a code for each component referred to its type and number on measuring instruments, (2) determined important rate for each component and placed it in the final list according the value of mean score.

Table 1. The action framework of delphi technique

Round/no	Manager Actions	Experts actions
1	Produces initial list of faculty competencies based on reviews related studies.	Modified initial list by add or remove competencies and (KSA) components.
2	Collected proposed items from panelist experts, design close–end questionnaire, Estimate the validity and reliability of it as measures tools.	Rates each competency in close –end questionnaires using a five - point Likert scale.

Round/no	Manager Actions	Experts actions
3	Calculates mean score and percentages, and distribution of the panelist experts' responses for each key component of competencies.	Reviewed individual rating of each component in view of group response.
4	Categorize competencies which rated point 1or 2 at likert scale by at least 90% of panelist experts as a core competencies.	Reviews the combination between key components of each core competencies based mean score.

5. Results and Discussion

In the Delphi technique, outcomes of investigation panelist experts' consensus included qualitative and quantitative data. Table 2 showed the results of the final round of Delphi technique which presented 4 core competencies ranked according to the responses percentages of panelist experts. These competencies consisted of 90 specific key components included 27 knowledge, 47 skills, and 16 attitudes components.

Table 2. Descriptive statistics of core mobile learning faculty competencies key components

Competency	Key components			Total	Ranking%
	Knowledge	Skills	Attitudes		
Planning And Designing	6	7	2	15	96.6%
Assessment And Evaluation	2	15	1	18	96.6%
Technical Supporting	12	13	8	33	96.5%
Teaching And Learning	7	12	5	24	90%
Total	27	47	16	90	

As shown in Table 3, the results of rated importance of planning and designing competency key components according to panelist experts responses revealed that faculty should be have a clear knowledge and skills about designing feedback and helps via mobile learning environments as a priorities needs which reaffirmed the Bailie (2011) sequel investigation that considered feedback skills in the top ranking of effective Online Instructional competencies as perceived by online university faculty and students. There were consistency between the consensus of panelist experts, and the previous literature about strengthening the roles of the faculty members in learning object managements system (LOMS) as a learning system appropriate with the features of m-learning and facilitate learner control of learning object as a heart of instructional design of m-learning system (Ally, 2004a; Ally, 2004b; McGreal, 2004; Khaddage & Lattemann, 2013). Faculty should be willing to explore new trends of design m-learning apps and focuses on designs of social learning activities via mobile technologies represent important attitudes components.

Table 3. Importance rate of planning and designing competency key components

Rate importance of component	Specification (Note 2)	Component code (Note 3)
Very important (1-1.7)		
1.34	Know types of design feedbacks and helps.	K_{17} (Note 4)
1.34	Know design assessment and evaluation tools.	K_{18}
1.42	Know design content of course as learning object.	K_{15}
1.42	Know instructional designs models based mobile features	K_{16}
1.42	Facilitate learner control of learning objects.	S_{31}
1.50	Design feedbacks/ helps types according learning situation.	S_{32}
1.57	Know criteria of design user interface application based on	K_{20}

Rate importance of component	Specification (Note 2)	Component code (Note 3)
	mobile devices features.	
1.65	Perform educational scenarios for interactive learning material.	S_{33}
1.65	Design collaborative activities and group work to meet students' needs.	S_{34}
1.73	Understand types of apps which uses in designing learning material via mobile	K_{19}
1.73	Formulating objectives and outcomes of learning activities.	S_{35}
1.76	Perform a variety of assessment methods designs based on mobile technologies.	S_{29}
1.76	Provide an opportunity for students to participate in design learning object and delivery it in learning situation.	S_{30}
Important (1.8-2.5).		
1.81	Concern with designs of social learning actives via mobile technologies	A_{10}
1.84	Willing to explore new trends of design m-learning apps	A_{11}

Note. 1=Very important, 2=Important, 3=Neutral.

Code name: K= knowledge, S=skill, A= attitudes.

Code number: placement of key component at measuring instruments.

