

# Feasibility Study Of Android Application In Architectural Education

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**Abstract:** Mobile devices are increasing day by day because of its portable features and effective applications. Nowadays not only individuals but entrepreneurs also depend on portable devices for their small and big assignments. However, rapid use of mobile technology increasing feasibility of mobile users and programmers. In development of mobile application, developers aiming to build their application with suitable platform which can access by any devices including smartphones, tablets, laptops and computers. Android is one of the best, popular and open source platform which provides ready-made, customizable and high-tech features for users. Almost in every sector android applications are useful like health care, e-commerce, banking and education. Million mobile educational applications are available on internet these days. This study highlights what is android application, architectural education and how android application is feasible in educational and architectural education sector. To improve the productivity and standards of learning architectural education, different methods can include in android application. After analysis of the present situation of architectural education this study analyze how android technology can provide single online platform to access multiple features simultaneously.

**Index Terms:** Android, Android Application, Educational Application, Architectural Education, Architectural Application.

## 1. INTRODUCTION

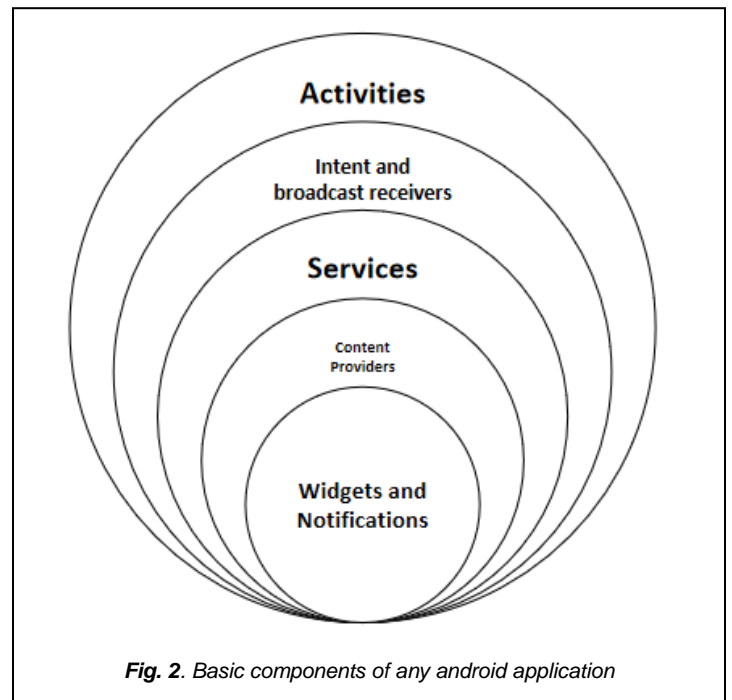
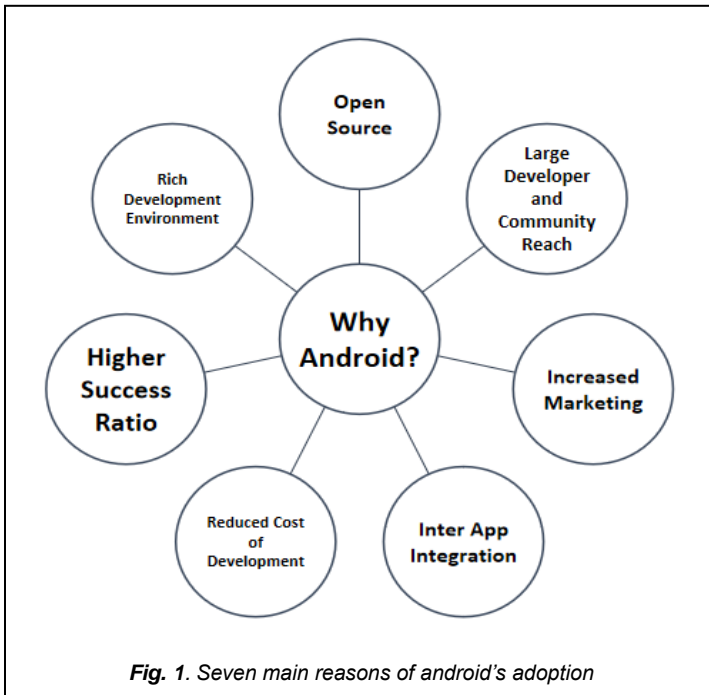
Android is one of the most useful and powerful operating systems these days because of its supporting feature. In several aspects smartphones considered as an important innovation. For distributing new knowledge, android technology as a tool is remarkable and problem-solving. Due to technological inventions, the android operating system has undergone great changes and it is running on countless models of smartphones, Pcs, Tablets, as well as many other devices [1]. With the availability of smartphone devices and advancement in mobile technology developers are designing interactive and effective android apps (applications) which can be used for learning and teaching architecture through single platform [2]. The aim of this research focus on android app based architectural design in architectural education and define how an android app feasible in architecture education by providing various facilities for architects and architectural students/aspirants including find registered architects through their uploaded profile, infrastructure and courses detail which will be helpful for architectural aspirants, best architectural firms for job/training and institutions for further education, reading/downloading architectural Ebook and online practice test portal for architectural aspirants. Android apps has begun to displace traditional architectural design and learning technologies and become more advanced in education sector due to its innovative and efficient technologies like virtual reality (VR) and augmented Reality (AR). In architecture education for visualization of three dimensional (3D) model, students require this technology on mobile devices to compare their 3D models with real world objects. Image architecture, virtual scene and digital simulation among other application are the example of digital technologies that have been involved in the education process

