

# Re-examining the Theoretical Foundations of Mobility and Mobile Learning

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## Abstract:

*This paper examines the concept of mobility and reflects on how mobility of the individual is the key aspect of mobile learning, which enhances the individuals' capacity to learn and acquire knowledge anytime, anywhere. Furthermore, this paper explores the field of mobile learning by investigating whether mobile learning is founded upon a technological deterministic or social-deterministic approach. We argue that mobile learning is a heterogeneously constructed experience, which is dominantly shaped by social forces, but is heavily influenced by technologically determined factors.*

## 1 Introduction

*"There is a need to re-conceptualise learning for the mobile age, to recognise the essential role of mobility and communication in the process of learning."*

*-- Mike Sharples: University of Nottingham*

Current technological developments within society allow for increased individual mobility while providing means of communication that augments and enhances individual connections and interactions. Broadly speaking, the establishment of wireless technological infrastructure, coupled with associated mobile information and communication technologies, (ICTs) allows for a quality of mobile communication and interaction that has enabled new forms and modalities of learning to emerge. This emergence can be observed in the adoption of mobile technologies that intrinsically broaden learning opportunities for individual learners and have helped to establish pervasive and ubiquitous learning environments and communities. The power of mobile technologies to enable a quality of situated learning, that is independent of constraints of time and location, is a new form of learning that is commonly referred to as mobile learning (or, m-learning).

It can be argued that since the dawn of civilization some form of mobile learning has always existed. Our ancestors (including many cultures that exist today) primarily lived within "pedestrian societies" characterized by individuals traveling afoot to meet and interact with other individuals in distant communities. This degree of mobility exhibited a 'slower' quality of interaction and exchange of ideas, news, experiences and knowledge amongst individuals and communities. Eventually, our ancestors developed ways to augment this quality of 'pedestrian' mobility by adopting faster means of transport (animal powered and machine

based transport), and created and adopted new forms of mediated communication to send and receive ideas, news, experiences and knowledge. These forms of communication may have been simply a visual or auditory signal, or may have been a handwritten letter (utilizing the tools of language) sent by an intermediary such as a bird (carrier-pidgeon) or delivered by a trustworthy individual (a messenger).

The purpose of the above illustration (although very rudimentary) is to argue that mobile learning has always existed in some form or another. Individuals have always experienced some form of mobility, and as long as they have been able to communicate have always interacted and learned from each other. The difference between current (modern) notions of m-learning and those of earlier generations is the level and quality of mobility experienced by individuals and the tools and means (infrastructure and modalities) utilized to convey information. Unlike our ancestors, our present tools for conveying information and communicating are ubiquitous, pervasive and instantaneous; furthermore, the current modalities for human mobility is both physical and virtual and is unrivaled compared to previous generations.

Bearing this in mind, m-learning today is poised to make a tremendous impact on society through its characteristic ability to equip individual and groups of learners with tools that allow for unbridled connectivity to access, acquire and collaborate within an unthethered environment, free from physical barriers and socially-created limitations. Never before in the history of civilization have the conditions been so ripe to redefine and change the way we view and experience learning.

### **1.1 Framing the debate**

The adoption and utilization of mobile information and communication technologies within formalized and informal learning contexts is fundamentally transforming the ways in which individuals learn and acquire knowledge. The ability to learn anytime, anywhere is becoming a commonly accepted reality, and is actively being pursued by individuals equipped with mobile-technologies that support this form of pervasive mobile learning. At first glance it can be observed that the emergence of this form of pervasive mobile learning is heavily influenced by the technologies themselves, which, upon observation, appear to create the conditions to allow for individuals to choose when and where they learn. In other words, it can be observed that the emergence of the mobile-technologies themselves is a driving force towards the adoption of mobile learning. However, upon closer examination, the acceptance and adoption of mobile learning practices clearly demonstrate a 'socially-constructed' nature, as it is the individual who has chosen to harness mobile-technologies to support their own personal learning. This brings to question the following: which perspective is correct, is mobile learning socially determined or technologically determined? To investigate this question will be one of the outcomes of this paper

This paper argues that mobile learning is not entirely socially deterministic nor technologically deterministic, but rather a combination of both. Individuals are harnessing technology in an attempt to reshape, enhance and improve their capacities and conditions for learning and acquiring knowledge in the world today. Yet, much research can be found that places tremendous emphasis on the technological aspects of mobile learning, rather than highlighting the social-aspects.