Figure 1 showed the total percentages of the panelist experts responses at 5 point likert scale for each components of planning and designing competency. 53.8% of responses indicated that knowledge components are *very important*, and 46.2% of responses referred to it as an *important* component. The corresponding figures for skills components were 42.9% and 51.1%, respectively, with 5.5% of the responses were neutral. Percentage of responses which related to attitudes components referred to 32.7% as very important, 61.5% as important, 5.8% as neutral component.

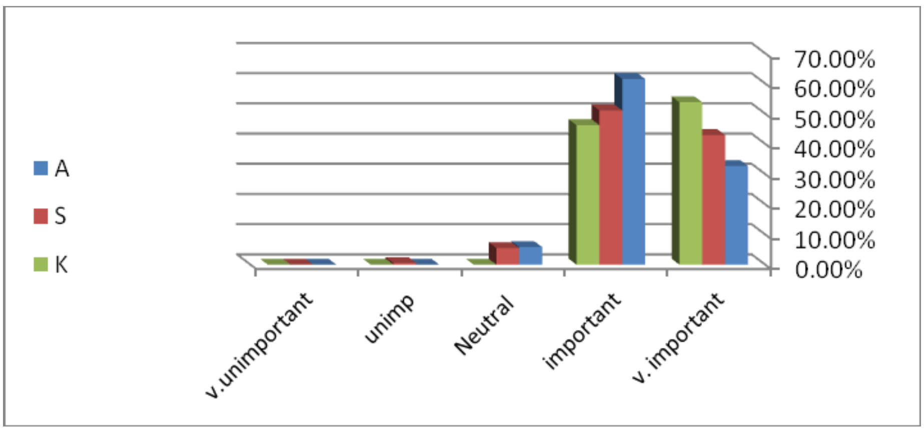

Figure 1. Distribution percentages of planning and design competency key components

As seen in Table 4. The faculty priorities skills acquisition in assessment and evaluation competency should be: a) skills of uses quizzing app via mobile device; b) perform a pre-assessment to determine student knowledge state c); provides adequate time for effective completion of the assignments for the given student audience and ability levels; d) performed remedial evaluation for students common misconception; e) provide assessments hints that challenges students to achieved objectives. In addition, faculty should understand self-evaluation techniques as a knowledge component. Also faculty should be concerned with with exploring new trends of evaluation and assessments via mobile as a (*v.important)* attitude component.

Table 4. Importance rate of assessment and evaluation competency key components

Rate importance of component	**Specification**	**Component code**
Very important (1-1.7)		
1.38	Uses quizzing app effectively via mobile devices.	S_{27}
1.42	Perform a pre-assessment via m-learning system	S_{26}
1.42	Provides face - face time for effective completion of assignments in learning situation	S_{22}
1.5	Performed remedial evaluation for student's common misconception.	S_{25}
1.54	Provide assessments hints that challenge students to achieved objectives.	S_{15}
1.54	Provides clear objectives in formal or informal situation.	S_{16}
1.61	Understand self-evaluation techniques.	K_{13}
1.61	Know adjustments learning objects cycle based on student performance, feedback.	K_{14}
1.65	Guided students to improve selection and reuse of learning objects.	S_{20}
1.65	Uses mobile delivery tracking system (MDTS)	S_{21}
1.69	Determine factor of student struggling	S_{18}
1.73	Willing to explore new trends of evaluation and assessments' via mobile app.	A_9
Important (1.8-2.5)		
1.80	Evaluates student self-regulated learning	S_{19}
1.84	Uses a variety of assessment methods	S_{28}
1.84	Provides explanations of where/how to submit the completed work.	S_{17}
1.96	Provides guide line during evaluation process.	S_{14}
2.19	Provides facilities for student peer's evaluation.	S_{23}
2.42	Perform adequate assessment of students with special needs or disabilities.	S_{24}

Note. 1=Very important, 2=Important, 3=Neutral.

Code name: K=knowledge, S=skill, A=attitudes.

Code number: placement of key component at measuring instruments.

Figure 2 pointed the percentages distribution of the panelist experts responses for each component of evolution and assessment competency. 41.9% of the responses referred to the attitude component as a very important component, 22.6% as important, and (19.4%) were neutral. However, 35.1% of the responses indicated that the skills component was very important, and 57.2% indicated it as important. For knowledge component, these figures were 39% and 61%, respectively.

