Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 44 No. 5 (2023)

Understanding the Accessibility and Satisfaction of Educational Apps Among Children with Special Needs

Manoj Kumar Gupta, ***Scholar, GGV Bilapur(C.G)***

Vidyasagar Maurya, ***Scholar, IASE, JMI Delhi***

Sudhir Sudam Kaware ,***Asst. Professor, GGV, Bilaspur(C.G)***

Shiv Kumar, ***Asst. Professor, GGV, Bilaspur (C.G)***

ABSTRACT

Educational apps for mobile phones are rapidly gaining transactions and can be used for a variety of purposes. They were widely used in education. Mobile phone educational apps are software that runs on mobile devices such as smartphones and Personal Digital Assistance (PDA). They were designed to provide disabled students with many essential functionalities in different ways. Therefore, ensuring ease of use and satisfaction in educational apps is a key concern of today. This article focuses on accessibility and its attributes related to educational apps, with a particular focus on satisfaction. To understand these quality features, various theories are examined from the perspective of psychology and disabled student behavior. From this, the reason why disabled students feel satisfied or dissatisfied, the main elements of satisfaction related to educational apps, the ISO model of satisfaction, the satisfaction problem in educational apps, and the factor determining disabled student satisfaction, ensuring maximum satisfaction and the ramification of satisfaction with educational apps are examined. Finally, ways to establish satisfaction with mobile phone educational apps are suggested their ramification for people are examined.

Keywords: Educational apps, satisfaction, Accessibility

1. INTRODUCATION

It is estimated that more than a billion people (or 15% of the world's population) have a disability (WHO& World Bank2011). According to the 2011 census, there are 1.2 billion people in India, of which about 833 million people live in rural areas. The total number of children with disabilities are 164.5 million. According to the statistics of the education of

Persons with Disabilities Act 2019-2020,33percent of students enrolled in special education have learning difficulties. Digital technologies (Including mobile apps) have the potential to help marginalized groups such as people with disabilities break down barriers to communication, interaction and access to information. Mobile technology has not only revolutionized the way we communicate, but it is also becoming an important medium of education and rehabilitation (Wilson, G.2018). Mobile technology has witnessed a lot of advances in development that have allowed a widespread of applications to be developed Harrison, R., Flood, D., & Duce, D. (2013). Multiple mobile apps services allow persons with different disabilities to access information and communication in the manner in which they can comprehend and prefer. Technological advances have increased the ability to use everyday consumer mobile apps devices as assistive devices. These mobile apps are developed by people, educational organizations, agencies owned by government, private agencies, ICT companies with the aim of education and meeting a need. They can be used to access any information by using. Many times, developers do not consider the fact that users want to makes use of these application for accessibility. As student with special need user are constantly depending on these apps for their communication and other important services like voice, text, videos, math skill, reading comprehension, voice control, control hand movement, head pointer, etc.

Accessibility is one of the software quality metrics stipulated by the ISO/IEC 25010:2011. It defined accessibility as the degree to which a software can be used by people with a wide variety of characteristics and abilities to achieve a specific goal in a specific context of use. Accessibility for people with disabilities can be expressed and measure as the extent which a product or system can be used by user with specific disabilities achieve specific goal effectively, safely and satisfactorily in specific context to use, or through which presence of product features that support accessibility. The quality model will be critically examined as they related to educational apps with special emphasis on the satisfaction attribute.

The work is organized as follows: Section 2 talk about accessibility and satisfaction an educational app, theories of satisfaction and elements of satisfaction. Section 3 introduced the ISO satisfaction model, the measurement of satisfaction with educational apps and the factors affecting student satisfaction with educational apps. Section 4 present the main problem in

educational apps satisfaction, ensuring students satisfaction with educational apps and the ramification of ensuring student satisfaction, Section 5 relates to conclusion.

2.ACCESSIBILTY IN EDUCATIONAL APPS

Educational apps are software system running on devices like smartphone and PDAs (personal digital assistants). Education apps can be used in different environment and at any time. Student used them for learning. Due to the ease-of-use interfaces for mobile devices (e.g., Smartphone and tablets) everyone including children with special need you can use them. In recent year, the effort of educational institutions has increased scientists to support children in their daily lives. Ongoing advances in information and communication technologies contribute in this process.(Kraleva & Kralev, 2018).Accessibility in mobile apps refers to an established set of practices that enhance apps functionality for people with various type of disabilities. By prioritizing accessibility, you can ensure that your apps reach the widest possible audience and limit your chances of accessibility related litigation. You also benefit from lower development costs and better user retention in the long term. Most people think that accessibility is that the goal create content for people with visual or hearing impairments. It's true that customization for people who use screen readers and other assistive technologies can improve your app's functionality.

The broader approach define accessibility as the ability to access and benefit from a system or entity.it is closely related to universal design, the process of creating product that can be used by the largest possible number of people and in the largest possible situation. Universal design generally provides a single total solution that accommodates both student with disabilities and the general and public. In contrast, accessible design focused on ensuring that there are no barriers for all people, including those with disabilities.

However, while viewing accessibility in this approach, it is observed that on way to examine accessibility of apps through the lens of universal design for learning. The universal learning design of flexible and accessible learning environment that provide all students, regardless of ability, equal access to the curriculum(More & Travers, 2013).

Centre for Applied Special Technology (CAST) has developed a framework called Universal Design for Learning that applies universal design principles to curricular materials and instructional strategies to support student learning. According to universal learning design there

are seven principals of educational apps/software. They are (a) equitable use (b) flexibility in use (c) simple and intuitive (d) perceptible information (e) tolerance of error (f) Low physical effort (g) size and space for approach and use (Mason, Orkwis, & Scott 2005, Scott, McGurie, &Shaw,2001).

