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Education Through QR Code

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Abstract

In today's society, the impact of information and communication technologies (ICTs) has led to the emergence of new environments, educational agents and learning opportunities. Consequently, ways of teaching and learning are shifting towards personalised learning and moving away from traditional universal schooling. The advent of technology in education has provided teachers with new opportunities and resources to create new ways of teaching. Mobile Learning (M-Learning) implies shift from courseware to performance-ware, mouse-and-click to pen and voice interface and centralized server to peer to peer network. M-learning can be made more effective and powerful by the use of QR code (Quick Response). QR code is a type of two dimensional barcodes used to provide easy access to information through Smartphone. QR code can be linked with learning material which may be in the form of Plain text, website URL, YouTube Video, PDF file and Image file. QR code for this learning material can be generated by making use of QR code generators which are freely available. This encoded information can be decoded by scanning the QR code with the mobile device having camera and QR reader and scanner software. The QR code system has become admired due to its features such as easy to generate, quick readability, and an abundant information load. Because of its features, QR code exhibits potential for integration in education. There are number of ways in which QR Code can be used in educational setting, which will make teaching learning process interesting and blended learning concept can be realized in its true sense. Apart from above discussion this paper also focuses on the attributes of QR Code, research based evidence on QR code and its extended uses in teaching learning process, and especially how we can integrate QR Code in educational setting.

KEYWORDS: M-learning, Smartphone, Quick Response Code (QR Code), Education, Teacher, Online, Learning Material

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INTRODUCTION

The technological, social and cultural changes brought about by the information and knowledge society have extended beyond the sphere of education, giving rise to a new ecology of learning. These changes are affecting every level of learning – the what, why, how, where, when and by whom of teaching and learning, thus making it necessary to re-examine how they should be incorporated into the curriculum. In today's society, the impact of information and communication technologies (ICTs) has led to the emergence of new environments, educational agents and learning opportunities. Consequently, ways of teaching and learning are shifting towards personalised learning and moving away from traditional universal schooling. The advent of technology in education has provided teachers with new opportunities and resources to create new ways of teaching. Mobile Learning (M-Learning) implies shift from courseware to performance-ware, mouse-and-click to pen and voice interface and centralized server to peer to peer network. Mobile technology, by far, has been the most rapidly adopted technology in history. Today, it is the most popular and widespread technology on the planet, with the global mobile internet industry expected to grow to 478 million by June 2018 in India (IAMAI report). M-Learning creates intriguing opportunities for new forms of learning because they change the nature of the physical relations between teachers, students, and the objects of learning. M-learning is most powerful tool of distance learning as it provides facilities of peer group learning, wide range of pattern of learning and work activity, wider topics and their relationship to prior experience etc. It has serious implications for educators, who would be required to develop new courses and revise existing course for delivery on mobile computing devices. That's why M-Learning is slowly but clearly emerging as the 'future' of learning. M-learning can be made more effective and powerful by the use of QR code (Quick Response). The QR code, short for Quick Response code, is a kind of matrix barcode (Wikipedia, 2018). As a consequence, also the meaning and significance of learning are changing (Traxler, 2009). Mobile technologies can respond to these changes in learning. Researchers and educators have recognized the potential of mobile technologies as learning tools, and mobile technology has promoted a new learning style,