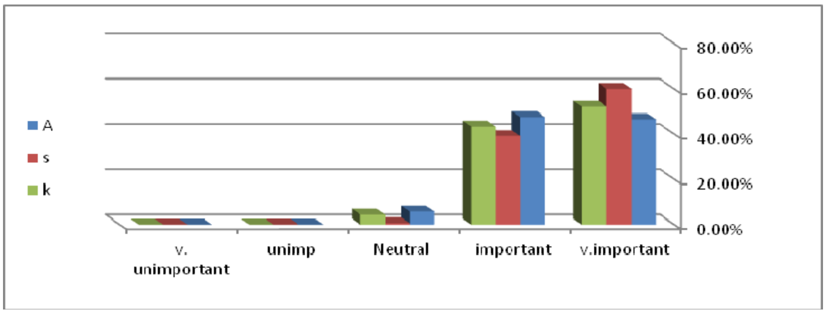

Figure 2. Distribution percentages importance of evolution and assessment competency key components

As shown in Table 5, importance rate according to panelist experts views related technical supporting competency components indicated that faculty should be mastery follow these skills: a) perform technical issues for manipulated with formal and informal learning system via smartphone; b) using mobile operating systems. Also importance rate indicated the ethical aspects of using mobile in learning process represented in the component respect technical issue which related to privacy of student data. Understanding technical issue as requirement to use m-learning as learning objects management system or open learning resources is a very important knowledge component. The convergence between a number of key components, specifically knowledge and skills components in technical supporting competency confirmed views that penetration of mobile technology to higher education of AME still the early stages (Altameem, 2011).

Table 5. Importance rate of technical supporting competency components

Rate importance of component	**Specification**	**Component code**
Very important (1-1.7)		
1.15	Perform technical issues for manipulated with learning systems via smart devices	S_2
1.15	Perform setting issues of mobile operating systems.	S_8
1.19	Ethical aspects of technical issue related to privacy of student data.	A_5
1.19	Manipulated with technical issues for using cloud learning systems via smart devices.	S_{13}
1.19	Understand technical issues for using learning objects management system (LOMS), open learning resources (OLR), learning management system (LMS).	K_3
1.23	Concern with the new educational applications via mobile phone.	A_1
1.23	Skills of using browser and search engines via mobile	S_7
1.23	Manipulated with user interface and navigations tools of formal or /and informal learning systems.	S_6
1.23	Provide students online technical Support synchronous and asynchronous modes.	S_5
1.26	Know online technical supporting types.	K_1
1.31	Willing to uses wireless technology in learning process.	A_2
1.35	Know Smart phone devices types.	K_2
1.38	Perform technical Safety and backup data via mobile app.	S_1
1.38	Manipulate with a wide variety of W/H and networks	S_3
1.38	Diagnose communication problems that learners have with m-learning technologies	S_4

Rate importance of component	Specification	Component code
1.42	Knowledge of using Web browsing software's via mobile device	K_6
1.42	Know setting of mail services via mobile	K_4
1.46	Respect institutional guidelines about using w/h devices and local wireless network.	A_4
1.5	Appreciation of the power and effectiveness of m-learning environment	A_8
1.54	Skills of using cloud computing technologies and open learning resources via mobile learning environments.	S_{10}
1.54	Know technical issue for management files/ folders/ portfolio via mobile	K_9
1.54	Know the ways of Safety and security data	K_5
1.57	Skills of manipulate with web2.0 apps via mobile	S_{11}
1.61	Understand proper rules for academic reporting and student privacy	K_{12}
1.65	Know technical requirements for sharing and distributed learning material	K_{10}
1.7	Know cloud computing technologies services via mobile	K_{11}
Important (1.8-2.5)		
1.8	Help students to perform troubleshoot issues	S_3
1.8	Manipulate with mobile operations systems (app, documents, files and folders, and work with multiple windows, app stores).	S_9
1.9	Awareness of technical support requirements via mobile technology	A_7
1.9	Know regulation about using formal learning environments via mobile devices.	K_8
1.9	Promotes healthy use of mobile technology resources	A_6
2.11	Know mobile protocol types (WAP, GPRS, 3-4G, Bluetooth, MDTS, SOAP, and SCORM.	K_7
2.2	Concern with the upgrade in hardware and software of mobile devices	A3

Note. 1=Very important, 2=Important, 3=Neutral.