Limiting the perspective of mobile learning by focusing on the technological aspects of this form of learning can be harmful. By placing more emphasis on the technological underpinnings of mobility and mobile learning one unwittingly omits the essential element of

m-learning, the learner. Furthermore, mobility can no longer be confined to human corporeal travel as was the primary characteristic of previous generations. The concept of mobility must be extended to take into account the changing face of mobility afforded by the very ICTs that also supports virtual as well as physical mobile learning and interaction.

## **1.2 Research Questions and Paper Structure**

The purpose of this paper is to reconsider, from a theoretical perspective, the concepts of mobility and mobile learning and explores whether mobile learning is founded upon a socially deterministic and technologically deterministic approach. The central questions behind this research are the following:

1. How can the concept of mobility be understood in relation to mobile learning?
2. Which factors are influencing and shaping the emergence of mobile learning?

The research conducted to address these two questions is based on a review of existing literature addressing the theoretical aspects of mobility and mobile learning and compares this with literature that critiques and addresses the concepts of mobility and mobile learning. The arguments and findings of this research are presented in two sections. The first section, *Exploring the Concept of Mobility*, focuses on the first research question highlighted above. The second section, *Determining the Shape of Mobile Learning*, addresses the factors influencing the emergence of mobile learning as indicated in the second research question.

This research paper is exploratory in nature, and thus, will not be able to cover in depth many of the concepts and topics surveyed. It is helpful to view this work as a medium to encourage thoughtful discourse and to continue the ongoing dialogue regarding mobility, mobile-learning and how the two concepts make an impact on society.

## **2 Exploring the Concept of Mobility**

The concept of mobility is an important subject to discuss to gain a fuller understanding of the concept of mobile learning. From our research perspective the mobility of the learner is central to concept of mobile learning. Due to modern advances in transportation technologies and the seemingly innate nature of humans to meet face-to-face, individuals are increasingly becoming more physically mobile (Adams, Freidman, Kakihara, Urry). Kakihara and Sørensen observe that “our life styles have become increasingly mobile in the sense that the speed of transportation and hence geographical reach within a given time span is dramatically augmented by modern techological developments and sophistication such as train and airplane systems.”[22] Yet, the concept of mobility according to Kakihara and Sørensen is narrowly defined and places too much emphasis on the notion of mobility “in terms of human independency from geographical constraints.”[22]

To expand this concept of mobility one must take into account the emergence of information and communication technologies that support virtual mobility, or ‘tele-access’ which in-turn supports a quality of mobility that is demonstrated in the “freedom of communication” via wireless networks and related technologies. (Castells, Dutton, Friedman, Kakihari, Schiller, Urry). This expanded concept of mobility is one of the unique characteristics of the age we live in and heavily influences our understanding of mobility and directly effects the perception of how mobile learning is implemented and practiced.

### **2.1 Understanding Mobility**

Embedded notions of how mobility is defined effects the perception of how mobile learning is defined and practiced. Taylor et.al. argue that it is imperative to approach mobile learning from a perspective in which the learner is mobile, “rather than defining ‘mobile-learning’ as

learning that takes place through the use of mobile devices”.[23] Thus, to develop a mutual understanding of the concept of mobility is imperative in order to define m-learning and help devise theoretical approaches to the implementation of mobile learning scenarios.

Kaikihara and Sørensen expand the concept on mobility beyond human geographical movement (or the movement of learners for that matter) and suggest that mobility should consider the follow three dimensions that apply to human interaction: 1) Spatial 2)Temporal and 3)Contextual.

*Spatial mobility:* This dimension of mobility does not exclusively refer to the mobility of people; but rather it also “signifies the global flux of objects, symbols and space itself and as such evokes complex patterns of human interaction”.[14] John Urry further explains that there are several aspects of ‘spatial mobility’ manifested within the modern society and refers this form of mobility as a “horizontal structure” with the ability to be applied to “a variety of actants and not just to humans.”[26] From this perspective it can be said that the “mobilization of spatiality in human interaction results from the complex and rapid flux of all entities in our living world including not just humans, but also objects, symbols and images.” (Kaikihara)

*Temporal mobility:* Mobile ICTs allow for a new quality of temporality in which human interaction is becoming increasingly more mobilized. Many of the technologies adopted today are done so to either save time or to use time more efficiently. As Kaikihara and Sørensen assert, “the temporality of human interaction can no longer be explained from a linear ‘clock-time’ perspective; it is now highly mobilized into multiple temporal modes such as monochronicity and polychronicity.” The ability to learn anytime in such a pervasive manner is one key advantage to mobile learning, and highlights this dimension of mobility quite well.