TABLE NO.2.1

Principal of Universal Design for instruction related to developmental domains

	Motor	Cognitive	Language	Social
Equitable use: provide access and avoid segregation	Is content easily manipulated will the child need assistance be using the app?	Is the content of the age and developmentally appropriate?	Does the app present inform in the child primary language?	Does the app provide individualized options? Does it promote group interactions?
Flexibility in use: Design meets a broad range of learning needs	Is there more than one way to make the app work (e.g., voice, physical movement)	Do required skills progress from low to high skill level? Is pacing appropriate? Will app work for multiple lessons?	Are unfamiliar words described with multi-media? Are there language options? Is content multi lingual?	Can the app be used by more than one user? In more than one setting?
Simple and Intuitive: Easy to understand	Does the app require multiple motor movement to manipulate?	Is the app self-exploratory to the child? How much adult support is needed?	Is Vocabulary thought? Is the language level appropriate for the child?	Does content provide opportunities for multiple children to interact with it and each other?
Precipitable Information: Information communicated effectively/varied mode	Are directions to how to physically manipulated the app clear? Will the student be able to see/hear?	Does app require age – appropriate attention span? Is content in presented in multiple way?	Are written directions presented in pictures/paired with verbal directions?	Is the app visually appealing? Will children likely share and talk about content?
Tolerance for Error: Design forgiving of unintended actions	How sensitive is the app in relation to the touch screen? Does it pick up on slight movement?	Does the app provide support for learning? Does the app provide feedback?	Does the voice activation recognize the varied tone of the child voice?	Does the app encourage? Is feedback provided a positive way?
Low Physical Effort: Comfortable to use, low physical fatigue	Does app require holding device up or movement? Can it be used various physical position?	Does app progress in natural/automatic sequence? Does app require tilting device for input?	How close does the device need to be when using voice activation? Is audio easy to hear?	Can multiple children view/use app at the same time?
Size and space for Approach and Use	Are object on the screen are large enough for easy manipulation by child?	Is the presentation of material clear? Is enough space provided for new information?	Is the speed of oral directions appropriate?	Are the visual pictures age and developmentally appropriate?

(More & Travers, 2013)

All the universal learning design principal fulfil the POUR (perceivable, Operable, understandable and Robust) model. When all the above principal fallows the developing educational apps, then user is satisfied. User satisfaction plays an important role in measuring the success of an application(Prastyo et al., 2021). At the basic level, user satisfaction is related to user shape and perception. At the next level, user satisfaction is not only associated with shapes and setting but also with features and experiences while using the apps (Ebrahimi S and Fahmifar,2019).

3.SATISFACTION IN EDUCATIONAL APPS

User satisfaction is the major concern and prerequisite for competitiveness in today's global market(Venkateswarlu et al., 2020). Satisfaction is defined as the happiness that an individual feels when their want to need are met. It is a mental state that a person experiences as a result of a performance or outcome that meet their expectations. Oxford online dictionary described satisfaction as "the fulfilment of one's wants, expectations, or need, or the perceived quality of the product". The definition reflects on the one hand the cognitive nature of satisfaction, i.e., comparison between expectations and performance, and other hand the effective nature, which is the pleasure associated with it(Sánchez-Garcia et al., 2007).To better understand user satisfaction, it is convenient to look at it from different theories of consumer behaviour and psychology.

4. SATISFACTION THEORIES

4.1 Value-Percept theory

Value percept is a popular theory on users' satisfaction. This theory was formulated by Locke E.(1969) and its states that satisfaction is an emotional reaction activated by a cognitive-evaluated process (Westbrook & Reilly, 1983).This theory also has been applied to explain why consumer value some brands, product and services over others, even when those other brands, products, and services more likely to be expected.

The value percept model explains user satisfaction in term of two factors fundamental to the perception of user value- actual value (AV) and ideal value (IV). AV is the actual quality or performance of product as perceived by a customer. In educational apps, users' personal value can be bright colours, and beautiful interfaces. If the user does not perceive the educational

apps to have these features, then there will be no formation of positive affect Therefore, the user dissatisfied.

However. It is also clear that this theory pays no attention to how this expected personal value and formed before they relate them to products. Likewise, some direct evaluations may be against customers or users' values, the theory has no attention to this. In educational apps, some apps may not have specific users as they are developed for the masses, it is difficulties to have a picture of each user's personal values mostly disabled user before comparing them to the values of services provided by apps as each disable individual has his own distinct personal values.

4.2 Attribution theory

Attribution theory has been used more in dissatisfaction/complaint behaviour model than in satisfaction model. Weiner B. (1985) postulated the attribution theory and its states that individuals involve in unprompted thinking about the cause of product failures in order to get a better understanding of the failure and have control over their environment. According to this user satisfaction model theory, consumers are considered to be rational processors of information, looking for reason why purchase outcome occurred, such as dissatisfaction. Therefore, satisfaction can differ depending on the type of attribution made by user of educational apps. If an educational apps fails its user in specific functionality, users may make negative attributions for the reasons such failure to get the causes of failures. This reduces satisfaction, they have communicative and direct effects on judgment of satisfaction.

The attribution theory can be viewed as a way of extending the Expectancy-Disconfirmation theory since attribution in mobile application is caused by negative disconfirmation of what users are expecting from educational apps. For example, users' expectation can be that an educational apps functions without any interruption or breakdown. When this failure happens, users may give reason for such failure. Therefore, it still lies on the fact many users may not have expectation for some apps in which they have not seen, felt or used before and getting attribution for failures from such may not be visible and may not be a good judgement for satisfaction. Also, not every user knows the technical details of educational apps. Not everybody is a computer literate. So, it may be difficult for users to give reasons for the failure of educational apps since they do not know internal technical details of working.