Code name: K=knowledge, S=skill, A=attitudes.

Code number: placement of key component at measuring instruments.

Figure 3 pointed to the percentages distribution of the panelist experts responses for each component of technical supporting competency. 46.6% of responses rated attitudes components as very important, 47.6% as an important, and 5.8% as neutral. Percentages related to the skills components indicated that 60.1% of the responses found these components very important, 39.2% important and 0.7% neither important nor unimportant. As well as knowledge components concern, 52.2% of the responses indicated them as very important, 43.4% as important, and 4.4% as neutral.

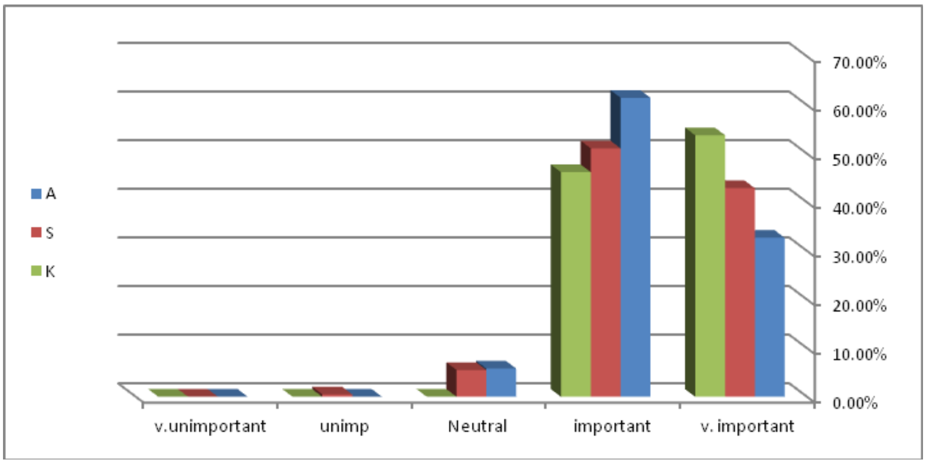

Figure 3. Percentages distribution of technical supporting competency key components

Table 6 showed the importance rate of teaching and learning competency components. Supporting lifelong learning via mobile technologies represented the first very important skill component which should be faculty acquired by a faculty. Also, the willing to explore a new teaching strategy via mobile technologies represented a very important attitude component. The highest rate of knowledge as a very important component is implementing active learning techniques via mobile technologies. The results of the experts' panel consensus about the teaching and learning competency confirmed previous literatures views about pedagogical aspects of m-learning, which refers to many tasks and roles that should be performed by a faculty. These include promoting engagement and self-directed learning, encouraging personalized learning and collaborative learning, facilitating seamless learning, and providing students advanced organizers to allow them use existing knowledge to make sense of and take in the new materials (Ally, 2004a; Scheerns, 2009; Zhang et al., 2010; Lai, Khaddage & Knezek, 2013).

Table 6. Importance rate of teaching and learning competency components

Rate importance of component	**Specification**	**Components code**
Very important (1-1.7)		
1.15	Skill of supporting lifelong learning	S_{42}
1.15	Willing to explore a new implement of mobile instructional design model.	A_{12}
1.19	Skill of management learning resources via mobile apps.	S_{43}
1.19	Skill of management effective learning situation via mobile.	S_{44}
1.26	Know implements of active learning techniques via mobile technologies.	K_{21}
1.31	Skills of implements life cycle of learning object management system	S_{38}
1.38	Know collaboration learning patterns via mobile technologies.	K_{22}
1.42	Promote collaborative learning via mobile	A_{13}
1.42	Skills of facilitated sharing workspace and practices between students via mobile apps.	S_{37}
1.46	Know academics guiding techniques	K_{23}
1.46	Skills of management learning times.	S_{36}
1.50	Know self-regulated learning strategies	K_{24}
1.50	Skills of supporting self-regulated learning	S_{47}
1.57	Respects diverse ways of m-learning	A_{14}
1.61	Skills of distributed interactive object learning materials	S_{35}

