CHAPTER FOURTEEN

Educational Application Platforms and Higher Education Students' Learning During Periods of School Closure

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Abstract
Higher education programmes in Nigeria has for ages or overtime, witnessed several challenges including the recent pandemic outbreak. This paper hence examines the cause of school closure in 2020 and the nature of educational application platforms used for teaching delivery. It also identifies the merits and demerits of educational application platforms. The paper equally adumbrates the mandatory factors in developing educational application platforms and the brain behind the popularity of educational services with application platforms. It similarly analyses the main trends of educational application development, types and features of educational application platforms. The paper correspondingly demonstrates how to build an educational application and explicates useful tips on educational application development. It concludes that educational application platforms are the prerequisite for meeting higher education students' learning demand during periods of school closure. The paper therefore advocates for adequate provision of educational application platforms for lecturers and students in order to promote sharing of instructional materials in a cost-effective manner during periods of school closure.

Keywords: Application platforms, higher education, students learning, school closure

Introduction

In a precautionary move aimed at curtailing the spread of the coronavirus (COVID-19) disease in the country, the Federal Ministry of Education ordered the immediate closure of all educational institutions which includes: tertiary, secondary and primary schools nationwide. This directive was confirmed by the Permanent Secretary of the Federal Ministry of Education, Echono, according to a statement released in Premium Times (2020) on Thursday, by Mr Echono on behalf of the Minister of Education, Adamu Adamu, it also noted that all 104 Unity Schools throughout the country should close on or before the 26th of March, 2020 as a precautionary step which is aimed at preventing the spread of the dreaded Coronavirus (COVID-19) which has become a global threat.

Efforts to stem the spread of COVID-19 through non-pharmaceutical interventions and preventive measures such as social-distancing and self-isolation have prompted the widespread closure of primary, secondary, and tertiary schooling in over 100 countries (Centers for Disease Control and Prevention, 2019). Previous outbreaks of infectious diseases have prompted widespread school closings around the world, with varying levels of effectiveness. Furthermore, a mathematical

modelling has shown that the transmission of an outbreak may be delayed by closing schools. However, effectiveness depends on the contacts students maintain outside of school. The closures of school may be effective when enacted promptly. If school closures relatively occur late to an outbreak, they are less effective and may not have any impact at all. Additionally, in some cases, the reopening of schools after a period of closure has resulted in increased infection rates. As closures tend to occur concurrently with other interventions such as public gathering bans, it can be difficult to measure the specific impact of school closures.

As an illustration, during the 1918-1919 influenza pandemic in the United States, Borman, Benson and Overman (2015) submitted that school closures and public gathering bans were associated with lower total mortality rates. Cities that implemented such interventions earlier had greater delays in reaching peak mortality rates. Schools closed for a median duration of 4 weeks according to a study of 43 US cities' on response to the Spanish Flu. According to Wong, Jianrong, Shi, Hongjiang, Zheteyeva, Lane, Copeland, Hendricks, McMurray, Sliger, Rainey and Uzicanin (2014), school closures were shown to reduce morbidity from the Asian flu by 90% during the 1957–58 outbreaks, and up to 50% in controlling influenza in the US, 2004–2008. Multiple countries successfully slowed the spread of infection through school closures during the 2009 H1N1 Flu pandemic (Entwisle, Alexander and Olson, 2010). Similarly, school closures in the city of Oita, Japan, were found to have successfully decreased the number of infected students at the peak of infection; however, closing schools was not found to have significantly decreased the total number of infected students (Cooper, Nye, Charlton, Lindsay and Greathouse, 2016). Mandatory school closures and other social distancing measures were associated with a 29% to 37% reduction in influenza transmission rates. Early school closures in the United States delayed the peak of the 2009 H1N1 Flu pandemic. Despite the overall success of closing schools, a study of school closures in Michigan found that district level reactive school closures were ineffective (Quinn & Politkoff, 2017).

