Chapter 12
Factors Affecting a Mobile Learning System: A Case Study

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12.1 Introduction

Education is an idea of lifelong learning, initiative learning. In today's world one of the most interesting domains available through the Internet is distance learning [1]. With the increase of networks and mobile computing, people are more interested in distance learning [2]. The m-learning focuses majorly on the student versatility with convenient gadgets [3], and discovering that how society and its organizations can oblige and bolster with an increasingly portable mobile population.

With technology advancements in smart devices like mobile devices, ipads, and tabs, people are more interested in distance and mobile learning as the abilities of these pervasive gadgets are expanding at an unfaltering rate [4, 5]. The students are distinctive in age level, sex, social job, their way of life, training foundation, consideration, and premiums; pastimes have an extraordinary effect in their learning conduct [6].

Providing corresponding learning content and strategies to acknowledge instructing as indicated by students' needs is an exceptionally difficult and a very challenging task [7]. With emerging mobile devices teaching/learning has to change in its entirety to adapt to this new mobile education [8]. m-Learning, which gives a consistent figuring out how students, can conquer any hindrance of portable mobile

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and desktop computing [9]. A large gap can be found between learners' expectation and in the actual m-learning.

Therefore, it is the need of hour to study and find out the factors that affect m-learning [10, 11]. Learner's context, various types of smart devices [12], speed of the network, and hardware and software of smart devices are the major factors that affect internal quality of m-learning [13]. Therefore, it is very meaningful to study and find the learner factor that impacts on m-learning.

12.2   Factors Affecting the m-Learning

The m-learning system should be adaptive to the needs of different learners, who have different individual mobile learning preferences. The m-learning preferences of a learner can be used as a basis for providing personalized learning platforms catered to the individual needs of learners. The learning styles are the major factors that impact on m-learning. Learners have different styles, preferences of learning, and tools which assist them in effective learning. Understanding how a learner learns is called meta-cognition, means thinking about thinking. Meta-cognition is about the perceptive how learner, as an individual, learns the best.

A learning style portrays the manner in which that learner wants to learn; learner may utilize certain procedures or like accepting data in a specific way. The learning styles can be affected by the manner in which learner think, feel, and behave. The learner factors can be influenced by personalization, the context of a learner. The two important factors are: (1) learner analysis and (2) context analysis.

12.2.1   Learner Analysis

Learner analysis includes analysis of learning behavior, styles, type of learning, and brain dominance. Each learner carries different characteristics of each of them. Attributes of the learners impact learning objectives and effect the way in which learning happens. Understanding and taking into contemplations the qualities of the learners can decide if the learning knowledge is significant.

Creating instruction that suits to every type of learning style for learners is not easily possible. Understanding the various learners learning styles can provide alternatives. Types of learning styles of learners are listed below in Table 12.1.

Based on the above learning styles, four learner categories are listed in Table 12.2.

Table 12.1 Various learning styles

Style	Description
Tactile/kinesthetic	Learners prefer physical engagement, i.e., "Hands on" activity. Prefer performing/doing practices rather just reading.
Visual/perceptual	Learners prefer looking. Demonstrations, for example, charts, writing on a blackboard, diagrams, and graphs are of interesting to them. Visual learners recall best what they see—pictures, outlines, flowcharts, courses of events, movies, and exhibits.
Auditory	Learners prefer information presented in an oral way. For example, classroom; listening to lectures; participating in group discussions.

Table 12.2 Lerner categories

Type	Description
Active	Learners comprehend the data best by effectively accomplishing something with it.
	[Discussions/applying/explaining to others.]
Reflective	Learners desire to think.
	[Think about the information is reflective learner's response.]
Sequential	Learners are preferred to learn slowly.
	[Step-by-step explanation, in an orderly process, up to the end result.]
Global	Learners like to have examples so that they know where they are headed and what they are working toward.
	Before learning a complex process learners first prefer an overview of what and how they are going to do.

12.2.2   Context Analysis

In addition to analyzing the learners, the learning context should also have to be analyzed. For, understanding the setting in which new abilities, information, or state of mind will be utilized can advise the arranging of instructional exercises that will estimate what learners will look in reality. Also, a comprehension of the learning context encourages in recognizing obstructions in the setting and best utilizes the instructional condition. It additionally includes depicting the idea of the learning context and compatibility and requirements of the environment for the learners and instructional objectives. Personalization provides personalized learning depending on the learners' profile; profiles are constructed based on the various factors of students' characteristics, like:

- In which location student prefers to study—home, college, laboratory, library, lounge park, office, etc.
- Preferences for sensed distractions within locations—noise, activities in surrounding, environmental factors, light, temperature, room layout, near-by attractions, seating.

- Personal factors like—friends, working culture, food, drink, time of the day, likes to be alone, in a group.
- Format of content—learner prefers audio, video, or animations in learning.
- Preferred time of study—daytime, morning, afternoon, evening, night, or midnight.
- Type of smart devices, network type and other features like screen size, RAM, etc.