of architectural education to replace traditional education tools which was mainly based on two dimensional (2D) sketches on physical 3D models. Integration of complete digital teaching like computer aided drafting (CAD), modeling, enumerating became the main subject in architectural education. Over the past decades, mobile technologies are providing more effective educational methods for classrooms and outdoor learning. The general objective of this study is to enhance productivity and standards of architectural education through android application. The rest of the paper further structured as follows: Section II provides an overview of android. Section III presents the structural components of android application. Section IV outlines the use of android application in education sector. Section V describes about architectural education. Section VI highlights the use and feasibility study of android application in architectural education. Section VII discusses the result analysis and finally the paper is concluded in Section VIII.

## 2 OVERVIEW OF ANDROID

Android is a popular, comprehensive (complete software stack) open source platform and Linux based operating system for mobile devices. It is powerful operating system (OS) which was developed by the Open Handset Alliance (OHA), led by Google, and primarily designed for touch screen mobile devices such as tablet computers and smartphones. These days android is one of the most sought-after and widely used mobile operating system because of its features such as interactive user interface (UI), connectivity, multi-touch, multi-tasking storage, media support, Web browser, messaging, multi-language, GCM, resizable widgets, android beam and wi-fi direct. Android OS has been released in number of versions with alphabetical order names including Android Astro (1.0), Bender (1.1), Cupcake (1.5), Donut (1.6), Eclair (2.0), Froyo (2.2.x), Gingerbread (2.3.x), Honeycomb (3.0), Ice Cream Sandwich (4.0.x), Jelly Bean (4.x), KitKat (4.4), Lolipop (5.0), Marshmallow (6.0), Nogut (7.0), Oreo (8.0), Pie (9) and Q (10) latest released version of android. As can be seen in Fig. 1 which shows seven main reasons why android is so much popular. Nowadays, number of architectural apps are available on android and helpful for architecture students to work smarter instead of harder.

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### 3 ANDROID APPLICATION

In the recent years, wireless communication techniques and android devices have evolved significantly in daily life style of individuals. This has led to a high demand for developing android apps that runs on android devices. This section outlines necessary components of an android application as can be seen in Fig. 2 which shows essential building blocks of an android application. For development of android application, developers use android software development kit (SDK) with Java, Kotlin and C++ programming languages in which Java considered as primary language of android [3]. SDK compile code with resource files and data into an archive file with an .apk file extension, which is an android package and contains all the contents of an android app. By default, android apps manage by android runtime (AR). Currently, there are 2.5 billion active mobile device and 2.8 million apps available in the Google Play Store. Google has provided free android studio integrated development environment (IDE) with powerful features such as code editor, themes editor, visual layout, Instant run, vector and image asset studios, and more for developers to build android apps and upload on stores such as Google Play, Amazon Appstore, Opera Mobile Store and others.

### 4 ANDROID APPLICATION IN EDUCATION SECTOR

In the education era, the rapid evolution and advancement of wireless portable technology such as mobile devices has led to radical development. The wide variety of android applications are available these days for learning and teaching. Apps are designed these days to be effective, engaging and interactive. Over the last few years, mobile learning has brought tremendous success with the possibility of learning anywhere anytime by using android based learning application [4]. Nowadays, android apps are more convenient and user-friendly for students and it bring different approaches in education such as knowledge objects and learning objects. Android apps has enriched and enhanced the current educational system to provide permanent, effective and productive learning in academic institutions. In the education sector, interactive android applications motivate learner and educators to adopt mobile learning as the teaching and learning tools [5]. Educational android apps provide various benefits of learning in education sector such as flexible, self-regulated, fun, collaborative, interactive, and experimental learning. Android apps has increased students learning experience and become meaningful, systematic, organized and socially interactive [6] as shown in Fig. 3 pillars of educational app. Android apps facilitate various feasible educational benefits for learners and educators such as sharing information, exchanging information and ideas with friends through digital method, discuss information with groups through centralized system, organize and select correct information, scan or captured needed information, access dictionary, check spelling and translate text from one language to other language and vice versa, social interaction technologies for students and instructors (i.e. Whatsapp, Blog, Facebook, Twitter, Email), multiple representation of information such as audio and video session for participants, share findings and discussion, quickly and broadly get knowledge in digital manner [7], game based learning, 3D

learning method with multiple interaction forms, eBooks, online course and library, visualization of real and virtual objects, and so on.