Specifically, during the swine flu outbreak in 2009 in the UK, in an article titled "Closure of schools during an influenza pandemic" published in the Lancet Infectious Diseases, a group of epidemiologists endorsed the closure of schools in order to interrupt the course of the infection, slow further spread and buy time to research and produce a vaccine. Having studied previous influenza pandemics including the 1918 flu pandemic, the influenza pandemic of 1957 and the 1968 flu pandemic, they reported on the economic and workforce effect school closure would have, particularly with a large percentage of doctors and nurses being women, of whom half had children under the age of 16. They also looked at the dynamics of the spread of influenza in France during French school holidays and noted that cases of flu dropped when schools closed and re-emerged when they re-opened. They noted that when teachers in Israel went on strike during the flu season of 1999–2000, visits to doctors and the number of respiratory infections dropped by more than a fifth and more than two fifths respectively.

The Cause of School Closure in 2020
The COVID-19 pandemic has affected the educational systems worldwide, leading to the near-total closures of schools, universities and colleges. Most governments around the world have temporarily closed educational institutions in an attempt to contain the spread of COVID-19. As of 7 June 2020, the United Nations International Children's Fund (UNICEF) (2020) reported that

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approximately 1.725 billion learners are currently affected due to school closures in response to the pandemic. According to UNICEF (2020) monitoring, 134 countries are currently implementing nationwide closures and 38 are implementing local closures, impacting about 98.5 percent of the world's student population. About 39 countries' schools are currently open. On 23 March 2020, Cambridge International Examinations (CIE) released a statement announcing the cancellation of Cambridge IGCSE, Cambridge O Level, Cambridge International AS & A Levels, Cambridge AICE Diploma, and Cambridge Pre-U examinations for the May/June 2020 series across all countries. International Baccalaureate exams have also been cancelled. In addition, Advanced Placement Examinations, SAT administrations, and ACT administrations have been moved online and cancelled. From March 23 till date, it is observed that the unanticipated school closures both in Nigerian societies and sundry have come with so many consequences which have attracted the attention of educational stakeholders. All the levels of the educational systems in Nigeria are on lockdown.

As a result, the extended school closures have a documented effect on student learning, resulting not just in lack of progress, but actual loss of mastery and knowledge. School closures impact not only students, teachers, and families but have far-reaching economic and societal consequences. School closures in response to the pandemic have shed light on various social and economic issues, including student debt, digital learning, food insecurity, and homelessness, as well as access to childcare, health care, housing, internet, and disability services. The impact is more severe for disadvantaged children and their families, causing interrupted learning, compromised nutrition, childcare problems, and consequent economic cost to families who could not work. In the same vein, Centers for Disease Control and Prevention (2019) and Johnson, Moore, Edelson, Kinnane and Davies (2018) established that the unintended consequences of school closure events pose difficulties for parents in arranging childcare and supervision, missed pay at work, diminished nutrition in a child's meals, and lower student performance on exams. These consequences have particularly harsh effects on low-income families and their children. Similarly, Marcotte and Helmelt (2017) and Marcotte and Hemelt (2018) provides evidence that losing school days to unscheduled closures has negative effects on performance on state assessments, and that these school closures have larger effects on performance for students in lower grades. This suggests that students' learning during periods of school closures may not be possible without education application platforms.

The Nature of Educational Application Platforms
In response to school closures, UNESCO recommended the use of distance learning programs and open educational applications and platforms that schools and teachers can use to reach learners remotely and limit the disruption of education. Educational application platforms are freely accessible, openly licensed text, media, and other digital assets that are useful for teaching, learning, and assessing as well as for research purposes (Gaurav 2018). In the same way, at the higher education level in Nigeria, the system of education consists of a university sector and a non-university sector. The former constitutes Federal and State Universities while the latter is composed of Polytechnics, Monotechnics, and colleges of education. The higher education sector as a whole offers opportunities for undergraduate, graduate, and vocational and technical education. The

academic year typically runs from September to July. Most universities in Nigeria use a semestering system of 18– 20 weeks. Others run from January to December, divided into 3 terms of 10-12 weeks. Higher education students are encouraged to embrace educational application platforms. Therefore, according to Gaurav (2018), educational application platforms are publicly accessible materials and resources for any user to use, re-mix, improve and redistribute under some licenses. As a result, the development and promotion of educational application platforms is often motivated by a desire to provide an alternate or enhanced educational paradigm. Educational application platforms are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others. They include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.