4.3 Cognitive Dissonance Theory

Dissonance theory (also known as dissonance reduction theory) is a term used in psychology to refer to the psychological stress experienced by someone who simultaneously hold two or more conflicting beliefs, idea or values. In other words, they are in conflict. Festinger L. (1962) formulated the theory of Cognitive dissonance, stating that it is the discomfort experienced by a person who hold two or more conflicting ideas and beliefs and that there can be an inappropriate relationship between cognitive elements. When dissonance occurs, there is pressure to minimize the dissonance and prevent it from growing. Manifestation of pressure includes cognitions and behavioural change(Revels et al., 2010).when many functional designs are used in educational apps, cognitive dissonance occurs among users as there are two or more competitions for valuable offering and users fell that they do not fit between different design features. This leads to a dissonance, negative attitude towards educational apps and reduction in satisfaction.

As we have seen, cognitive dissonance has indicated that there may be discrepancies between different features of a product, leading to negative attitude; it has not fully and directly explained why students get dissatisfied. Although there may be some features in educational app that can create dissonance, for example, there may be two or three different attractive user interface elements. Student have different perspective on the app's features and students' mindsets are different. What will create likeness in an individual may cause hatred and irritation for another person because we have some student who will see love to see a lot of eye-catching interface elements, while other will not. Therefore, the theory has not specifically stated what occurs dissatisfaction in students.

4.4 Expectancy- Disconfirmation theory

Expectancy Disconfirmation Theory (EDT) which is upon the basis of Cognitive Dissonance Theory (CDT) that was introduced in 1957 by Leon Festinger. It is viewed as the most favourable framework for evaluating user satisfaction and it was formulated by Oliver R. (1977). It states that consumers acquired good and services with pre- purchase expectation becomes the point of reference in which the products. This level of expectation become the point of reference in which the product is judged against(Oliver, 1977).When products and services are used, they are compared against what is expected from the product(Lorenzo et al.,2010).If there is a match between customers expectation and the outcome using the product,

confirmation happens. Disconfirmation happens when the difference between expectation and outcome wide. Therefore, a customer is either satisfied or not satisfied depending on the positive or negative difference as a result of the comparison made(Yuksel, 2008). In educational apps, users' expectation can be usefulness and enjoyment, fast loading, fast access to internet, etc. Degree of confirmation must relate positively with these expectations. If is not the case, disconfirmation occurs and use feels unsatisfied (Chou et al.,2013).

However, since this theory is based on expectation as the main standard for determining user's satisfaction, it has some disadvantages as it assumes and believes that everyone has certain expectations for a given product(Yuksel, 2008).This means that without expectation, no comparison is possible and no satisfaction can be determined. Having expectations doesn't always have to happen as we have people who may not have expectation of product until they see and feel it. There are also some products for which no expectations can be developed. An example is a food product have never tasted before by a consumer. Therefore, the theory may not be valid in such cases.

In the case of educational apps, we have some apps that are completely new to the user (including disabling student), probably because they've never heard of them or came across them through popup ads. In this case, it is very difficult for the user to create expectations before installing and using it. Thus, when user satisfaction in education apps is based on expectations, satisfaction may not be determined when there are no expectations about an educational app, but when there is an expectation about an educational apps, satisfaction can be determined from confirming of those expectations.

4.5 Contrast theory

It's another well-known theory of user's satisfaction. According to this, theory, if the products actual performance falls short on the users' expectations of the product, the contrast between the expectation and the outcome will cause the users exaggerate the discrepancy. This implies that the negative impact of actual product performance on users' satisfaction is greater than the positive impact of higher performance on lower performance. Davis F(1986), related it to construct like perceived usefulness relative advantage(Venkatesh et al., 2003).Perceived utility refers to the continued use of product caused by the resulting benefits. In educational apps, a user can have so using an app can help them perform better at work. If this happens after using

an app, satisfaction increases; if this does not happen, users' satisfaction decreases (Lee &Shim,2006). This will be discussed in detail later as factor affecting user satisfaction.

However, it is important to note that specific educational app may be developed for different subject purposes or function as it may not be generic in nature. Therefore, its performance will differ in term of difference in context in which it is used. Some users may have incorrect performance expectations for educational apps as they may not fit their context of use. When this happen, no satisfaction is derived. A typical example of this is when an individual is trying to design a graphic document using a word/text processor mobile app.

5. ELEMENTS OF SATISFACTION

5.1 Cognitive effective element

Cognition is defined as "mental action or the process of acquiring knowledge and understanding thought experiences and the senses". At Cambridge cognition, we mean the mental processes involved in entering and storing information and how that information is the used guide your behaviour. It is essentially the ability to perceive and response information, to process and understand information, to store and retrieve information, to make decision, and provide appropriates responses (*What Is Cognition & Cognitive Behaviour - Cambridge Cognition*, 2015).

Cognitive- affect has been seen as major elements of satisfaction. Satisfaction is said to be a cognitive process when a student thinks and decides whether a product meet his/her need while on the other hand, it is an affective process when a user has some feelings about product. When there are positive affects, satisfaction is positively affected while the presence of negative affects increase dissatisfaction(Velázquez et al., 2009).