mobile learning. By mobile learning we mean learning that happens when the learner is not in a fixed, predetermined location and/or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies (O´Malley et al., 2004). At best, mobile technologies facilitate learning outside of the classroom, and learning materials are no longer limited to textbooks (Shih, Chu, Hwang & Kinshuk, 2011). The study of QR codes in education can be placed in the context of mobile learning. Research has been conducted on mobile learning all over the world but only a few studies have addressed the use of QR codes in education (Law & So, 2010). QR code is a type of two dimensional barcodes used to provide easy access to information through Smartphone. QR code can be integrated with Smartphone which can be very effective teaching aid in the classroom. QR code can be linked with learning material which may be in the form of Plain text, website URL, YouTube Video, PDF file and Image file. QR code for this learning material can be generated by making use of QR code generators which are freely available. This encoded information can be decoded by scanning the QR code with the mobile device having camera and QR reader and scanner software. This paper focuses on QR code integration in learning which will enhance motivation, communication, collaboration and critical thinking in the classroom. The QR code system has become admired due to its features such as easy to generate, quick readability, and an abundant information load. Because of these features, QR code exhibits potential for integration in education. There are number of ways in which QR Code can be used in educational setting, which will make teaching learning process interesting and blended learning concept can be realized in its true sense. The concept of Learner centered learning and Green Classroom can be used in which learners can produce reports or other materials online and share their work with QR code and will make the educational environment paperless and save trees. This kind of practice of QR code reduces the space required for storing the record related to student curriculum. Even students can enhance knowledge by various means of using QR code, it can be pasted on books at important point which may connect the student to related video, web page or other sources of information which will help them to enhance their knowledge about specific topic. Along with it, home assignments and practice session can be generated by using QR code. QR code can be added to school or college magazine which can lead to student, teacher and parents to the quality work submitted by the student but was not printed in the magazine. Library can be made interactive library by using QR code, which can be generated for recording audio, video, review of the books they have read. This review can help the other students for selecting a book for better reference. They can pass the QR code of outstanding book or book review.

For better understanding of particular subject QR code can be created for linking students to more examples of the related topic/subject for better understanding of concept. Even for extracurricular activities or extend learning to outdoor activities, instead of carrying a laptop or other bulky devices outside the classroom, a student can engage into the learning process by a pocket sized device. QR code can be generated for the link of Google Forms which are good source of collecting information from students or parents at events. Apart from above discussion this paper also focuses on the attributes of QR Code, research based evidence on QR code and its extended uses in teaching learning process, and especially how we can integrate QR Code in educational setting.

BACKGROUND OF QR CODE DEVELOPMENT

In 1970, IBM developed UPC symbols consisting of 13 digits of numbers to enable automatic input into computers. These UPC symbols are still widely used for Point-Of-Sale (POS) system. In 1974, Code 39 which can encode (symbolize)approx. 30 digits of alphanumeric characters was developed. Then in the early 1980s, multistaged symbol codes where approximate 100 digits of characters can be stored such as Code 16K and Code 49 were developed. As information rapidly developed in the recent years, requests had mounted for symbols which can store more information and represent languages other than English. To enable this, a symbol with even higher density than multistaged symbols was required. As a result, QR Code, which can contain 7,000 digits of characters at maximum including Kanji characters (Chinese characters used in Japan) was developed in 1994. The history until realising high-capacity and high-density symbols can be described as illustrated in Figure 1 when seeing them from the technology's aspect. Firstly, Interleaved 2 of 5 and Codabar which can encode (symbolise) numbers were developed, followed by the development of Code 39 which can encode alphanumerical characters. Along with the information developments, it had become necessary to have full ASCII enocded, and this resulted in the development of Code 128. Then, multistaged symbols were developed where these linear symbols were arranged in several stages. Toyota Motor's Kanban Code is the world's first multistaged symbol. As computers became popular, these codes developed into multi-row symbols where multistaged codes were extended and into matrix symbols where data were arranged in matrix. The printing area for matrix symbols are the smallest among all, and is seen as highly prospective as the main symbol for the future. QR Code is a matrix symbol which has been developed as the one enabling all of high capacity PDF417, high density printing of data matrix, and high speed reading of maxi code based on the research made on their characteristics.

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STRUCTURE OF QR CODE

QR code looks like a small box which includes a random series of black and white pixels. Even though QR code is a tiny symbol. Currently, various versions of QR code (from Version 1 to Version 40) are freely available along with decoding applications. QR code consist of different areas that are reserved for specific purposes version 1 does not contain all these areas. Therefore, we refer to version 2 of QR code (Figure 1).