*Contextual mobility:* A key characteristic of Mobile ICTs is the diverse modalities of interactions it affords (Kaikihara). Mobile ICTs allow for human interaction to be conducted in virtually any context or situation. This dimension of mobility is limited only by artificially constructed limitations of physical constraints. The ability to learn anywhere within a ubiquitous, situated manner is another advantage of mobile learning, and highlights this dimension of mobility quite well.

To further assist in developing a broader understanding of the concept of mobility it is important to highlight the contributions of Manuel Castells with his development of the concept of “the space of flows”[8] which emphasizes a broader understanding of the concept of mobility. This ‘space of flows’ describes both the real time interaction of people who are physically distant from one another as well as the technological infrastructure that makes this form of interaction possible; in other words, the ‘space of flow’ has both material and immaterial aspects. These thoughts are more clearly elucidated within the book, *The Rise of the Network Society*, in which Castells’ describes the ‘spaces of flows’ in the following quotation:

„Our societies are constructed around flows: flows of capital, flows of information, flows of technology, flows of organizational interactions, flows of images, sounds and symbols. Flows are not just one element of social organization: they are the expression of the processes dominating our economic, political, and symbolic life. ... Thus, I propose the idea that there is a new spatial form characteristic of social practices that dominate and shape the network society: the space of flows. The space

of flows is the material organization of time-sharing social practices that work through flows. By flows I understand purposeful, repetitive, programmable sequences of exchange and interaction between physically disjointed positions held by social actors.“ [8] (p.412)

Castells' central argument, when applied to the concept of mobility, demonstrates that the 'space of flows' is a mobility enabler that affords the real-time interaction of distributed social actors. This space, which can be observed as a form of 'enhanced mobility,' is comprised of the material infrastructure and the communications that ensue which makes these interactions possible.

As noted earlier the concept of mobility is an important subject to discuss and allows us to gain a fuller understanding of the concept of mobile learning in relation to mobility and the learner. We have demonstrated that mobility is not limited to human corporeal travel, but rather mobility takes on several dimensions, which are both material and immaterial. Yet, there are other emerging perspectives on mobility, which could profoundly affect our adoption and acceptance of mobile learning.

## **2.2 Emerging Perspectives on Mobility**

One emerging concept that bears importance in mentioning is that of 'hypermobility' which highlights some of the potential negative consequences of 'too much' mobility. According to John Adams the "growth trends for electronic mobility correlate strongly and positively with the trends for physical mobility, but the growth rates are much higher." [1] Adams states that there are many disadvantages to hypermobility that he observe' is a product of the technological advances and affordances of mobile ICTs. Adams postulates, quite pessimistically, that a 'hypermobility-society' will be:

- More dispersed and polarized
- More dangerous
- More hostile to children
- Less culturally varied
- More anonymous
- Less convivial
- More crime ridden
- Less democratic

It is important to point out that Adams' observations are founded upon his perception of society as a citizen within a western, industrialized nation. It remains to be seen if the emergence of a 'hypermobility-society' in line with Adams' observations will come to pass.

Upon reflection on the concept of 'hypermobility' the question remains whether a 'hypermobility-society' is actually shaped by a complex mix of social-cultural and economic influences, or by the technologies themselves. It is safe to say that people still have the ability to make choices as to the level of mobility they experience, thus placing the responsibility on people in shaping society into a 'hypermobility-society' rather than placing the onus on the technologies themselves.

Whether the above observations will prove to be true or not, is not the focus of this research. What is important is that Adams' assertions raises important questions and is instructive when examining the influence 'mobility' (and potentially m-learning) could have on society. Furthermore, it is instructive to examine the potential emergence of 'hypermobility' within society in order to weigh the consequences of this form of mobility in relation to mobile learning. One question we need to ask ourselves is: would we adopt and engage in mobile learning if this form of learning were to produce a level of 'hypermobility' that could potentially spawn negative consequences?