Among the users of educational apps, the enthusiasm to deepen the cognitive state implies a conscious decision about the purpose of using an educational app which can be the ease of use or the functional provision of services, while the affective system is relates to personal feelings like enjoyment about an educational app which can be positive and negative feelings. They are seen as either encouraging or discouraging(Kim et al., 2013). Depending on the context of use, engagement has been shown to foster many practical and hedonic experiences. Frequent attention can lead to cognitive and affective use and attachment to an educational app The conscious decision to use or interact with an educational app is cognitive in nature. This

includes functional motives that may affect affective state due to engagement with affective experiences. This result is getting more value with less effort. As user continue use an educational app, more value is delivered than when they first started using it. This typically saves time, provide more pleasurable experiences and increases satisfaction by encouraging more engagement(Kim et al., 2013).

Most of the times, educational apps with high initial cognitive value might not make much impact as user find that a particular app require high cognition i.e., High level of mental processing for their proper use. This leads to increase in negative affect, lower frequency of use and dissatisfaction.

However, there are some educational applications with initially low cognitive demands that have not resulted in high students linking. This could be due to some reasons like personal interest. Students may not just be interested using a educational app just because of their mood or plan to try it. Therefore, a learning app can be less than satisfactory for many types of learners(Olubusola, 2015).

5.2 Behavioural element of satisfaction

Students' behaviour and the acceptance of educational apps and their service are determined by the success of educational app. This success factor depends on the continued usage of educational apps by students. According to the Expectation- confirmation theory postulated by Oliver R.(1977), confirmation is the rate at which the a product performance exceeds or matches users expectations(Oliver, 1977). This can be positive or negative(Oliver, 1977). A student's reuse behaviour is preceded by satisfaction, i.e., satisfaction must be achieved before deciding or intending to use an app again. On the other hand, students' satisfaction is also determined by the rejection that occurs when students' expectation is inconsistent with the performance of an educational app(Liao et al., 2007).

Another view to students' behaviour towards educational app usage is through unified theory of acceptance and use of technology model (UTAUT), UTAUT model has been applied and tested extensively for predicting system usage and making technology-adoption- and technology-usage-related decisions in various fields such as interactive whiteboard (Sumak et al.,). The theoretical model of UTAUT suggests that the actual use of technology is determined by behavioural intention. The perceived likelihood of adopting the technology is dependent on

the direct effect of four key constructs, namely performance expectancy, effort expectancy, social influence, and facilitating conditions. The effect of predictors is moderated by age, gender, experience and voluntariness of use (Venkatesh et al., 2003). These four factors can be seen as perceived value and in educational app, it determined a student's intention of use and attitude towards an educational app.

5.3 ISO MODEL FOR SATISFACTION

The International Organization for Standard (ISO/IEC23592:2021) users feedback management to ensure user satisfaction. (ISO/IEC 25010:2011) defines satisfaction as the rate at which a user is satisfied and happy with a product in given context (Bevan,2010). Satisfaction was further split in to the following attributes:

5.4 Pleasure: It is the rate at which a user is satisfied with the fulfilment of hedonic needs and initiation of an effective response by a system.

5.5 Likeability: It is the rate at which a user is satisfied with the ease of use of a system, the achievement of goals, and results from using the system.

5.6 Trust: It is the level at which a user is satisfied that a system is working as intended and with satisfactory perceived consequences of use (Beavn,2010).

5.7 Comfort: It the rate at which a user perceives that a system provides some level of physical comfort.

6. MEASURMENT OF SATISFACTION

Designing of an educational app must consider the operation logic, interaction, content, user experience and may other aspects. For the user, the most intuitive feel is that the app should meet the users' needs for learning objective, while designing the learning experience and enhancing fun enhance the fun of learning, enhancing the user interface perception, and encouraging the users trust and use(L. Liu et al., 2018).An approach was used by Liu et al.,(2018) for measuring user satisfaction in learning app. It is based on many studies of learning app review, considering the representative of the selected indicators and the simplicity of the model, three factor- PR, PN, PC.

6.1 Perceived Responsiveness-Responsiveness is the most important experiences when using the app. Responding quickly to user needs, including providing feedback and learning

resources in timely manner, responding to user problems encountered in learning in a timely manner, and helping users to test their learning effect, can significantly enhance the user's confidence and learning effect (E. VAZquez-Cano,2014). Assessment and feedback are important parts of the teaching and learning (Pacheco-Venegas & Andrade-Arechiga,2015).

6.2 Perceived Network- Anytime and anywhere network access is an important factor affecting user satisfaction when using an educational app. Also, it depends on the speed of network. Users who used mobile devices continuously paid more attention to this factor than those who stopped using them(Parthasarathy & Bhattacherjee, 1998). During the period of mobile learning, because two-sides or more sides communication by use of educational app is mainly informal communication, it required to be carried on anytime and anywhere and to have strong flexibility. It can be considered that good mobile network services will affect users' attitude to educational app. Furthermore, access to instant messaging services anytime anywhere will have positive influence on the users' adoption attitude(L. Liu et al., 2018).

6.3 Perceived content – Rich graphical elements, reasonable content structure and nice user interface are important factors for educational apps. Learning content, including the latest learning material and material created during the usage process to improve user confidence in an educational app. Because the learning content is refined and short, it can help students to use fragmented time to study(L. Liu et al., 2018).The learning content should be controlled according to the learning rule and characteristics of the users.

This approach has been seen to be efficient as its closely related specifically to educational apps. PR, PN, PC model is a consistent and approved standard for measuring satisfaction**.** Its measures object attributes by using a five-point scale. It is found that PR and PC are two major factors in influencing user satisfaction. PN is also important influence factor of satisfaction, the mobile app developers could take the interaction into consider.