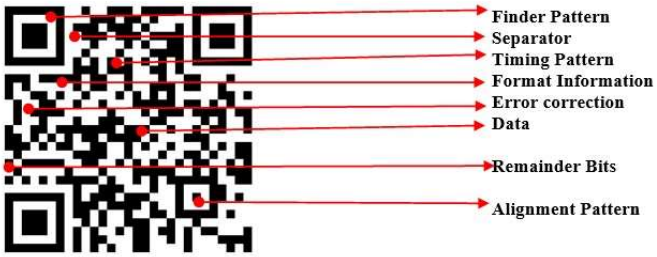

Fig-1: Structure of QR code

(1). **Finder Pattern**: The finder pattern consists of three identical structures that are located in all corners of the QR code except from the bottom right one. Each pattern is based on a 3×3 matrix of black modules surrounded by white modules that are again surrounded by black modules. These patterns facilitate the decoder software to identify the QR code and determine the correct orientation.

(2). **Separators**: The white separators have a width of one pixel and improve the recognizability of the finder patters as they separate them from the actual data.

(3). **Timing Pattern**: Alternating black and white modules in the timing pattern enable the decoder software determine the width of a single module.

(4). **Format Information**: Format Information section consists of 15 bits next to the separators and stores information about the error correction level of the QR code and the chosen masking pattern.

(5). **Error Correction**: Similar to data codes, error correction codes are stored in 8 bit long codewords in the error correction section.

(6). **Data**: Data is converted into a bit stream and then stored in 8 bit parts (called codewords) in the data section.

(7). **Remainder Bits**: Consists of empty bits, if data and error correction bits can not be divided into 8 bit codewords without remainder.

(8). **Alignment Patterns**: Alignment Patterns support the decoder software in compensating for moderate image distortions. With growing size of the code, more alignment patterns are added.

The surface QR code has to be surrounded by **Quiet Zone**, an area shaded as white modules, to increase code recognition by the decoder software. The capacity of a QR code depends on several factors, such as the version of the code that defines its size, the chosen error correction level and the type of encoded data influence capacity.

CHARACTERISTICS OF QR CODE

QR codes, are simple, scannable images that are a form of barcode. By scanning a QR code image through a mobile device, information can be accessed including text, links, bookmarks and email addresses. It's basically a quick, scannable barcode-like image that takes you to a specific digital destination. Additional to the characteristics for two-dimensional symbols such as large volume data (7,089 numerical characters at maximum), high-density recording (approx. 100 times higher in density than linear symbols), and high-speed reading, QR Code has other superiority in both performance and functionalities aspects.

Information that can be stored in QR Codes :

- A website URL
- Contact Information
- Geographical Location
- Calendar event
- A text message to be sent on a phone #
- A plain text message

Salient Features of QR Code

- All-Direction (360°) High-Speed Reading – Reading matrix symbols will be implemented by using a CCD sensor (area sensor). The data of the scan line captured by the sensor will be stored into the memory. Then, by using the software, the details will be analyzed, finder patterns identified, and the position/size/angle of the symbol detected, and the decoding process will be implemented. Traditional two- dimensional symbols used to take much time for detecting the position/angle/size of the symbol, and had a problem that their readings were less accurate when compared with those of linear symbols. QR Code has finder patterns for notifying the position of the symbol arranged in three of its corners to enable high -speed reading in all directions (360°). Additionally, by identifying the positional relationships of the three finder patterns listed in Figure below from among the image field of the CCD sensor, the size (L), the angle (!), and the outer shape of the symbol can be simultaneously detected. By arranging the finder patterns into the three corners of the symbol, the decoding speed

of the QR Code can be made 20 times faster than that of other matrix symbols. Because of their unusual design, the QR codes would certainly draw the viewers eye, the problem is, these codes are meant to be viewed (primarily but not exclusively) on a mobile phone.