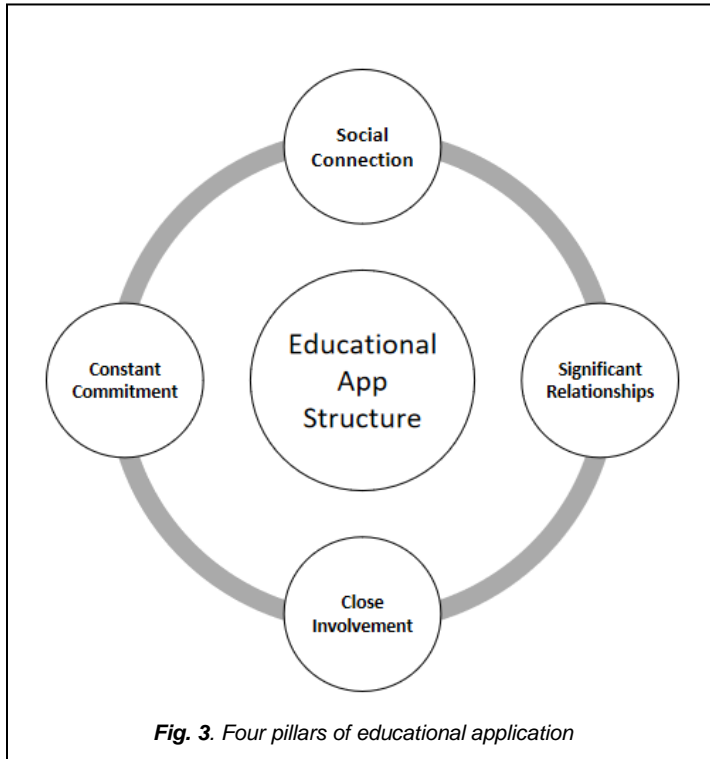


Fig. 3. Four pillars of educational application

## 5 ARCHITECTURE EDUCATION

Architecture is a mixture of science and art and it is also considered as social, engineering and practical art. Education means transfer systematic and necessary information directly or indirectly from one generation to other generation with proper teaching techniques for more advanced bright careers and it is categorized into sub sections such as educational environment, educational tools, educational techniques, educational psychology. There are two types of educational techniques in architectural education such as traditional techniques (i.e. problem solving, question and answer, pair and group works, showing example, discussion, sample case, narrating lecture, etc.) and digital techniques (i.e. computers, mobiles and tablets learning). Architecture is completely developed discipline and it consists mainly collaborative and synthetic profession [8]. Architecture Education (AE) is the combination of professional training and academic scholarship which includes not just knowledge of drafting, constructional elements, sketching, building materials but it also includes history, geometry, philosophy, etc. In AE programme students have to learn architectural theory and history, problem solving, building design on computer aided design and drafting, analyzing and communication, structures, physical science, building construction methods and professional practice [9]. AE is based on teacher oriented and student oriented programme whereas theoretical lectures is managed in teacher oriented manner and design studio managed in both teacher and student oriented manner. In AE it is necessary for students to involved in building construction, modeling, planning and designing. These days architectural students should have creative aptitude, software skills, technical knowledge to become a professional architect [10].

## 6 ANDROID APPLICATION IN ARCHITECTURE EDUCATION

Today's era is the era of science and technology and the time of traditional teaching is going to change. In digital era, architectural educators and learners are completely depended on modern teaching and learning tools such as visualizers, educational software, user-friendly whiteboards, projectors, audio-visual techniques, response system, etc [11]. In architectural education, android applications facilitates new learning source or e-learning paradigm which were not available in traditional AE process including flexibility, choice, affordability and accessibility as shown in Fig. 4 comparison between traditional education system vs educational android app system. Architectural design is the core of architectural education and it is pretty collaborative and complex process but in the age of technology design process has become easier with the help of computer-aided architectural design (CAAD), digital modeling using 3D, animation using 4D, virtual design studios (VDS) and virtual reality aided design (VRD) [12]. Technologies have brought revolution in architecture education by giving access, power and choice [13]. There are