7. FACTOR AFFECTING DISABLED STUDENTS' SATISFACTION IN EDUCATIONAL APPS

7.1 Screen size

This was seen as an important factor influencing the satisfaction of students with disabilities with educational apps. The screen size of typical mobile phone is about 1.65 inches in

diagonally compared to a laptop which is about 12 inches. This is an important factor because human visual perception and attention limit the amount of detail that can be seen. This affects people on attention. Let the user to zoom in on images and objects in apps when viewing, to ensure that user retains all the information about image and the object in their mind, resulting increased cognitive activity. This activity can be limited by the human attention span as we have people with high and low cognitive abilities(Maniar et al., 2008). To reduce the negative effect of screen size, Findlater and McGerenere (2008) proposed the using of adaptive graphical user interfaces for mobile devices. This allows for a shorter search path for items that are accessed regularly by adopting a representation of functionally on the fly to fit a person's tasks skill, and patterns.

7.2 Perceived ease of use

This Major concept for assessing the acceptance and usage intention of technology. The Technology Acceptance Model (TAM) proposed by Davis (1989) is one of the most influential theories in research on disabled student acceptance of new technologies. According to TAM, the factors influencing personal acceptance of information. It refers to how disabled users perceive whether using a particular technology or information system will require much or less mental effort for performing a task while using the system or app. This can be influenced by complexity of educational app. In educational app, perceived ease to use determines disabled user's satisfaction as student prefer to use an app that will require minimum mental effort. If cognitive requirement is too high, student will prefer to switch to an app that only require small cognitive processing.

Learning satisfaction reflects learners' perceptions of how much learning satisfies their needs, goals, and desires (Mohammadi, 2015). Liu et al. (2018) indicated that a mobile learning system with quick response, access to network and rich content facilitated learning and satisfied learners' need. Such satisfaction could also come from the benefit and creation of learning strategies, schedules, assessment, perceived responsiveness, and collaborative learning by using mobile learning technologies. One of the essential factors that affects user satisfaction with a mobile application is perceived content (Klimova & Polakova, 2020). It is important to present clear, concise and refined knowledge so as to enable users to have an effective learning experience and high satisfaction (Liu et al., 2018).

7.3 Perceived Usefulness

It was also introduced by Davis F. (1989). It is an indicator of the student's beliefs that using a particular system will improve their work performance. This factor reinforces the disabled user's intent to use any technology. Mobile devices allow students with disabilities to access many apps. When student with disabilities find that they can use the app when needed and that is reliable, they will find that the apps haven been helpful. It also determines trust in mobile apps(Goi & Ng, 2011).

Disabled Student have different perception about usefulness. This is based on personal motivation of each individual, since the need of disabled students are different. Therefore, perceived usefulness for an app by a single person cannot be generalized for everybody. Personal reason and wishes must be taken into account. Students use mobile apps not only their education but also for other purpose such as entertainment and games. Therefore, need of disabled student are different and their perception for usefulness will also be different.

7.4 Perceived value

Perceive value is the consumer's overall assessment of the usefulness of the service, based on perception of what is benefit and sacrifice. There are six major value components -

7.5 functional value: It refers to product's ability to perform functionally, usefully or physically. It derives from the specific attributes that consumer can directly experience when using a mobile app, such as core purpose, overall quality, responsiveness, flexibility.

7.6 Economic value: Based on rational choice theory consumers use cost- benefit analysis to maximize benefits. The economic value results from the economic use of a product are service.

7.7 Emotional value: it is the perceived benefit of a product ability to evoke an emotional or affective response.

Social and self-expressive value: It is acquired through associations with demographic, Socioeconomic, and cultural ethic groups. Social media apps (Face book, Twitter, Instagram) belong this value category. Self-expressive apps are mixing virtual and physical world.

7.8 Epistemic value: This value is the perceived utility of product's ability to satisfy a desire for knowledge, for example assist in learning, arouse curiosity, provide novelty, be the first to discover new social space, be the first to have a new product.

7.9 Conditional value: These values can be viewed as the value resulting from a specific situation or set of circumstances faced by the consumer, primarily context, location.

Perceived value is always a compromise between perceived benefits and sacrifices. In educational apps, users offer almost the same service but different developers. They spend on a given app with what other people spend on similar apps in terms of money and cognitive processing, and what they get in return. If there is little or no difference, users feel that the developer have treated them fairly and are satisfied(Turel et al., 2007).

7.10 Battery life

Mobile apps satisfaction is strongly influenced by battery performance, specifically how long the battery lasts before it needs to be recharged. When an educational app on a mobile phone consumes a lot of battery resources, user get frustrated and dissatisfied when they go everywhere with their chargers. The educational apps developer should take this into account by ensuring that the app automatically goes to sleep to minimize battery drain while user is less active in an app.

8. SATSFACTION ISSUE IN EDUCATIONAL APPS

The following are the major issue that relate with user's satisfaction in educational app.

8.1 Context: The word context here refers to the environment in which the user will be using the app. We want to be able to see the context separate from both the user and the task. The Context does not only refer to a physical location, but also includes other features such as the user's interaction with other people or objects and other tasks that user may attempt to perform(Harrison et al., 2013).The context in which an educational app is used is very important and it can determine the resulting satisfaction. To ensure real satisfaction, developers must take this into account by determining appropriate amount of contextual information, showing only the information needed to ensure full control of the app when an app fails unexpectedly, the perception of user control is weakened.

8.2 Bad Tutorial: Many apps have great intentions but are so confusing that users abandon them prematurely. It's important to ensure that the user has a clear understanding of how the app work and why their learning objective is important as they become familiar with the game. Providing clear, structured advice one at a time can be time- consuming for the developer, but

remember that the best apps devote up to thirty percent of their codebase to first experience users. Every minute the user spends confused is a minute they should be learning (Staff, T.2012).