Rate importance of component	Specification	Components code
1.61	Skills of integrate student knowledge into posts that occur within the general course discussion in formal or/and informal learning.	S_{41}
1.65	Know learning supporting types.	K_{25}
1.70	Know the principles of various learning theories	K_{27}
Important (1.8-2.5)		
2.00	Know student errors and misconceptions influence learning.	K_{26}
2.11	skills of provide student advanced organizer to manipulated with learning material	S_{39}
2.19	Skills of using Meta cognition approaches in learning process.	S_{45}
2.23	Promotes self-regulated learning strategies via m-learning environments	A_{15}
2.31	Willing to explore a new teaching strategy via mobile technologies	A_{16}
2.34	skills of academic guiding via mobile (i.e. one –one, one –many guiding)	S_{46}

Note. 1=Very important, 2=Important, 3=Neutral.

Code name: K=knowledge, S=skill, A=attitudes.

Code number: placement of key component at measuring instruments.

Figure 4 pointed to the percentages distribution of the panelist experts responses for each components of teaching and learning competency. A response percentages related to a component which represented attitudes referred to 43.8% of experts panel found it as a *very impotent* component, 38.5% is *important*, 17.7% is *neutral.* However, 51% of responses considered the skills components a *very important*, 38.1% *important.* Knowledge components represented 46.7% of the responses as *very important*, and 49.5% as *important* components.

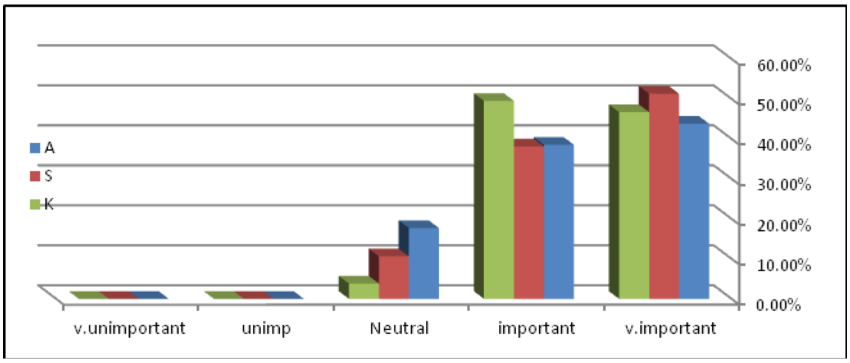

Figure 4. Percentages distribution of teaching and learning competency key components

Although the above lists of core competencies may seem complex and largely duplicates the information, it corresponds with Kerka notation "integrated approach [should recognize] levels of competence—entry/novice, experienced, specialist-rather than a once for all attainment. Interpreted broadly, competence is not trained behavior but thoughtful capabilities and a developmental process" (Kerka, 1998, p. 6).

6. Conclusion

Identification m-learning faculty competencies based on integrated approach represent a new trend of recent researches on this domain that cross the limits of identify competencies as a sorting list to interactive list designed according to the combination between the knowledge, skills and attitudes as components of each competency. Current research is trying to fill the gap of faculty needs of what faculty members should be able to know, do and aware when employment m-learning as a formal or informal learning environment in higher education based on consensus of experts perception, which also so importance as a guide line for policies and decision making of supporting using m-learning in higher education of Egypt. Identification of key components of m-learning core competencies confirmed a unique pedagogical and technological characteristics of m-learning different from the rest of the other (e-learning) environments, which pointed the needs to do further comparative studies between m-learning environment and other (e-learning) environments to determine a difference in the roles and tasks of the faculty members in these environments. Also researcher suggests doing a sequel study to identify m-learning competencies as perceived by faculty and students in higher education. As well as we recommended developments training programs directed to acquisition of m-learning competencies for faculty members in higher education.