Features of Educational Application Platforms
According to Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019), the following constitutes the basic features of educational application platform.

1. **User profile**. This interface indicates the personal profile of the application user. It is the place where information about his/her success in learning will be kept.

2. **Social networks integration.** Today it is impossible to imagine a mobile app without the implementation of such a feature. In fact, it has several tasks, namely - to allow the user to:

   a. Register in his/her own app for learning with a few clicks by integrating all the necessary information from the social network profile;

   b. Share his/her achievements with friends.

3. **Learning material** such as:

   a. Interactive exercises to test knowledge and consolidate the material;

   b. Audio and video materials with explanations of the lessons and exercises.

4. **Categorization of lessons.** This phase coalesces the lessons and sorts them into different topics: For instance, shopping, travel, work, family, etc.

5. **Push Notifications**. This is another mandatory feature of the modern mobile app. Push notifications are an unobtrusive way to remind of oneself and increase the user's engagement factor. It notifies the user of prolonged non-use of the application, the opportunity to get a discount, new interesting features, amongst others.

6. **Feedback.** This consolidates the reviews of user's experience with the application which may sometimes be negative and even aggressive, but it constitutes a great way to improve the application in accordance with the wishes of the users.

7. **Scheduling system.** This promotes an effective learning with a systematic approach. Therefore, it is ideal to consider a convenient scheduling system when thinking of how to

build an educational app. The designer needs to break the learning process into a few logical levels and give the user a tool to plan his/her training adequately.

8. **Search system**. This feature helps the user to navigate within the application easily and find the information he needs without unnecessary efforts. Also, the faster the user gets the desired results, the better the chances that he/she will keep using the application.

9. **Interaction with friends.** The application could be turned into a kind of miniature social network with the ability to add friends, communicate, and share successes. Therefore, a competent designer is expected to create an educational app with this factor in mind.

Types of Educational Applications Platforms

Before thinking of how to make an educational app, the designer needs to find out what types of mobile learning services are most in demand. Hence, Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019), avers that considerations ought to focus on the following dimensions:

1. **Apps aimed at apprenticeship courses**

   These educational applications usually accompany certain training courses; they supplement it and thereby increase its effectiveness. That is, there is a real course of tuition on a certain subject, the program of which provides students with the possibility of additional independent learning through a mobile program. So, developing an app for education will come in handy.

2. **Educational apps focused on kids**

   This type of application is very beneficial for children. It teaches them the patterns of calculation, reading, pronunciation and other useful skills). Such learning services are very popular among parents who aspire to give their daughters and sons all the best.

3. **Classroom education apps**

   This category of educational app is designed for teachers and students of all kinds. These mobile programs are usually being used during lessons within a classroom. Such a type of software serves as a tutorial material which facilitates the whole learning process. Such educational apps of the sort can help them give instruction in their subjects more effectively.

4. **The grading learning apps**

   For educational evaluation purposes, this sort of learning app development can be aimed at testing students. The mobile application is a convenient way to evaluate their knowledge and give a proper   estimation of instructional outcomes.

5. Reference tutoring apps

The purpose of developing an educational app of this type is to provide users with a comprehensive educational resource, including encyclopedias and dictionaries.

6. Niche markets apps

This kind of educational application serves the purpose of a specific course such as driving lessons, medical programs, etc. The most popular programs in this regard are, of course, learning foreign and sign language apps. Others help in learning how to play the guitar or explaining anatomy (for example, Anatomy 4D), and so on.

7. An educational app for teachers

This educational application development is designed to guide teachers in making up programs of instruction and improving the effectiveness of the teaching   process.