8.3 Interruption: An app can be interrupted by other unwanted events like phone calls or reminders. From interaction perspective, mobility means more cognitive demands as users can lose focus of what they were doing before the disruption. Interruptions affect task completion time of education apps be delaying task.

To avoid the negative effects of interruptions, users can be assisted to recapture their context again by maintaining the state of the context while going back to the interrupted app. For example repeating the last few interactions on the users interface/screen automatically so that user can have an idea of what was going on before the interruption happened(Leiva et al., 2012).

8.4 Wireless connectivity: This issue degrades the performance of educational app because they rely heavily on wire- less networks for their operations. Wireless network is characterised by frequent interruption when users move, low bandwidth and high error rates. Therefore, mobile app must be designed to switch between different wireless network when users are constantly changing their location. This allows mobile apps to work on without any network interruption. With it, the user can use the apps anywhere, which give them enough satisfaction (C. Liu & Correia, 2021).

8.5 Risk of losing privacy: It is the ability of a user to know how his /her personal information will be taken, used, shared and also how controlled will be exercised over it. There is evidence today's hacker are targeting educational app to gain access to student personal information and detail and using them in malicious ways. This is very important in educational app as we have a lot of students with special need using mobile app for various reason. Therefore, app developers need to be very careful while creating an app for iOS and Android device. Also, the educational app developer should try to provide students not only with a new feature, but also with the security aspect of the app and a source of information for the educational app users on how to maximize the utility of educational apps(Mkpojiogu et al., 2021)

9. ESTABLISH SATISFACTION IN EDUCATIONAL APPS

In order to achieve the greatest satisfaction for student with disabilities from educational apps, the following are recommended

i. Educational apps are comprehensive and systematic ways not only to acquire knowledge but also enable teacher, student and parent interaction when needed, since all information, data, and performance record are readily available for reference discussion (Manchanda,2022).As educational app users are increasing, expectations are also increasing, users are expecting fast access to educational apps and sites, and fast downloads. To meet this expectation, developers must have an understanding of how individuals are using an app in each interaction. This will allow them to build apps that will meet user's expectation at a point in time been used.

ii. The younger generation, especially students with disabilities, prefer learning with accessible apps because they are more convenient. It gives them some psychological relief as they don't have to visit website and search through too many topics. Developers must ensure that a educational apps requires minimum cognitive processing for student with disabilities to be able to operate a educational app(Harrison et al., 2013). When an educational app can only be operated with high mental processing by thinking for several minutes or hours, student with disabilities satisfaction will be reduced as it will impact the affect stage of usage. Student with disabilities will not have any perceived affections for such app. Therefore, design must be kept as a simple as possible to ensure that student with disabilities do not put in much mental inputs to educational app usage.

iii. The various limitations of educational apps, such as lack of physical interaction, unexpected software and hardware problems, limited feedback, lack of technology knowledge that leads to inequalities in children with disabilities, limited screen size and battery life should be considered when designing educational apps as they also affect satisfaction. The display of object and images should be clarified in term of screen size especially for visually impaired students. In addition, the educational app should be developed that it does not consume many battery resources. This can increase student engagement in educational app(Olubusola, 2015).

iv. Learning has become more enjoyable and convenient with the integration of technology. Developers must ensure that standard design guidelines are followed when developing

educational apps. Because students now have access to a new platform and the opportunity to study with at prestigious lectures around the world.

10.RAMIFICATION OF SATSFACTION IN EDUCATIONAL APPS

Without a doubt, education and learning through apps have only made the process faster, more understandable, and more convenient, especially for children with disabilities. It was considered a good idea to ensure students satisfaction with educational app as it enable them to study with educational apps, makes their life easier, make them decide to use the app again and also make them recommended satisfactory apps to other students. On the other hand, when students have an excessive feeling of satisfaction with educational app, the following ramification results.

Gopika M & other (2020) pointing out that excessive consumption can negatively affect the physical, mental, emotional and social development of young people. It also affected their interpersonal relationship and they have low self-esteem and self-confidence. At the same time, they are heavily distracted by other apps on their device during online classes(Sawant & Naik, 2022).

10.1 Emotional development: Daniel Goleman of emotional intelligence fame, worries that the use of technology is affecting children's ability to focus and could affect emotional development. The emotional development of young students is just as important as good grades. A non-human device like an app can't teach self-control or order in a classroom, and students might learn a subject but not how to play nice with each other.

10.2 Sensory over load from too much screen time: overstimulation from excessive screen time can disrupt sleep patterns and cause emotional dysregulation. Screen time should be monitored to manage stress and mood swings in students. Increased stress and mood swings are often used as indicators of too much screen time in young children.

10.3 Decreased social interaction: Educational apps are primarily designed for individual use and not for group activities. This results in students remaining self-absorbed and not interacting with other students in the class or school. This causes delays in the development of social skill, such as speaking and interacting with others, and can young students to become withdrawn.

10.4 Laziness: When satisfaction is assured in educational app, students tend to feel totally depended them totally for most their assignment. This reduces the activity rate of students' therapy and make them lazy. If there are students with lazy attitude, their cognitive/ mental activity will be lowered, which is not a healthy idea. Developers can minimize laziness by ensuring that an educational app doesn't do all the work for the users. Student should be allowed to do some tasks themselves(Olubusola, 2015).