References

Abdulla, A. G. (2004). *Distance learning student's perceptions of the online instructor roles and competencies* (Electronic Theses, Treatises and Dissertations). Retrieved from http://diginole.lib.fsu.edu/etd/14

Alexander, A. (2011). *How reliant are college students on smart phones*. Retrieved May, 2014, from http://ansonalex.com/technology/how-reliant- are -college -students-on-smartphones-infographicl

Ally. M. (2004a). Foundations of educational theory for online learning. In F. Elloumi, & T. Anderson (Eds), *Online Learning Handbook* (pp. 3-32). Athabasca: Athabasca University.

Ally. M. (2004b). Designing effective learning objects for distance education. In R. McGreal (Ed.), *Online Education Using Learning Objects* (pp. 87-97). London: Rout ledge/Falmer.

Altameem, T. (2011). Contextual Mobile Learning System for Saudi Arabian Universities. *International Journal of Computer Applications*, *21*(4), 21-26. New York, Foundation of Computer Science (FCS). http://dx.doi.org/10.5120/2499-3377

Arnaud, G., & Lauriol, J. (2002). Development a model of competencies: Evaluation for HRM. *Journal of Management Sciences*, *194*, 11-20.

Ausubel, D. P (1974). *Educational psychology: A cognitive view*. New York: Holt, Rinehart and Winston.

Bailie, J. L. (2011). Effective Online Instructional Competencies as Perceived by Online University Faculty and Students: A Sequel Study. *MERLOT Journal of Online Learning and Teaching*, *7*(1).

Baran, E. (2014). A Review of Research on Mobile Learning in Teacher Education. *Educational Technology & Society*, *17*(4), 17-32.

Bates, C. C., & Martin, A. (2013). Using mobile technology to support literacy coaching practices. *Journal of Digital Learning in Teacher Education*, *30*(2), 60-66. http://dx.doi.org/10.1080/21532974.2013.10784728

Boak, G. (1991). *Developing Managerial Competences: The Management Learning Contract Approach*. London: Pitman.

Che, C. et al. (2009). A Study of English Mobile Learning Applications at National Chengchi University. *International Journal of Distance Education Technologies*, *7*(4), 38-60 . http://dx.doi.org/10.4018/jdet.2009062403

Cochrane, T. D. (2012). Critical success factors for transforming pedagogy with mobile Web 2.0. *British Journal of Educational Technology*, *45*(1), 65-82. http://dx.doi.org/10.1111/j.1467-8535.2012.01384.x

Corbeil. J. R., & Valdes-corbeil, M. E. (2007). Are we ready for mobile learning? *EDUCAUSE Quarterly*, *2*, 51-58.

Dalkey, N. C. (1972). The Delphi methods: An experimental study of group opinion. In N. C. Dalkey, D. L. Rourke, R. Lewis, & Snyder (Eds.), *Studies in the quality of life: Delphi and decision-making* (pp. 13-54). Lexington, MA: Lexington books

Delamare Le Deist, F., & Winterton, J. (2005). What Is Competence? *Human Resource Development International*, *8*(1), 27-46. http://dx.doi.org/10.1080/1367886042000338227

Dooley, K. E., Lindner, J. R., Dooley, L. M. & Alagaraja, M. (2004). Behaviorally anchored competencies: Evaluation tool for training via distance. *Human Resource Development International*, *7*(3), 315-332. http://dx.doi.org/10.1080/1367886042000210958

Egan, T. M., & Akdere, M. (2005). Clarifying distance education roles and competencies: Exploring similarities and differences between professional and student-practitioner perspectives. *The American Journal of Distance Education*, *19*(2), 87-103. http://dx.doi.org/10.1207/s15389286ajde1902_3

Fahad, N. F. (2009). Students' Attitudes and Perceptions towards the Effectiveness of Mobile Learning in King Saud University, Saudi Arabia. *The Turkish Online Journal of Educational Technology–TOJET*, *8*(2), 111-119.

Forster, F. (2008). Distributed Creative Problem Solving over the web. *International Conference on Internet and Web Applications and Services on 2008* (pp. 283-288).