Merits of Educational Application Platforms
According to Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019), the merits of educational platforms includes but not limited to:
1)   Expanded access to learning – can be accessed anywhere at any time

2)   Ability to modify course materials – can be narrowed down to topics that are relevant to course

3)   Enhancement of course material – texts, images and videos can be used to support different learning styles

4)   Rapid dissemination of information – textbooks can be put forward quicker online than publishing a textbook

5)   Cost saving for students – all readings are available online, which saves students hundreds of dollars

Demerits of Educational Application Platforms
According to Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019), the demerits of educational platforms includes but not limited to:
1)   Quality/reliability concerns – some online material can be edited by anyone at any time, which results in irrelevant or inaccurate information

2)   Limitation of copyright property protection – educational application platforms licenses change "All rights reserved."   into "Some rights reserved.", so that content creators must be careful about what   materials they make available

3)   Technology issues – some students may have difficulty accessing online resources because of slow internet connection, or may not have access to the software required to use the materials.

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Mandatory factors in Developing Educational Application Platforms

Creating an educational application for students and teachers is a welcomed idea. But none would ever want to entertain mistakes in any phase of its development. Hence, there is a research process mentioned by Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019) for a competent designer. The research process includes:

1) Transforming dull subject matter into amazing e-learning experiences

2) Lack of learner motivation and engagement

3) Staying up-to-date with modern tech

4) Designing e-learning courses for different generations

5) Subject matter experts with prior instructional design knowledge

6) Balancing tight e-learning budgets

7) Finding the perfect e-learning authoring tool or learning platform

Undoubtedly, educational application platform for teachers and students are becoming more popular every day. For exploring the possible profitability of a mobile learning service, Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019), argued that the following should be carefully adhered to:

Reasons for the Popularity of Educational Services with Application Platforms

1. **Always at hand.** Learning apps are especially convenient because a person can use them at anytime and anywhere! So, by developing an educational app, you provide users with the opportunity to study subjects they want on a convenient schedule.

2. **Modernity**. You must create an educational app if you want to offer a service that perfectly meets the needs of the community. In the end, modern users choose modern ways of solving problems, and mobile apps are just what they really need today.

3. **Efficiency.** Undoubtedly, high technologies expand opportunities to obtain knowledge most effectively, qualitatively and with comfort.

4. **Saving.** It is about saving time and money on teachers and students.

5. **Analysis of the effectiveness of training**. An educational app for learning provides statistics on achievement dynamics and user level.

Main Trends of Educational Application Development

When thinking of designing a personal app for learning, one should consider the main trends in education in the mobile area. According to Cacheiro-Gonzalez et al (2019), the five major points of consideration are:

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1. **The essential role of certifying organizations**. This suggests that providers of educational courses and learning services will have to carefully select lecturers and take care of their reputation.
2. **Video content as a must-have in training programs**. According to forecasts, by 2030, videos will generate 80% of global Internet traffic. First of all, some of the entertainment content is going to be in demand, but the trend will affect the mobile education market.
3. **Training in a game format:** Such an approach works not only with children but also with grown-ups. Educational apps for adults (those created with the game in mind) guarantee a high level of involvement and interaction: emotional perception increases the absorption of information by 9%.
4. **Micro-training:** The average person is willing to devote 1% of his time to additional training. Subsequently, the use of short videos, small text or visual materials will be in trend. It is therefore ideal that a competent app developer should keep this in mind when creating educational apps.
5. **Increasing interest in virtual and augmented realities**: Virtual technologies are more accessible and are being actively used to study historical events, train medical professionals, amongst others. Such a method provides complete immersion in the learning process at an emotional level. The use of augmented realities in training looks more realistic. In this case, it is enough to download a suitable educational application, without need in additional accessories such as a helmet or something of the sort.
6. **Visibility**: The technology allows one to see the smallest details, bringing a certain object closer and creating the illusion of interaction with it.
7. **Security:** One can get into the essence of things without fear of breaking or spoiling something.

