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A Responsive Website: Development and Traffic Analysis

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ABSTRACT

Internet Access is now more mobile than ever because of the introduction of internet enabled devices such as Smart-watch, Smartphones, Tablets, Phablets in addition to the Laptops and Palmtops. The study developed a responsive website and provided a website traffic analysis. It employed the descriptive and applied methods of research. Documentary analysis was used to determine the Transparency Seal requirements. The Enidus web application development model was used to develop a responsive website. Google Analytics was used to describe the website traffic. The study found out that the Transparency Seal requirements were divided into seven (7) categories namely: a) Agency's Mandate, Vision, Mission, and List of Officials**;** b) Annual Financial Reports**;** c) DBM Approved Budget and Targets; d) Projects, Programs, and Activities, Beneficiaries, and Status of Implementation; e) Annual Procurement Plan 2015; f) System of Ranking Delivery Units and Individuals; and g) Quality Management System certified by international certifying body or Agency Operations Manual. The Enidus model provides a clear perspective regarding the life-cycle of a website. Google Analytics is an excellent tool for Website Administrators to monitor website traffic for it provides data not only on the visitors' sessions, but also to the devices used.

Keywords **—** Information Technology, responsive website, website, traffic analysis, descriptive-applied design, Philippines

INTRODUCTION

Modern devices such as Smart-watch, Smartphones, Tablets, Phablets along with the old Desktops are viewing devices often used to access websites. Given that these devices do have different viewing sizes, a website must be responsive to determine the viewable width of the devices. A responsive website refers to the style a web page look equally good regardless of the screen size of a device used to browse a web page.

According to Kim (2013), responsive web design is the most recent trend that helps libraries meet high expectations of their patrons in mobile-first culture information consumption. A responsive web design most likely is one of the reasons that prompted the World Wide Web Consortium (W3C) to formulate standard for media query. A media query consists of a media type and zero or more expressions that check for the conditions of particular *media features* like 'width,' 'height,' and 'color' and presentations can be customized to a range of devices without modifying the content. Likewise, it is responsive web design that convinces web designers to develop a responsive Cascading Style Sheet (CSS) Front-End Frameworks that consists of a package made up of a structure of files and folders of standardized code.

Among the most popular CSS Front-End Frameworks is Bootstrap. According to Jain (2015), Bootstrap is a Front-End Framework that has the following advantages: a) Speeds up the mock-up process; b) Clean and tidy code; c) Solutions to common CSS problems; d) Browser compatibility; e) Learn good practices; f) Having a single procedure to resolve common problems; g) makes maintaining various projects more straightforward; and h) Helpful in collaborative work. In connection to this, it is suggested that the use of the framework should result in more effective commercial Web application development (Lu & Yeung, 1998).

The Abra State Institute of Sciences and Technology as one of the National Agencies is expected to adhere to the General Appropriations Act for Fiscal Year 2012 Section 93 that requires all government agencies to have a Transparency Seal placed on its official website to improve transparency and enforce accountability. The Transparency Seal is one among the criteria set by the AO 25 to be rated. The AO 25 is the collective name of the Task Force which is composed of National Agencies like Department of Budget and Management (DBM), Commission on Audit (COA), Commission on Higher Education (CHED) for State Colleges and Universities, Civil Service Commission (CSC) and other allied agencies. Reports in prescribed format must have to be available online on or before the set

deadline. The presence of the Transparency Seal is, therefore essential. Failure to comply would be a ground for not granting to the school a Performance Based-Bunos (PBB) and would have a great probability of domino effects on State Universities and College's levelling.

With all the national agencies complying and there are deadlines to beat, indeed the AO 25 have tons of job to do. Personnel surely accesses the Transparency Seal wherever and whenever there is an opportunity to connect to a Wireless Fidelity. Mobile devices could be a potential viewing medium to check and validate the presence of the required reports in the Transparency Seal. In fact, according to Butler, Giannetti, Gimson and Wiley (2002), users expect to access the same content from any device with similar capabilities. Even when device capabilities differ, users still want access to an adapted version of the content. Moreover, Frain (2012) goes on to say that accessibility problems limit users' webpage navigation and obtaining information.

About the possibility that the general public visits the school website, Internet World Stats (2016) states that the country ranked 13, among the world's top 20 countries with the highest number of internet users (with 54,000,000 users). With regard to the possibility that the users might use mobile devices, Rappler further states that the country has a total of 119 million mobile phone subscribers of which 55% have a broadband subscriptions.

In Abra, based on the 2010 Philippine Statistic Authority data, there are 234,733 residents. In Today's internet driven or crazy society, which can be associated with the popularity of social media apps in mobile phones, it is expected that websites related to transparency of government data and transactions are heavily or often visited too by the populace.

But how exactly can data on internet usage be known? Is there a present technology that can be used to this? According to Glommen and Barrelet (2002), for every website page requested by a website visitor, the state of the visitor's browser is recorded, and data relating to the path that visitors take through the website are collected and studied. Moreover, website tracking data can be achieved using a data collector having a user interface for assigning custom events and attributes to events occurring on a website (B. Error, C. Error & Curran, 2003).