Frohberg, D., Göth, C., & Schwabe, G. (2009). Mobile learning projects–A critical analysis of the state of the art. *Journal of Computer Assisted Learning*, *25*(4), 307-331. http://dx.doi.org/10.1111/j.1365-2729.2009.00315.x

Geddes, S. J. (2004). *Mobile learning in the 21st century: Benefit for learners.* Retrieved from http://knowledgetree.flexiblelearning.net.au/ edition06/download/geddes.pdf

Georgiev,. T, Georgieva, E., & Smrikarov, A. (2004). M-Learning: A new stage of e-learning. *International Conference on Computer Systems and Technologies*. http://dx.doi.org/10.1145/1050330.1050437

GSM Association (GSMA). (2011). *African Mobile Observatory 2011: Driving Economic and Social Development through Mobile Services*. London, UK: GSMA. Retrieved from http://www.mobileactive.org/files/file_uploads/African_Mobile_

Hamshire, C., & Crumbleholme, H. (2012). "The Head in the box"—Using tablet technology to support learning and teaching, ALT-C 2012 a confrontation with reality. *The 19th international conference of the Association for Learning Technology*. University of Manchester.

Hargis, J., Cavanaugh, C., Kamali, T., & Soto, M. (2013). Measuring the difficult to measure: Teaching and learning with an iPad. *International Journal of Mobile and Blended Learning*, *5*(2), 60-77. http://dx.doi.org/10.4018/jmbl.2013040104

Isaacs, S. (2012). Turning on Mobile Learning in Africa and the Middle East. *Illustrative Initiatives and Policy Implications by the United Nations Educational, Scientific and Cultural Organization 7, UNESCO 2012, France.* Retrieved from http://unesdoc.unesco.org/images/0021/002160/216083E.pdf

Keeny, S., Hasson, F., & McKenna, H. P. (2001). A Critical Review of the Delphi Technique as a research methodology for nursing. *International journal nursing studies*, *38*, 195-200. http://dx.doi.org/10.1016/S0020-7489(00)00044-4

Kerka, S. (1998). *Competency-based education and training: Myths and realities*. ERIC/ACVE. Retrieved from http://ericacve.org/docgen.asp available at http://www.eric.ed.gov/

Khaddage, F., & Lattemann, C. (2013). "iTeach We Learn Via Mobile Apps "a Case Study in a Business Course". In R. McBride, & M. Searson (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference* (pp. 3225-3233). Chesapeake, VA: AACE. Retrieved from http://www.editlib.org/p/48591.

Kissinger, S. J. (2012). The Social & Mobile Learning Experiences of Students Using Mobile E-books. *Journal of Asynchronous Learning Networks*, *17*, 1.

Kurubacak, G. (2007). Identifying Research Priorities and Needs in Mobile Learning Technologies for Distance Education: A Delphi Study. *International Journal of Teaching and Learning in Higher Education*, *19*(3), 216-227. Retrieved from http://www.isetl.org/ijtlhe/pdf

Kwok-Wing, L., Ferial, K., & Gerald, K. (2013). *Working Group 2: Advancing mobile learning across formal and informal contexts*. EDU sum IT 2013.

Luvai, F. M. (2007). Mobile learning: A framework and evaluation. *Computers & Education*, *49*, 581-596. http://dx.doi.org/10.1016/j.compedu.2005.10.011

McGreal, R. (2004). *Online education using learning objects.* London: Rout ledge/Falmer.

McGuire, D., & Czech, M. (2006).The development of the field of HRD: A Delphi study. *Journal of European industrial Training*, *30*(8), 653-667. http://dx.doi.org/10.1108/03090590610712304

Miller, L. E. (2006). *Determining what could/should be: Delphi technique and its application. Paper presented at the meeting of annual meeting of the Mid-Western*. Columbus, Ohio: Educational Research Association,

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples , M. (2004). *Literature review in mobile technologies and learning*. Retrieved from http://www2.futurelab.org.uk/resources/documents/lit_ reviews/Mobile_Review.pdf

Okoli, C., & Pawlowski. S. D. (2004). The Delphi method as a research tool: An example, design consideration and applications. *Information & management journal*, *42*, 15-29. http://dx.doi.org/10.1016/j.im.2003.11.002

Palloff, R. M., & Pratt, K. (2003). *The virtual student: A profile and guide to working with online learners*. San Francisco: Jossey-Bass.