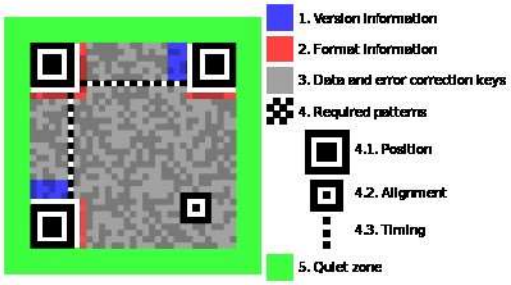

Fig-2: Components of QR Code

- High Capacity Encoding of Data – As compared to 2D bar code, QR Code is capable of handling several dozen to several hundred times more information. QR Code is capable of handling all types of data, such as numeric and alphabetic characters, symbols, binary, and control codes. Up to 7,089 characters can be encoded in one symbol. In the figure below it shows that a QR code symbol of this size can encode 300 alphanumeric characters.(Denso 2010)

Fig-3: Possibility of High Quality Data Storage by QR Code

- Small Printout Size - Since QR Code carries information both horizontally and vertically, QR Code is capable of encoding the same amount of data in approximately one-tenth the space of a traditional bar code. The figure below illustrates the concept.

Fig-4: Smaller Printing Size in compare to Bar Code

- Dirt and Damage Resistant - QR Code has error correction capability. Data can be restored even if the symbol is partially dirty or damaged.

Fig-5: Dirt and Damage Resistant QR Code

- Structured Append Feature - QR Code can be divided into multiple data areas. Conversely, information stored in multiple QR Code symbols can be reconstructed as single data symbols. One data symbol can be divided into up to 16 symbols, allowing printing in a narrow area. The same data can be read either from the upper symbol or the lower four symbols.

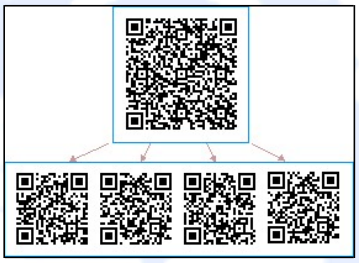

Fig-6: Structured Append Feature of QR Code

- Variety of QR Code.

Fig-7: Different Variety of QR Code.

THEORETICAL BACKGROUND

QR codes were first created in 1994, to track vehicles during the manufacturing process at high speed. In 2002, when Japanese handset makers and others wanted to turn everyone's phone camera into a barcode scanner for marketing purposes, QR codes made perfect sense. With two dimensions to work within, QR codes can store several hundred times the amount of information carried by ordinary bar codes. They can contain anything that can fit into a maximum of around 4k (roughly one page of text). The reason for its quick response is that the code could build a bridge between online information and offline materials. It can be decoded quickly by a specialized application, called QR code reader. QR code readers could navigate users to an abundant online information resource, such as Uniform Resource Locator

(URL), text, images, audios and videos, as long as the reader figures out what the code represents. In spite of its powerful function, the QR code has only several black modules arranged in a square pattern against a white background. Then these above are all the constituent parts of a complete QR code, making it possible to decode those contents at a high speed. However, the code itself has different formats, such as numeric only, binary, alphanumeric, or Kanji symbols (Byrne, 2011). Coupled with moderate equipped mobile devices, QR Codes can connect the users to the information quickly and easily. QR Codes allow smart phone and tablet computer users to more easily access information. The low technical barrier of creating and reading QR codes allows innovative educators to incorporate them into their educational endeavors. The operations to retrieve or store QR codes are incredibly simple and quick, and with mobile devices, make them the ideal educational tools for teaching and learning. In education, author believes that the movement of using QR codes is slow and still in its infancy.