Building of Educational Application

According to Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019), there are simple schemes which would allow an individual to build an educational app of high quality. The steps are to:

1. Brainstorm on Educational App Ideas: It all starts with a bright idea which is undoubtedly half the success. So do not spare the time and energy, try to think up something special and original.
2. Conduct Market Research: And now check the originality of your idea. Do not be discouraged if it is not unique, such a result is almost inevitable! In addition, competition indicates the relevance of your future mobile service. To avoid the possibility of getting lost among competitors, do your best to find a way to stand out among them. What can you offer to catch the user's attention?
3. Testing-run educational app ideas: Test your idea among representatives of your target audience, whether kids, students or teachers. Ask if they are interested in your service. And if so, how do they see it, how should it look like? Use their tips when developing an app for education.
4. Hiring educational app developers: This is an important stage which should include the following steps:

a)   Prototyping (creating a screen flow)

b)   UI/UX design

c)   Development stage

d)   Testing

e)   Release assistance

Useful Tips on Educational Application Development
According to Cacheiro-Gonzalez, Medina-Rivilla, Dominguez-Garrido and Medina-Dominguez (2019), it is not enough to know how to build an educational application; one also needs to know how to improve its profitability. The authors suggested the following tips:

a)   **Use real teaching methods.** Education should be efficient and as such if one does not understand the appropriate pedagogy clearly, it is advisable not to stint on the expert advice.

b)   **Game elements.** A designer must remember that game elements constitute the main trends of educational   apps. Hence, it is pertinent to put such knowledge into practice. That implies that learning apps can (and should) be implemented as exciting games. In fact, this condition is especially necessary when developing educational apps for kids.

c)   **User-friendly interface.** It must be simple, nice, and clear. Again, when it comes to children, the simplicity of design must be of paramount consideration.

d)   **Compatibility with different devices**. Since the designer may not know which platforms (iOS, Android) users might prefer, so, having a good knowledge of coding is necessary in order to enable the development of all the possibilities regarding the creation of the desired educational Android and iOS apps.

e)   **Use bright graphics and interesting sounds.** Having developed the application, it is ideal at the same time to ensure that the sound effect can be turned off in order to accommodate the needs of all customers.

f)   **Offer a free version of the mobile learning service to entice users:** A trial program or a light option (with the possibility of acquiring a full Pro service) is pertinent to draw clients.

g)   **Lessons should be clear, short, useful and rewarding**. If users have to spend too many hours doing the task, they might get bored, and boredom is dangerous when it comes to mobile training services. However, it is of course, necessary not to forget to reward the learner if the user has successfully completed the task. For instance, something like a bright greeting sticker with a cheerful musical accompaniment would make a great reward and please the disciple.

h)   **Keep an eye on competitors and follow the main trends in education.** This rule is quite simple and clear. It is unwise to appear odd in the labour market. An intelligent app

designer ought to always be among the leaders and know what is in demand right at the moment.

g) **User experience must come first.** Among other things, this tip implies that user's needs have to be foremost. Going by the fact that some users have devices with very small screen sizes, the designer must ensure that when creating an educational app, the content is readable on the screens of any resolution/version.

h) **MVP model.** Model–view–presenter is a derivation of the model–view–controller architectural pattern, and is used mostly for building user interfaces. In MVP, the presenter assumes the functionality of the "middle-man". In MVP, all presentation logic is pushed to the presenter. This could be done by a designer whose budget is lean but still wants to make an educational app. It is advisable to start with the MVP model first and improve on the mobile service later.

Conclusion

Efforts to stem the spread of COVID-19 through non-pharmaceutical interventions and preventive measures such as social-distancing and self-isolation have prompted the widespread closure of primary, secondary, and tertiary schooling in over 100 countries. Previous outbreaks of infectious diseases have prompted widespread school closings around the world, with varying levels of effectiveness. As a result, the extended school closures have a documented effect on student learning, resulting not just in lack of progress, but actual loss of mastery and knowledge. School closures impact not only students, teachers, and families but have far-reaching economic and societal consequences. School closures in response to the pandemic have shed light on various social and economic issues, including student debt, digital learning, food insecurity, and homelessness, as well as access to childcare, health care, housing, internet, and disability services. In response to school closures, UNESCO recommended the use of distance learning programs and open educational applications and platforms that schools and teachers can use to reach learners remotely and limit the disruption of education. Educational application platforms are freely accessible, openly licensed text, media, and other digital assets that are useful for teaching, learning, and assessing as well as for research purposes. They are publicly accessible materials and resources for any user to use, re-mix, improve and redistribute under some licenses.