12.3   A Case Study Based Results and Discussions

For the case study, Java Programming for the students has been considered. We have captured individual learning preferences of Java Programming. 240 students of various branches of engineering participated in this study. Table 12.3 provides the details of students of various branch of engineering.

Table 12.4 furnishes the figures of the 240 students' interests in studying Java Programming.

We have collected data with respect to context that we have assumed. We have used Google form to collect the data. Table 12.5 will give details about the characteristics that are assumed for our circumstances and assumptions.

These factors help to identify the context of a student. Figure 12.1 depicts an example of context scenario of student 1.

Another similar scenario of student 2 is represented in Fig. 12.2.

Table 12.3 Number of students participated

Branch	Number
Information Science	50
Computer Science	60
Mechanical	40
Civil	40
Electronics	50

Table 12.4 Opinion about Java Programming

Questions	No (%)	Yes (%)
I enjoy studying Java in any noisy situation	76	34
I can study Java in any location with full concentration.	77	33
Studying Java, whatever the mood, time may be, makes me joyous/happy.	44	56
Studying Java bores me	84	16
Java motivates me to learn to programming	15	85

Table 12.5 Context characteristics and possible values

Characteristics	Possible values
Place	House—Room or hall
	College—Classroom or library
Time	Morning
	Afternoon
	Evening
	Night
Posture	Laying on
	Table and chair
Noise	Alone
	One friend
	Two or more friends
Smart device	Smart phone
	iPad
	Tab
Network	4g
	3g
	2g
RAM	6 GB
	4 GB
	2 GB
	1 GB
Battery	Full
	Average
	Low
Screen size	6″
	5″
	4″
	10″
Content	Video (demonstrations, films, animations)
	Audio (mp3)
	Text/pdf (hands on, tutorials, pictures/images)

Similarly we have captured the context of all the students, and content format they are interested in. Students are interested in various formats of content relative to their day-to-day contexts. Few sets of students are interested in fixed content formats and other showed interest in mixed kind of content formats.

The graph in Fig. 12.3 depicts the formats of content accessed by different number of students. Content formats change with varying contexts of students in routine life.
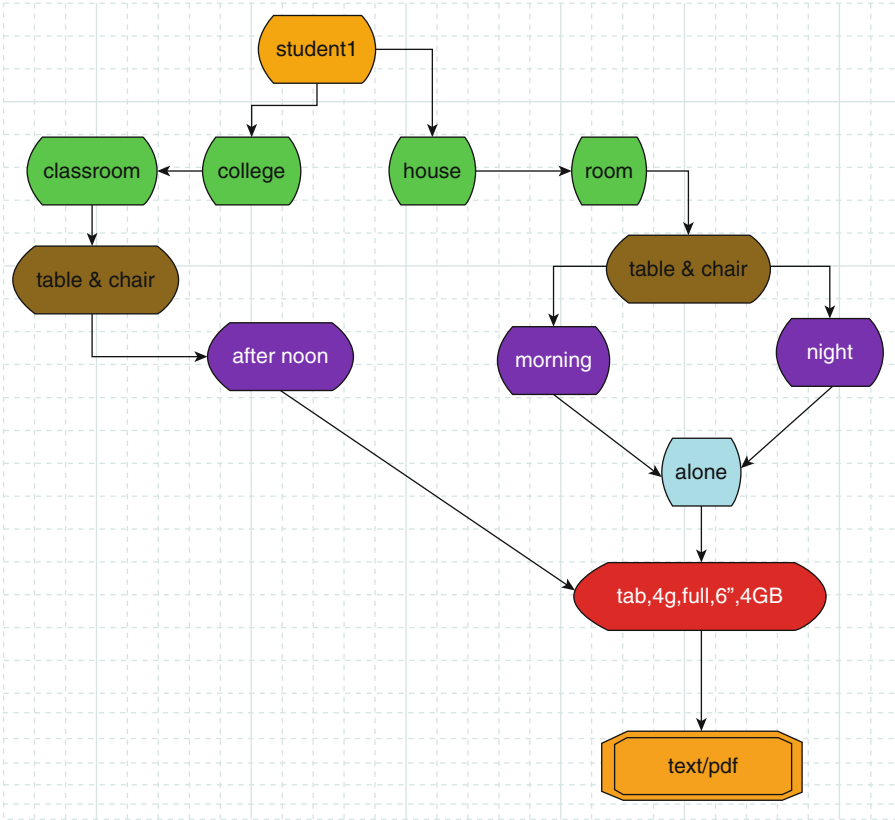
Fig. 12.1 Scenario of student 1