11. CONCLUSION

In this work accessibility attribute were considered and satisfaction was examined in detail from the perspectives of psychology and consumer/student behaviour. The satisfactions theory has helped to understand how student with disabilities feel satisfied or dissatisfied, all though there are differences in the application of these theories**.**

For educational apps, student satisfaction is determined by what student perceive of an educational app, product expectations, expected performance, and match between personal value and apps value. It has been found that in situation where user has expectations for an educational app, satisfaction depends on confirmation of his expectations, otherwise satisfaction cannot be determined based on them. In addition, the more negative the attribution of failure in an educational app, the lesser student get satisfied. These are the reasons why students are satisfied or dissatisfied. In addition, the cognitive/affective and behavioural element show the processes of student's assessment of whether they are satisfied or dissatisfied with regard to the mental perquisites for using an educational app and their intention to continue using an educational app because of the usefulness. Issues such as context, bad tutorial, interruption, wireless connectivity, risk of losing privacy have been show to impact students' satisfaction.

Also, satisfaction has some negative effects such as emotional development, sensory over load from too much time, Decreased social interaction and laziness. This can be solved by ensuring there is a balance between what is fun about educational apps and what student need to themselves.

References

[1] Abid, S., Abid, S., & Ahmed, T. (2013). *Mobile Application for Disabled People*. *1*.Acosta-Vargas, P., Salvador-Ullauri, L., Jadán-Guerrero, J., Guevara, C., Sanchez-Gordon, S., Calle-

Jimenez, T., Lara-Alvarez, P., Medina, A., & Nunes, I. L. (2020). Accessibility Assessment in Mobile Applications for Android. In I. L. Nunes (Ed.), *Advances in Human Factors and Systems Interaction* (Vol. 959, pp. 279–288). Springer International Publishing. https://doi.org/10.1007/978-3-030-20040-4_25

[2] Chao, C.-M. (2019). Factors Determining the Behavioral Intention to Use Mobile Learning: An Application and Extension of the UTAUT Model. *Frontiers in Psychology*, *10*, 1652. https://doi.org/10.3389/fpsyg.2019.01652

[3] Chou, C.-H., Chiu, C.-H., Ho, C.-Y., & Lee, J.-C. (n.d.). *Understanding Mobile Apps Continuance Usage Behavior and Habit: An Expectance-Confirmation Theory*.

[4] Goi, C.-L., & Ng, P.-Y. (2011). *Perception of Young Consumers on Mobile Phone Applications in Malaysia*.

[5] Griffin-Shirley, N., Banda, D. R., Ajuwon, P. M., Cheon, J., Lee, J., Park, H. R., & Lyngdoh, S. N. (2017). A Survey on the Use of Mobile Applications for People who Are Visually Impaired. *Journal of Visual Impairment & Blindness*, *111*(4), 307–323. https://doi.org/10.1177/0145482X1711100402

[6] Harrison, R., Flood, D., & Duce, D. (2013a). Usability of mobile applications: Literature review and rationale for a new usability model. *Journal of Interaction Science*, *1*(1), 1. https://doi.org/10.1186/2194-0827-1-1

[7] Harrison, R., Flood, D., & Duce, D. (2013b). Usability of mobile applications: Literature review and rationale for a new usability model. *Journal of Interaction Science*, *1*(1), 1. https://doi.org/10.1186/2194-0827-1-1

[8] Kim, Y. H., Kim, D. J., & Wachter, K. (2013). A study of mobile user engagement (MoEN): Engagement motivations, perceived value, satisfaction, and continued engagement intention. *Decision Support Systems*, *56*, 361–370. https://doi.org/10.1016/j.dss.2013.07.002

[9] Korczak, P., & Zwierzchowska, A. (2020). Using mobile applications in the process of enhancing and restoring abilities in individuals with intellectual disability and other disabilities – a literature review. *Advances in Rehabilitation*, *34*(4), 36–41. https://doi.org/10.5114/areh.2020.100774

[10] Kraleva, R., & Kralev, V. (2018). An Evaluation of The Mobile Apps for Children with Special Education Needs Based on The Utility Function Metrics. *International Journal on Advanced Science, Engineering and Information Technology*, *8*(6), 2269. https://doi.org/10.18517/ijaseit.8.6.6309

[11] Lee, C.-P., & Shim, J. P. (n.d.). *An Empirical Study on User Satisfaction with Mobile Business Applications Use and Hedonism*.

[12] Leiva, L., Böhmer, M., Gehring, S., & Krüger, A. (2012). Back to the app: The costs of mobile application interruptions. *Proceedings of the 14th International Conference on Human-Computer Interaction with Mobile Devices and Services*, 291–294. https://doi.org/10.1145/2371574.2371617

[13] Liao, C., Chen, J.-L., & Yen, D. C. (2007). Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: An integrated model. Computers in Human Behavior, 23(6), 2804–2822. https://doi.org/10.1016/j.chb.2006.05.006

[14] Limaye, S. (n.d.). *Factors Influencing the Accessibility of Education for Children with Disabilities in India*.