This brings us now to a point in which we will examine how mobility and mobile learning influence each other in an attempt to understand how mobility can be understood in relation to mobile learning.

### **2.3 Mobility & Mobile Learning**

Bearing in mind that our world is unevenly developed, a commonly held fact is that the mobile phone is ubiquitous in most parts of the world. It is safe to say that most societies place tremendous emphasis on the use of mobile phone and associated wireless-communication infrastructure and this can be observed in how mobile phones and related mobile technologies are becoming a central part of many people's lives. For many, mobile technologies are thoroughly embedded within their daily routines, and complements the fact that wireless communication has diffused faster than any other communication technology in history, touching the lives of literally billions of individuals. [9] It can be argued that the pervasiveness of mobile ICTs in our world is an indicator that individual mobility is important, and as these technologies complement mobility they are attractive to individuals. Which brings us to our question we posed earlier: how can the concept of mobility be understood in relation to mobile learning?

One answer to this question is given by Vavuola and Sharples, in which they describe the nature of learning as an activity that is closely linked to the concept of mobility. Furthermore, they assert that "learning is mobile in terms of space (or situated context), i.e. it happens at the workplace, at home, and at places of leisure." Moreover, Vavuola and Sharples described some of the various dimensions of mobility proposed by Kaikihara and Sørensen in showing that mobility of the learner can be observed in situated contexts "between different areas of life, i.e. it may relate to work demands, self-improvement, or leisure; and it is mobile with respect to time, i.e. it happens at different times during the day, on working days or on weekends." (p152)[27] Sharples also emphasizes that learning is taking place "more and more outside of the classroom and into the learner's environments, both real and virtual, thus becoming more situated, personal, collaborative and lifelong." [20]

The mobility of individuals, objects, symbols or technologies (mobile phones) are all playing a role in the emergence of the field of m-learning. Whereas the mobility of space itself, be it virtual communities, cyberspace or computer mediated communication among people, minimizes the geographical distance between people and places. We are already observing how the boundaries between 'here' and 'there' are dissolved through mobile ICTs. The learner is unleashed within the world. As Bryan Alexander suggests: "[when] learners [are] mobilized through the use of mobile ICTs and adopt m-learning practices, the nomadicity of students will increase, thereby affecting the very fabric of learning and student life at University Campuses." [2]

Generally speaking, when we envision mobility in relation to mobile learning we may conjure up mental models of individuals in motion using mobile technologies for learning purposes. More specifically, we can envision individuals using smart phones or any other form of portable-computing device to connect, access and interface with mediated content and communicate through mobile ICTs and maintaining contact with classmates and colleagues for the purpose of exchange ideas and sharing knowledge. In whichever way we model and envision m-learning, individual mobility, coupled with ICTs are part and parcel of our vision. In conclusion, we can safely argue that the mobility of the individual and mobile learning are intrinsically intertwined.

### **3 Determining the Shaper of Mobile Learning**

Technology is ubiquitous; and it is this very characteristic of technology that it has the ability to shape our lives in many ways. Technologies and technological practices, it is argued, “are built in a process of social construction and negotiation, a process often seen as driven by the social interests of participants.”[6] Many questions surface when we examine technologies relationship to the emergence of mobile learning. On the surface it can be observed that recent advances in mobile ICTs have afforded the ability of individuals to harness technology for the purpose of using them to enhance their learning. Smaller more powerful devices with interconnectivity have enabled individual learners to engage in mobile learning practices. Yet the question remains, which factors are influencing and shaping the emergence of mobile learning, are they primarily technological factors or the social interests of individual learners? The following thoughts help to answer this question.

#### **3.1 Technological Factors**

According to Smith & Marx technology is understood as an agent of change.[22] For example, they suggest that “anyone who has witnessed the advent of the computer knows a great deal about how new technologies can alter the very texture of daily life.”[22] Therefore, it can be argued that technology is developed out of the social, economic and technical relations that are already embedded within societies; thus, technology can be understood as a product of “the existing structure of opportunities and constraints” already manifest within society.[6] When considering mobile learning it can be argued that the technology shapes user behavior, and that behavior in turn affects the way the users perceive technology.[23] Technological factors are not the only influences that are shaping the emergence of mobile learning practices. There are numerous social factors involved, which are observed as factors that shape mobile learning.