Pea, R., & Maldonado, H. (2006). WILD for learning: Interacting through new computing devices anytime, anywhere. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 427-441). Cambridge: Cambridge university press.

Peng, H., Su, Y.-J., Chou, C., & Tsai, C.-C. (2009). Ubiquitous knowledge construction: Mobile learning re-defined and a conceptual framework. *Innovations in Education & Teaching International*, *46*(2), 171-183. http://dx.doi.org/10.1080/14703290902843828

Pettit, J., & Kukulska-Hulme. (2007). Going with the grain: Mobile devices in practice. *Australasian Journal of Educational Technology*, *6*(1), 47-54.

Rossouw, A., Hacker, M., & Mevries, M. (2011). Concepts and contexts in engineering and technology education: An international and interdisciplinary Delphi study. *International journal of technology design education*, *21*, 409-424. http://dx.doi.org/10.1007/s10798-010-9129-1

Scheerens, J. (2009). Aims and scope of the study. In D. N. Aspin, J. Chapman, & J. Scheerens (Eds), *Informal learning of active citizenship at school: An international comparative study in seven European countries* (pp. 1-10). Dordrecht, NLD: Springer Netherlands.

Schuck, S., Aubusson, P., Kearney, M., & Burden, K. (2013). Mobilising teacher education: A study of a professional learning community. *Teacher Development*, *17*(1), 1-18. http://dx.doi.org/10.1080/13664530.2012.752671

Smith, T. C. (2005). *Fifty-One Competencies for Online Instruction*. Axia College, Western International University. Retrieved from at http://www.thejeo.com/Ted%20Smith%20Final.pdf

So Wing-mui Cheng, May-Hung. (2004). An impact of Teaching Practice: Perception of Teacher competence among Student teachers. *Journal of Primary Education*, *6*(1). Retrieved from http: // sunzi1.lib.hku.hk/hkjo/view/484800041.pdf

Taxler, J. (2007). Defining, discussing, and evaluating mobile learning: The moving finger writes and having written. *International Review of Research in Open and Distance Learning*, *8(2)*, 1-12.

Valk, J., Rashid, A., & Elder, L. (2010) .Using Mobile Phones to Improve Educational Outcomes: An Analysis of Evidence from Asia. *The International Review of Research in Open and Distance Learning*, *11*(1), 117-140.

Varvel, V. E. (2007). Master online teacher competencies. *Online journal of distance learning administration*, *10*(1). Retrieved from http://www.westga.edu/~distance/ojdla/spring101/varvel101.html

Virvou, M., & Alepis, E. (2005). Mobile educational features in authoring tools for personalized tutoring. *Computers and Education*, *44*, 53-68. http://dx.doi.org/10.1016/j.compedu.2003.12.020

Weinert, F. E. (2001) Concept of competence: A conceptual clarification. In D. S. Rychen, & L. H. Salganik (Eds.), *Defining and selecting key Competencies* (pp. 45-66).

Williams, P. E. (2000). Defining distance education roles and competencies for higher education institutions: A computer-mediated Delphi study. *Dissertation Abstracts International*, *61*(4).

Winters, N. (2006). What is mobile learning? In M. Sharples (Ed.), *Big issues in mobile learning* (pp. 5-9). University of Nottingham.

Wu, Y.-C. J., Chen, C.-Y., Kao, H.-Y., Lin, C.-H., & Huang, S.-H. (2012). Review of trends from mobile learning studies: A meta- analysis. *Computers & education*, *59*(2), 817-827. http://dx.doi.org/10.1016/j.compedu.2012.03.016

Zhang, B. H., et al. (2010). Deconstructing and reconstructing: Transforming primary science learning via a mobilized curriculum. *Computers & Education*, *55*(4), 1504-1523. http://dx.doi.org/10.1016/j.compedu.2010.06.016

Notes

Note 1. KSA: knowledge, skills, attitudes

Note 2. Rate importance : 1 = Very important, 2 = Important, 3 = Neutral

Note 3. Component code: Code name: K= knowledge, S=skill, A= attitudes

Note 4. Code number: place of key component at measuring tool.