Suggestions

1. The University should give priority to the development of educational application platforms for all the departments via the library by subscribing to relevant educational databases and carrying out a retrospective conversion of the library's print materials to digital format. This is to make the online learning easy for students during periods of school closure.

2. More online training facilities should be provided by the University management to both postgraduate and undergraduate students in order to equip them on how to use online information resources during periods of school closure.

3. Information retrieval skills using information technology should be included in the curriculum for students to be able to make use of educational apps effectively. Hands-on training on the use of educational applications should be actively promoted by lecturers.

4. The cost of accessing and downloading the electronic resources by students should be highly subsidized by school management if they are to bear the list of off-prints and buy access time, in order to encourage the use of the educational application platforms during periods of school closure.

5. Lecturers and students should be provided with and given improved access to computer systems, preferably laptops. They could be made to purchase them at subsidized rates that are affordable to them so that they can install and utilize educational application platforms comfortably during periods of school closure.

6. Government should review the undergraduate curriculum and incorporate how to build educational application platforms as part of the entrepreneurial studies for students. This will help to reduce not only stress encountered by graduates in search of jobs but also curbs the difficulties usually faced with distance learning during periods of school closure.

References

Borman G. D., Benson J. & Overman L. T. (2015). Families, schools, and summer learning. *The Elementary School Journal, 106*(2), 131–150.

Cacheiro-Gonzalez, M. L., Medina-Rivilla, A., Dominguez-Garrido, M., & Medina-Dominguez, M. (2019). The learning platform in distance higher education: students' perception. *Turkish Online Journal of Distance Education. 20*(1), 71-95. 10.17718/tojde.522387.

Centers for Disease Control and Prevention (2019). Impact of seasonal influenza-related school closures on families - Southeastern Kentucky, February 2018. *Centers for Disease Control, Morbidity Mortality Weekly Report (MMWR) 58:*1405–1409.

Cooper H., Nye B., Charlton K., Lindsay J. & Greathouse S. (2016). The effects of summer vacation on achievement test scores: A narrative and meta-analytic review. *Review of Educational Research, 66*(3), 227– 268.

Entwisle D. R., Alexander K. L. & Olson L. S. (2010). Summer learning and home environment. In R. D. Kahlenberg (Ed.), A nation at risk: Preserving public education as an engine for social mobility (9–30). New York, NY: Century Foundation Press

Gaurav, H. (2018). Mobile learning application and its usage among students in education. *Journal of Emerging Technologies and Innovative Research (JETIR). 5*(1), 984-998

Johnson A.J., Moore, Z.S., Edelson, P. J., Kinnane, L., & Davies, M. (2018). Household responses to school closure resulting from outbreak of influenza B, North Carolina. *Emerging Infect*

Disease14:1024–1030.

Marcotte, D., & Helmelt, S. W. (2017). Unscheduled school closings and student performance. Discussion Paper No. 2923. Bonn, Germany: Institute for the Study of Labor. Retrieved from: http://ftp.iza.org/dp2923.pdf

Marcotte, D. E. (2017). Schooling and test scores: A mother-natural experiment. *Economics of EducationReview,26*:629–640.

Marcotte, D. E., Hemelt, S. W. (2018). Unscheduled school closings and student performance. Education,3:316–338.

Premium Times (2020). Nigerian government orders closure of school to check spread of COVID-19. Retrieved on 07/07/2020 from www.premiumtimes.com

Quinn, D. M., & Politkoff, M. (2017). Summer learning loss: What is it, and what can we do about it? Evidence Speaks. Washington, DC: The brookings institution. retrieved from: https://www.brookings.edu/research/summer-learning-loss-what-is-it-and-what-can-we-do-about-it/

Wong, K. K., Jianrong Shi, J., Hongjiang, G, Zheteyeva, Y. A., Lane, K., Copeland, D., Hendricks, J., McMurray, L., Sliger, K., Rainey, J., & Uzicanin, A. (2014). Why is school closed today? Unplanned k-12 school closures in the United States, 2011–2013. Plos One. Retrieved from: https://doi.org/10.1371/journal.pone.0113755