Learning is changing and the educators, employers, parents and the public have begun to emphasize the need for lifelong learning and 21st century skills. Technologies can respond effectively to these changes in learning and technologies have made many new educational forms possible. It has been shown that innovative teaching practices can support students in developing the skills they will need in future life and work (Norrena, Kankaanranta & Nieminen, 2011). Based on the literature review (Rikala, 2012), innovative teaching practices (e.g. student-centred pedagogy, extending learning beyond the classroom) can be realized through different mobile learning solutions. It is found that learning with mobile technologies can be very personalized, situated and authentic and that at best mobile technology can bridge formal and informal learning, make learning more student-centered and encourage creativity and innovation.

Based on the literature review (Rikala, 2012), author can suggest that the core characteristics of mobile learning are personalisation, authenticity, and collaboration. The authenticity feature can promote learning scenarios such as contextualized, participatory and situated learning (Kearney, Schuck, Burden & Aubusson, 2012). Situated learning activities promote learning within an authentic context and culture. Mobile devices are very well suited for context-aware applications because mobile devices are available in different contexts and are able to extend the learning environment into authentic contexts. Mobile devices can provide additional information based, for example, on the location and make available activities that are relevant to the environment. (Naismith, Lonsdale, Vavoula & Sharples, 2004)

In literature review author found that QR codes can support learning when students move in the field (e.g. in trail and field activities). With the QR codes embedded in the environment, students can obtain contextual or location-aware information (Osawa et al., 2007). QR codes also allow the implementation of innovative systems based on the paradigm of just-in-time learning and collaborative learning (De Pietro & Frontera, 2012). With QR codes it is also possible to connect digital resources to printed text. This implies the potential to enrich paper-based learning materials. These enriched learning materials can serve and motivate students with different learning needs (Chen, Teng & Lee, 2010). It is also observe that on the whole QR codes can expand the learning experience and provide authentic tasks that take place in real-world settings. Learning can happen outside of the classroom and learning materials are no longer limited to textbooks. Thus overall learning with QR codes can be very personalized, situated and authentic.

QR CODES IN AN EDUCATIONAL SETTING

When considering QR codes in an educational context, it is important to see QR technology as an enabler. The focus should be more on the learners and pedagogy than on QR technology, as mobile technologies do not guarantee enhanced learning by themselves. The potential for mobile learning is dependent on the provision and development of pedagogically meaningful opportunities and environments that enhance learning. The intention should be to promote more learner-centered learning, not to bind teaching and learning to mobile devices. (Zhang et al., 2010)

There is a variety of ways to use QR codes in an educational context. Literature review indicated that they can be divided into five main categories as follows:

- Trail activities or treasure hunts (Law & So, 2010)
- Outdoor or field activities (Lee et al., 2011; Law & So, 2010)
- Paper-based tasks (Law & So, 2010)
- Learner generated content (Mikulski, 2011)
- Working instruction (Walker, 2010)

In trail activities or treasure hunts, pupils or students explore their communities and solve problems that relate to what they find. This kind of activity can be organized in the form of collaboration or competition between the students but may also be used to support individual study. Law and So (2010) carried out a math trail activity in which students explored their communities and created one or more math problems that related to what they found. At each location, the students answered a question by scanning a code and writing down their answer.

Law and So (2010) discovered that the students found the activity interesting and they were very curious about the new approaches that deviated from their routine exercises.

In outdoor or field activities, pupils or students can explore life science subjects such as species of wild fauna or flora. A QR code can, for example, give hints when identifying the species or provide additional information about them. The code may, for example, include a link to resources that direct the learners to information about the living conditions of the species. Lee et al. (2011) incorporated QR codes and smart phones into field trips for biology classes. Students explored and identified species at the field study site using a QR code sheet and shared their results with their classmates via a social network system, presentations, and discussions. Lee et al. (2011) found that, with QR codes, teachers can create customized guidebooks for individual field studies and students learn more effectively because the code only contains information that is relevant to the matter at hand. They also noticed that QR code activities can integrate digital learning materials with field trips in a motivating way.