[15] Liu, C., & Correia, A.-P. (2021). A Case Study of Learners' Engagement in Mobile Learning Applications. *Online Learning*, *25*(4). https://doi.org/10.24059/olj.v25i4.2827

[16] Liu, L., Zhang, L., Ye, P., & Liu, Q. (2018). Influence Factors of Satisfaction with Mobile Learning APP: An Empirical Analysis of China. *International Journal of Emerging Technologies in Learning (IJET)*, *13*(03), 87. https://doi.org/10.3991/ijet.v13i03.8381

[17] Lorenzo, M., Maria, J., Calderón, F.-A., Centeno, G., & Carmen, M. D. (n.d.). *Revisiting The Expectancy/Disconfirmation Paradigm for Small Questionnaires: The Cultural/Heritage Tourism Case.*

[18] Maniar, N., Bennett, E., Hand, S., & Allan, G. (2008). The Effect of Mobile Phone Screen Size on Video Based Learning. *Journal of Software*, *3*(4), 51–61. https://doi.org/10.4304/jsw.3.4.51-61

[19] Mkpojiogu, E. O. C., Hussain, A., & Agbudu, M. O. (2021). Security Issues in the Use of Mobile Educational Apps: A Review. *International Journal of Interactive Mobile Technologies (IJIM)*, *15*(06), 124. https://doi.org/10.3991/ijim.v15i06.20631

[20] More, C. M., & Travers, J. C. (2013). What's App With That? Selecting Educational Apps for Young Children With Disabilities. *Young Exceptional Children*, *16*(2), 15–32. https://doi.org/10.1177/1096250612464763

[21] Oliver, R. L. (1977). Effect of expectation and disconfirmation on postexposure product evaluations: An alternative interpretation. *Journal of Applied Psychology*, *62*, 480–486. https://doi.org/10.1037/0021-9010.62.4.480

[22] Parthasarathy, M., & Bhattacherjee, A. (1998). Understanding Post-Adoption Behavior in the Context of Online Services. *Information Systems Research*, *9*(4), 362–379. https://doi.org/10.1287/isre.9.4.362

[23] Prastyo, E., Budiyanto, C. W., & Yuana, R. A. (2021). Measuring mobile applications user's satisfaction: A closer look into the appropriate information systems user's satisfaction. *IOP Conference Series: Materials Science and Engineering*, *1098*(4), 042002. https://doi.org/10.1088/1757-899X/1098/4/042002

[24] Revels, J., Tojib, D., & Tsarenko, Y. (2010). Understanding Consumer Intention to Use Mobile Services. *Australasian Marketing Journal*, *18*(2), 74–80. https://doi.org/10.1016/j.ausmj.2010.02.002

[25] Sánchez-Garcia, J., Moliner-Tena, M. A., Callarisa-Fiol, L., & Rodríguez-Artola, R. M. (2007). Relationship Quality of an Establishment and Perceived Value of a Purchase. *The Service Industries Journal*, *27*(2), 151–174. https://doi.org/10.1080/02642060601122710

[26] Sawant, N., & Naik, S. (2022). Is Online Education Leading to Technology Addiction? *International Journal for Research in Applied Science and Engineering Technology*, *10*(2), 338–343. https://doi.org/10.22214/ijraset.2022.40269

[27] Smadi, O. Y. (2022). The Satisfaction Level of Students with Disabilities with Library and Information Services. *International Journal of Education in Mathematics, Science and Technology*, *10*(2), 436–457. https://doi.org/10.46328/ijemst.2352

[28] Thompson, S. (n.d.). *Mobile technology and inclusion of persons with disabilities*.

[29] Turel, O., Serenko, A., & Bontis, N. (2007). User acceptance of wireless short messaging services: Deconstructing perceived value. *Information & Management*, *44*(1), 63–73. https://doi.org/10.1016/j.im.2006.10.005

[30] Velázquez, B. M., Blasco, M. F., Contrí, G. B., & Saura, I. G. (2009). Cognitive and Affective Causes of Consumer Dissatisfaction With the Hospitality Encounter. *Journal of Hospitality Marketing & Management*, *18*(7), 653–675. https://doi.org/10.1080/19368620903170216

[31] Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, *27*(3), 425–478. https://doi.org/10.2307/30036540

[32] Venkateswarlu, P., Malaviya, S., & Vinay, M. (2020). Determinants of the Satisfaction of Students Studying in Private Universities—Application of Kano Model. *Theoretical Economics Letters*, *10*(01), 1–16. https://doi.org/10.4236/tel.2020.101001

[33] Wagner, S. (2013). *Software Product Quality Control*. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-38571-1

[34] Westbrook, R. A., & Reilly, M. D. (1983). Value-Percept Disparity: An Alternative to the Disconfirmation of Expectations Theory of Consumer Satisfaction.

[35] Yuksel, A. (2008). *Consumer Satisfaction Theories: A Critical Review accessibility in mobile application pdf—Google Search*. (n.d.). Retrieved February 14, 2023, from http://surl.li/mtebj

[36] *Assistive technology for children with disabilities: Creating opportunities for education, inclusion and participation: a discussion paper*. (2015). UNICEF: WHO.

[37] *Conceptualization, development and implementation of a web-based system for automatic evaluation of mathematical expressions—ScienceDirect*. (n.d.).

[38] *Ebrahimi S and Fahmifar A A 2019 Design; Beauty and User Satisfaction (German: Researchgate)—Google Search*. (n.d.). Retrieved February 15, 2023, from http://surl.li/mtebm

[39] *(Mason, Orkwis, & Scott, 2005; Scott, McGuire, & Shaw, 2001)—Google Search*. (n.d.-a). Retrieved February 14, 2023, from http://surl.li/mtebp

[40] *What Is Cognition & Cognitive Behaviour—Cambridge Cognition | Cambridge Cognition*. (n.d.). Retrieved February 28, 2023, from https://www.cambridgecognition.com/blog/entry/what-is-cognition

[41] *What's App With That? Selecting Educational Apps for Young Children With Disabilities—Cori M. More, Jason C. Travers, 2013*. (n.d.). Retrieved February 14, 2023, from https://journals.sagepub.com/doi/abs/10.1177/1096250612464763

[42] Olubusola, A. O. (2015). *User Satisfaction in Mobile Applications*. http://surl.li/mtebq