The learning styles are of three types: visual, auditory, and tactile. Students are interested to study various content formats: only video or only audio or only text; in any context, college or house. Students have shown interest in studying mixed content formats also: text and audio, text and video, text and animations. Figure 12.4 shows the mapping of learning styles mapped to the students.
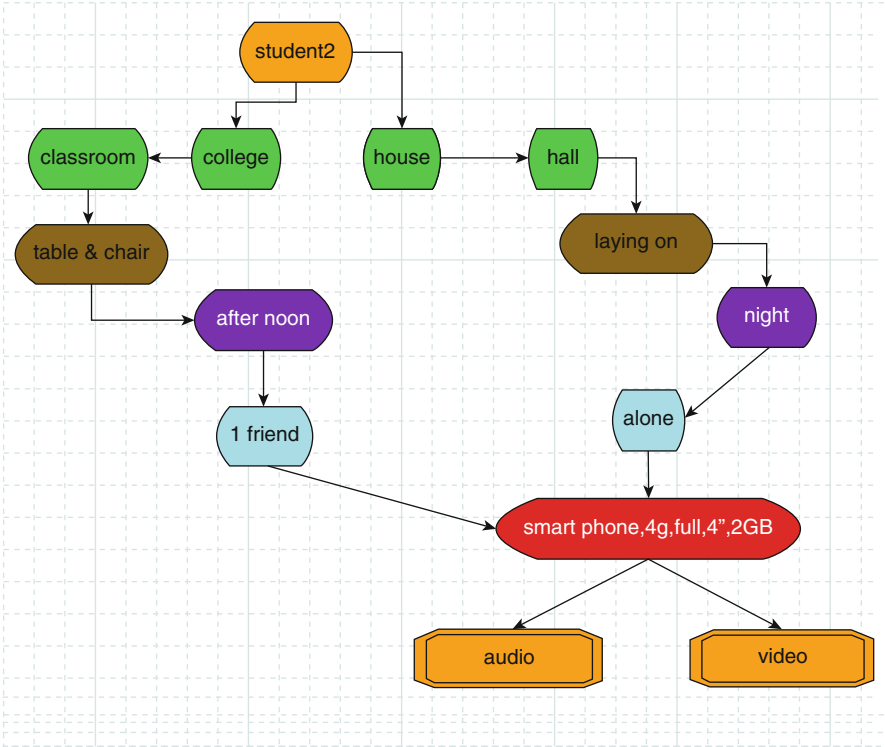
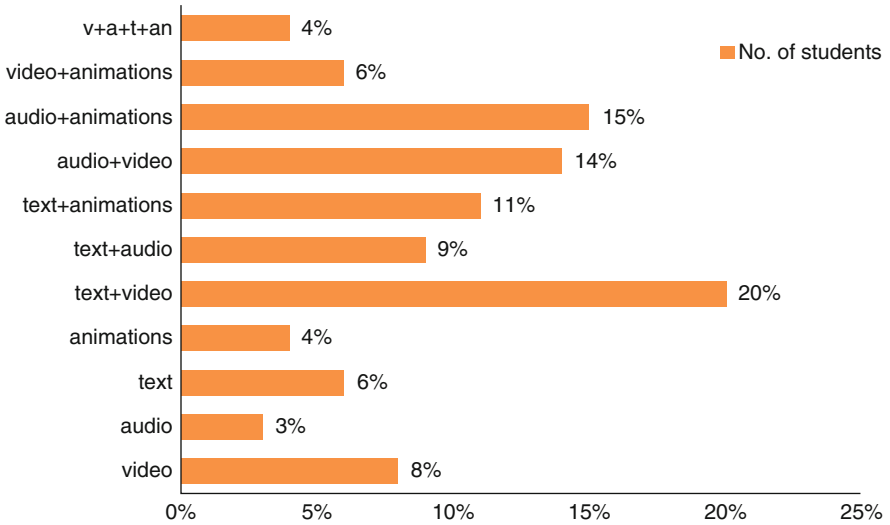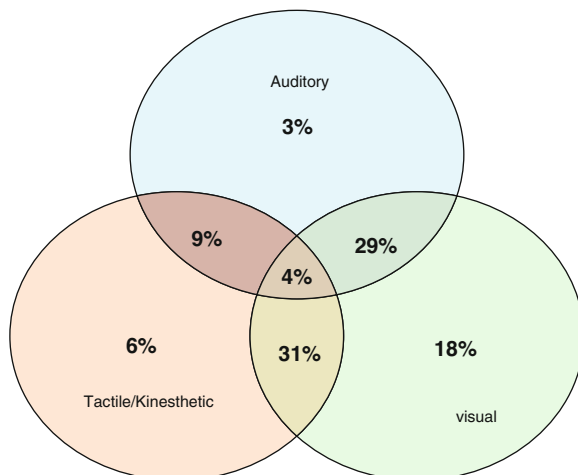**Fig. 12.2** Scenario of student 2

Fig. 12.3 Content formats interested against the number of students

Fig. 12.4 Mapping of the
students to learning styles

12.4   Conclusions

In this chapter an attempt has been made to study and analyze the factors that
affect m-learning system. The chapter focuses on two factors: (1) Learner analysis,
which is identifying what type of learner he/she is, and (2) context analysis—the
real-time scenario the learner involved in. As m-learning should cater the needs
of learner with various learning styles and different contexts, this study helped to
understand behavior of the learners with respect to their preferred contexts and also
various content formats to be delivered. Understanding each learner's context and
preferences is very crucial as the individual needs and requirements are different.
So it's challenging and complex task to cater the adaptive content delivery system
based on the various interests of various learners at one platform.

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