In paper-based tasks, QR codes can contain links to multimedia resources such as audio materials or video clips in the case of listening exercises. In paper-based tasks, QR codes can also guide learners through the self-assessment process. For example, a QR code on the worksheet can direct the learner to a web page showing the right answers and the learners can check up on how much they have learned. Law and So (2010) used QR codes to demonstrate how QR codes can be used as part of a listening exercise. They noticed that QR codes provided a very efficient and flexible way for the students to obtain the resources ubiquitously. Law and So (2010) also used QR codes to guide the learners through the self-assessment process. The QR code printed on the worksheet directly linked to a web page with the right answers. Students' feedback indicated that it was more convenient and quick to use mobile devices and QR codes for individual exercises.

In learner-generated content, learners can produce reports or other materials online and share their work with QR codes. For example, students can record book reviews and attach the QR code to the inside cover of the book or they can write children's books and record their reading and then add QR codes linking to the audio to create an interactive reading experience. At best, this approach can support learner-centred learning.

In working instruction, the teacher can give directions and information to students on how to complete their assignments. For example in art workshops, QR codes can be placed on pieces of equipment such as different kinds of brushes, or in an engineering workshop on different electronic equipment to guide students in their use. At best, this approach can support independent learning.

These above-mentioned activities and tasks can, of course, be mixed and combined. For example, there could be an outdoor treasure hunt and a paper-based task combined with a trail activity. One can mixed and combined a variety of different types of activities.

WAYS TO GENERATE AND USE QR CODE

QR codes can be generated for URL, Email address, Phone number, Text, Contact information, SMS, YouTube, Services, Graphical (to put an image into your QR code for a URL), and Google Maps easily by some websites that can generate the QR code for free. Few of the sites are as follows through which we can create QR codes :

- QR code generator: https://www.the-qrcode-generator.com/
- ZXing Project : http://zxing.appspot.com/generator/
- Delivr : http://delivr.com/qr-code-generator
- Maestro : http://www.sparqcode.com/static/maestro
- Kaywa : http://qrcode.kaywa.com/

An example with QR code generator to create QR code of CASE, Faculty of Education and Psychology, Sayajiganj, Vadodara location and also it will helpful in shorten the url.

Save the generated QR code as image.

Fig-8: Location QR Code of CASE, Faculty of Education and Psychology

Original url (long) of CASE, Faculty of Education and Psychology, Sayajiganj, Vadodara location: https://www.google.co.in/maps/place/Maharaja+Sayajirao+University+of+Baroda-+Faculty+of+Education+And+Psychology/@22.3117397,73.1808053,17z/data=!3m1!4b1!4m5!3m4!1s0x395fcf4d43738cb5:0x6f41619764a6caa2!8m2!3d22.3117397!4d73.182994?hl=en

Shorten url of CASE, Faculty of Education and Psychology, Sayajiganj, Vadodara location: https://goo.gl/TxQDXK

INNOVATIVE USE OF QR CODES IN EDUCATION

As smart phones have become the part and parcel of modern life. People are capable of accessing online resources in the classroom. M- Learning has become very popular, as it appeals to students of this generation. This technique is very popular and increasingly used in

the field of Education in Japan, America and other countries. M-Learning stands for Mobile Learning which is location and time independent, student can learn at his own pace after room class also. In India due to limitations of economy, as all students don't have smart phones, so the technique is not fully emerged into classrooms. Figuring out ways to use mobile devices as a tool in the classroom is a strategy that can be put in place to not only enrich student learning but also curve negative aspects of a cellphone in the classroom to a positive use. Students from Japan have done a lot of research work in this field and still in progress. After study of literature and online blogs we can figure out the use QR codes in the classroom teaching:

1. **Digital Storytelling:** For the creative-minded student QR codes can be used as part of a digital story. This video example explains the concept far better than words can.
2. **Web-quest/ Scavenger Hunts:** Create scavenger hunts and/or webquests for your students that get them moving around the room. Scanning a QR code makes is easier for the younger students so they don't have to type the long urls.
3. **Book Reviews:** One of the best ideas I have heard for using QR codes is in the college library. QR codes are created for specific books, linking to reviews, trailers or additional resources. The QR codes are then printed on to stickers and stuck inside the cover of the book. This is great as students can scan and learn more about the book before they choose to read it. Taking this concept a step further, try getting students to create their own book reviews or trailers. The content can then posted to the class blog or wiki and linked to the physical book via QR code. This is a great way for students to interact on both ends of the technology and have their work reach a broad and diverse audience.
4. **Library Book Add-On:** Put QR codes on classroom library books, linking out to information about the author and or book. "You can also have students create 'book trailers' and turn them into QR codes using iMovie!
5. QR Codes On School Equipment : QR codes let us link physical objects in the real world with digital assets online. This is very useful as we can now attach all sorts of additional information to equipment to assist in use. Some examples of this are linking loan equipment to forms and rules for lending. Linking complex or dangerous equipment to instructions or safety warnings. These are just a few ways colleges can use QR codes to save time, money and administrative effort.
6. Solutions And Tutorials : A practical and fun application for QR codes is a modern version of answers being written in the back of the book. By placing answers to

questions online and linking with QR codes, students can attempt their own solutions before using the code to review the correct answer. Not only is this a novel way for students to look up answers, it once again lets teachers use interactive media to present solutions in a more thorough and engaging manner. Take a look at some of the great things jazrob86 is doing with his class and QR codes.

7. Create Interactive Labs or Dissections : Codes attached to a skeleton model or dissected pig can take students to important directions or content. Or vice versa. Maybe this will help them to create the lab themselves or make a model for the class lab.
8. Provide Extension Assignments : A great way to provide optional activities for students who want to excel is to simply put the code on the class assignment and let them follow it to the extension activity or question. It won't take up much space, and might facilitate a little excitement about the extension assignment.
9. **Inform Parents:** Place QR codes around the college informing parents about different places around the college.
10. **Access Help:** Add QR codes to homework sheets that link out to sources of help. "For example, if the student forgets how to solve a math problem or gets stuck, they can scan the QR code for help. The QR codes can be linked to a 'how to video' such as a Khan Academy video or a ShowMe video you created yourself.
11. **QR Stations for self-directed learning:** Students become self-directed learners by creating QR stations. The students scan the QR code to reveal the task and the students must work together to get the task complete. This builds on the 21st century skills of communication, collaboration and critical thinking.
12. **Cite Sources:** Have students use QR to link out to sources they use for research for paper writing, etc.
13. **Assistive Technology:** Provide an alternative access format for students who need additional support in reading and writing. Students can quickly access information while using their own literacy support apps or software.
14. **Classroom Hot Spots**: Provide information 'hot spots' throughout the classroom to access online videos, websites, text that is related to curriculum and instructional material.

15. **Interactive Classroom Calendar:** Attach QR Codes to the classroom calendar / timetable to point to information about upcoming class events, assessment reminders, etc.
16. **Website access from IWB:** Take students to a website you are browsing on an interactive whiteboard. Using the Mobile Barcoder add-on for the Firefox web browser, quickly generate a QR Code and have students scan with their own hand held device.
17. **Link handouts to resources:** Turn a handout into a dynamic, interactive resources by linking them to interactive update-able websites.
18. **Add information to artwork:** To link artwork … to information about the artwork, the artist, the historical period, etc.
19. **Nutritional Information:** To link nutritional objects to calorie counters (and other health applications)
20. **Online Manuals:** To link equipment to online how-to-manuals.
21. **Easy Audiobook Access:** This web page discusses 75 Story Time Read Aloud Picture Books with QR Codes Cards, an app that could be purchased and placed on a shared iPad, enabling students to scan a QR code and then listen as popular children's books are read aloud!
22. **Check Work:** Create QR codes that students can use to check their work.
23. **Award Prizes:** Use a QR code to award a prize for good work or good behavior! The code can simply link to web page or image that informs them what their reward is (a new pencil o marker, a cool eraser, etc.).
24. **Provide a Service:** If students helped create awareness around spreading germs, for example, they might put the [QR] codes around the college or in a parent newsletter.
25. **Go Green**: Rather than giving students the time-worn paper handout, provide a QR code that accesses instructions, announcements, or assignments. Use one page of QR codes to displace multiple handouts, or use codes on-screen to eliminate paper entirely!
26. **Provide Optional Activities for those** : "Go-Getters": A great way to provide optional activities for students who want to excel is to simply put the code on the class assignment and let them follow it to the extension activity or question.
27. **Vote:** QR codes can be a great voting tool allowing students to vote by simply scanning the code as they enter or exit the classroom.