#### **3.2 Social Factors**

According to Robin Williams, “social scientists have increasingly recognized that technological change is shaped by social factors.”[29] This perspective is embedded within the field of Social Shaping of Technology (SST) research. It is further implied that “technology is a social product, patterned by the conditions of its creation and use.”[28] According to William H. Dutton, “ICTs are social in that they define how people do things, such as how they get information, work, communicate, and are educated.”[10]

As technological factors and social factors are both understood as factors that structure mobile learning then the question surfaces, how do we articulate this process? This ‘co-shaping’ of mobile learning can be understood as a heterogeneous shaping process.

#### **3.3 The Heterogeneous Shaping of Mobile Learning**

Pinch and Bijker assert that “social and technological change come together, as a package, and that if we want to understand either, then we really have to try to understand both.”[19] Furthermore, Bijker asserts that: “all relations should be seen as both social and technical.”[6] Moreover, Bijker and Law postulate that socially deterministic and technologically deterministic views on technology and its relation to society are flawed. This can be highlighted by the observation Manuel Castells makes when he states that: “indeed, the dilemma of technological determinism is probably a false problem, since

technology is society, and society cannot be understood or represented without its technological tools.”[8] In summary, the factors that are influencing and shaping the emergence of mobile learning are a combination of both technological and social factors.

## 4 Conclusions

This paper has examined the concept of mobility and has reflected on how mobility of the individual is a central component of mobile learning. This paper also explored the field of mobile learning by investigating whether mobile learning is founded upon a technologically determined factors or social-determined factors, coming to the conclusion mobile learning is a heterogeneously constructed experience, which is dominantly shaped by social forces, although heavily influenced by technologically determined factors. Regarding the exploration of the concept of mobility it was discovered that this concept is not solely defined in terms of human corporeal travel, but rather encompasses also immaterial objects as well, such as the exchange of information and ideas within networks and spaces of flow.

As stated earlier this research paper is exploratory in nature, and thus, was not able to cover in depth many of the concepts and topics surveyed herein. Therefore, this paper serves as a medium to encourage thoughtful discourse and to continue the ongoing dialogue regarding mobility and mobile-learning and how the two concepts impact society. Yet, many questions arise from this research. The following thoughts serve to conclude this paper are to inspire further thought and help in the evolution of this nascent field of research.

### 4.1 Research Reflections

Inspiration for this paper came from reading Dan Schiller’s thought provoking article, “*Why The World Went Mobile*” published in *Le Monde Diplomatique*. Dr. Schiller’s argument as to why the world went mobile focused primarily on social factors, (predominantly political economics), as the main determinants ‘shaping’ the way the world went mobile. His argument prompted a detailed investigation into the literature to examine more fully as to which factors were influencing and shaping mobile learning. This investigation also led to a deeper exploration into the concept of mobility in relation to mobile learning.

In the research that followed many questions began to surface. Is m-learning too narrowly focused on apply technological solutions to societal problems? Should society focus more on improving education and its accompanying institutions rather than placing valuable resources in developing new modalities of learning? Or, in contrast, can m-learning be applied in a normative sense, to help increase the capacities and abilities of individuals to develop their full potential, thus improving education opportunities of individuals. In other words, can it be said that m-learning has the ability to make a positive impact on society as long as we keep in mind the consequences that could emerge by adopting these technologies and make efforts to minimize the negative impacts of these mobile ICTs and maximize the positive potential.

In order to find solutions for these questions it is imperative that current and future research conducted within the field of mobile learning takes on a transdisciplinary and interdisciplinary character. As noted in the text, *The Social Construction of Technological Systems*, Bijker, Hughes and Pinch note that: “system builders are no respectors of knowledge categories or professional boundaries. Thomas Edison [a prolific inventor] so thoroughly mixed matters commonly labeled economic, technical and scientific that his thoughts composed a seamless web.”[5] This observation illustrates a point that researchers need to start thinking and exploring from various perspectives and disciplines to gain greater acuity and understanding of the interconnectedness of social and technological forces within society to help us determine current and future scenarios for augmenting learning with mobile technologies. In

doing so, we will be able to further the development of mobile learning in a positive vein, and as Mike Sharples reports, that through m-learning we are now able to design learning differently. By designing learning differently we will directly affect the shape of societies to come.

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