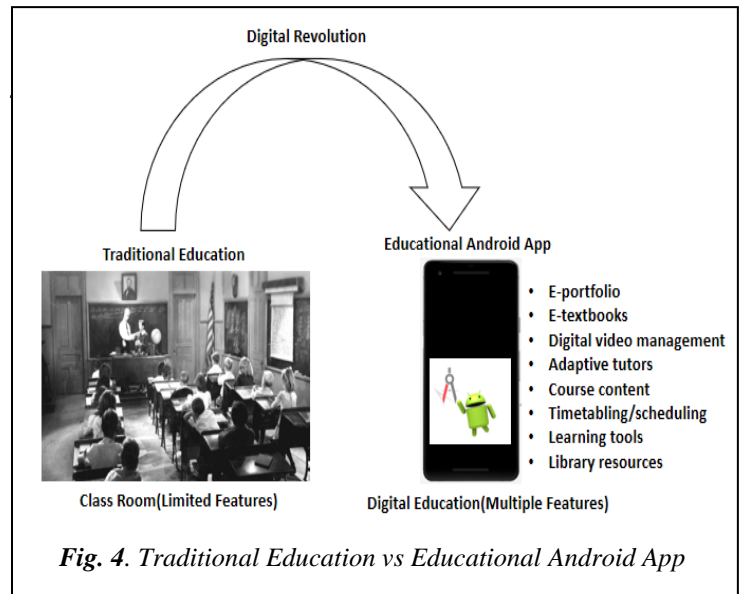


Fig. 4. Traditional Education vs Educational Android App

number of android apps are available for architectural students such as Adode Photoshop Touch(useful features include selection tools, use of layers, adjustments and filters), ArcGIS(useful to get information on geographic regions), Graphisoft BIMx (useful for 2D and 3D floor plans, design and construction process), CADTOUCH (useful for editing and viewing drawing and also helpful for calculating the area of any design, floor plans, space), SketchBook (useful for digital sketching and helpful to draw sketches anywhere anytime), Autodesk Formit (useful for creating conceptual models and edit BIM models), Magin Plan (useful for draw floor plans of real area), Evernote(useful for write notes and maintain to-do lists), GoogleEarth (useful for geological survey), iRhino 3D (useful for zoom Rhino models effortlessly), Business Analysis Online(useful for site research), Layer(useful for augmented reality (AR)). In architecture education, android technologies provide new ways and opportunities for students to access wide range of content. The feasibility study of android application in architectural education depends on five parameters explained below:



1. **Technology & System Feasibility:** Feasibility study of technology and system depends on the interface design of how android application is interactive, best visualized and user-friendly for architectural students and on the system functionalities how the features of architectural application are best and useful and also on hardware availability.
2. **Human-Factor/Time Feasibility:** Feasibility study of human-factor and schedule depends on user background so that user can set their on background and on comfortability, how the user is able to use the application efficiently and produce meaningful and precise output and also on user's demands, project deadlines and readiness that how the application fulfills the flexibility and requirement of the users.
3. **Financial Feasibility:** Economy feasibility study depends on infrastructure cost, Maintenance cost and overall solution cost of proposed application [14].
4. **Legal Feasibility:** Legal feasibility depends on privacy, security and legal concerns such as data privacy, accountability, nepotism, and many more.
5. **Operational/Resource Feasibility:** It depends on how application (system) solves the problems and satisfies the requirement of users by using some operational parameter such as affordability, reliability, disposability, maintainability, sustainability, usability, supportability, producibility and resource feasibility depends on time availability and amount of resources.

## 7 RESULT ANALYSIS

Android is one of the most trendy and sought-after platforms in the world for smartphone applications and it receives high demand in the marketplace because of its tremendous features. Architecture education included in the education of creative thought and the study of architecture is a process of learning clear thinking and working strategy. Although the main aim of this research is to explain the feasibility of android apps in architectural education. This section analyzed the following result of this study:

1. **Transforming Architectural Education :** Educational transformation of architectural students and teachers by incorporating android application and enhance their skills with excellent designed features.
2. **Creative Thinking and Techniques :** An architect must gain intellectual ability and to be creative at many stages. In architectural education, for creative thinking students can transform their knowledge to the actual practice by using visualization techniques through android application.
3. **Improve Literacy Standards:** Educational android apps are designed to be focused on academic practice of students to improve their efficiency and literacy standards by integrating specific features.
4. **Innovative Educational Methods:** Android applications are one of the most popular and innovative educational method in architectural education which helps build imagination, problem solving, literacy development and creative thinking skills through interactive features.

## 8 CONCLUSION

As mentioned in the paper architecture is a design process which involves various phases such as constructing, designing and programming and in architectural education for designing phase android apps are effective teaching tools to engage students for constantly growing and evolving them. This study mainly focus on feasibility of android app based learning and teaching method as compared to traditional method in education sector and architectural education. Thus, the feasibility study of android application in architectural education aimed at overall high-quality performance of architectural students and teachers by providing them a logical and best architectural solutions.

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