28. **Compile Research :** Have students create codes linking to items discovered during research. These could be posted in class wikis on a specific topic, or on a wall in the classroom. It helps give them ownership of the research process and literally creates "walls that talk."
29. **Differentiate Instruction :** Perhaps you have a poem for students to analyze. You can provide additional scaffolding with a link to a recitation or focused questions to get them started. Use the QR to help you manage differentiation of the various strategies in your tool belt of teacher practices.
30. **Create 21st Century Resumes :** Have students use QR to create resumes that link to other content such as their professional website or portfolio. All colleges do some level of resume building and technical writing. Help them bring it into the 21st century by creating a resume that requires interaction. Not only will this help engage them in technical writing, but also their work will be innovative.
31. **Show Exemplars:** You can create QR for linking students to examples of quality work, whether it's PowerPoint or slideshare for a class presentation, or people speaking a foreign language specific to your current lesson.
32. **Provide a Service:** Integrate QR with a PBL or Service Learning project where students can create the codes that will link to the content they create. If students helped create awareness around spreading germs, for example, they might put the codes around the institution or in a parent newsletter. They can take it a step further by creating codes for a local business or organization.
33. **Provide Extension Assignments :** A great way to provide optional activities for students who want to excel is to simply put the code on the class assignment and let them follow it to the extension activity or question. It won't take up much space, and might facilitate a little excitement about the extension assignment.

CONCLUSION

From the above research based study and basic explanation of QR code, it may be concluded that QR code is an excellent technique which promotes Mobile Learning , facilitates e-learning and online learning. It is in developed mode in Japan , but in India it is still at beginning stage. Many researchers are doing research in this context and findings are helpful. But Implementation requires mobile devices which is not possible to have in every classroom.

It can help parents of students as they can provide extended knowledge to their children. The basic requirement for this technique is smart technology , which can be used in innovative ways in Classroom teaching. In general, we believe that QR codes have great potential in education. If the mobile devices are equipped with Wi-Fi access and the activities do have the wireless coverage, the cost for communication would be minimal. At the same time, the QR code also brings about much more interactivities and interests. Teachers can create their mobile sites and can upload video lectures and notes on the site , and publish their codes to students via www.winksite.com for free. The current education system is in the process of a reform featured with the use of instructional technology with smart learning. Considering these characteristics, the QR code really accords with the trend of educational development towards student-centered instruction. Furthermore, the QR code itself is also in the progress of improvement. No doubt that the QR code has a good potential for being integrated into the curriculum. But with its rapid development, some risks and drawbacks of QR codes are exposed to the public. The privacy, content safety, and availability of QR code reader really threat its further promotion in the area of education.

FUTURE SCOPE

QR codes can be easily implemented form upper primary school level to higher education level, where parents can access online resources provided by the teacher/professor and QR code can be given in printed form. College students can submit their work and create QR code for the work. QR codes can be implemented at school level and college level both. Authors aims in future experiments is to find more proper educational uses of QR codes and to categorize them. It is also expect that from this paper participants of seminar will understand how to utilize QR codes in an educational context and that way we can promote mobile learning.

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