As techniques for developing a responsive website are available, with the steady increase of broadband subscribers, and techniques on monitoring the activities of online visitors, A Responsive Website: Development and Traffic Analysis was conducted. It attempted to solve the problems related to screen sizes by developing

a responsive website for the Transparency Seal of Abra State Institute of Sciences and Technology, Philippines and ensure that it could be validated for its content by the AO 25 by any medium. With respect to traffic analysis, it attempted to provide real-time flow of traffic analysis as it is achievable based on the finding of Glommen and Barrelet (2002) that for every website page requested by a website visitor, a cookie can follow the visitor browser through independent file servers, regardless of how the pages of a website might be distributed in storage.

OBJECTIVES OF THE STUDY

The main objective of the study is to develop the ASIST responsive website and describe the website traffic. Specifically, it achieved the following objectives: 1) determined the Transparency Seal guideline; 2) developed the ASIST responsive website; and 3) determined the website traffic from January 2016 to June 2016 regarding behavior, technology and mobile.

METHODOLOGY

Research Design

Descriptive and applied designs of research were used in the study. Figure 1 shows the research paradigm of the study. The input of the study includes the Transparency Seal requirements and the website traffic data. The processes done in developing the website comprised analyzing the website requirements, design, develop and enhance. Furthermore, it contains web traffic analysis regarding behavior, technology, and mobile. The output box shows the result of the study, the ASIST Responsive Website: Development and Traffic Analysis.

The study was conducted from January 2016 to June 2016 at the Abra State Institute of Sciences and Technology Main Campus, Lagangilang, Abra.

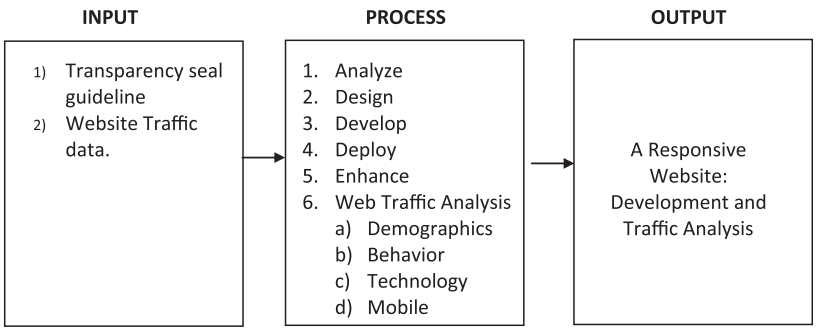

Figure 1. Research Paradigm

Sources of Data

The Director for Planning, Acting Budget Officer, Supply Officer, Secretary to the President, School Accountant, Human Resource Officer, and visitors of the website served as the respondents of the study. All of the respondents except the visitors of the website provided data needed for objective 2.

The Director for Planning was chosen because the Officer leads in ensuring that the Agency's Mandate, Vision, Mission are incorporated in all of the school activities. Likewise, the officer can provide data on DBM Approved Budget and Targets for the current year, the Budget 2015, and Targets/MFOs/GAA targets 2015.

The Acting Budget Officer was chosen because he is in charge on the Annual Financial Reports for the whole year as of December end of the year or 4th Quarter, Quarterly Physical Report of Operations/Physical Plan, and Financial Plan.

The School Accountant was chosen because the Officer leads in providing data on Statement of Appropriations, Allotments, Obligations, Disbursements and Balances as of December YEAR, 2013-2015 Summary Report on Disbursements, 2013-2015 FAR No. 5 or the Quarterly Report on Revenue and Other Receipts, and Detailed Statement of Current Year's Obligations, Disbursements, and Unpaid Obligations.

The Supply Officer was chosen because the officer is the primary source of data for Annual Procurement Plan 2015 of the School.

The Secretary to the President was chosen because the Secretary keeps data on the List of Officials duly designated by the School President.

The Human Resource Officer was chosen because the Officer leads in providing data on the Citizen's Charter on front-line services.

Data Instrumentation

For objective 1, document analysis was done as a document on Transparency Seal requirement exist and as observation and interviews are not possible.

For objective 2, First Phase, the ASIST responsive website was developed using the Enidus web application development model. It has five phases, namely, a) analyze; b) design; c) develop; d) deploy, and e) enhance. Moreover, a documentary analysis was done as school document required by Task Force exist.

Figure 2. Enidus Web Application Development Model

Analyze

The DBM issued Transparency Seal guidelines on the required report that must be posted on the ASIST website was strongly considered.

Design

A unique user interfaces that showcase the ASIST in the best possible light was created. This is study ensured the white space management, color compatibility, consistent corporate brand guidelines, visually appealing interface, and effective layout of content and images.

Develop

This study worked on the writing of code of the website, testing of mobile devices compatibility, validating and documenting work of the website.

Deploy

The website files were uploaded only after all the Transparency Seal requirements were satisfied.

Enhance

A constant analysis, supervision and scrutiny make gaps easily visible. With the trends changing rapidly, it is important to constantly enhance the physical features of the website to maintain and improve its productivity.

For the Second Phase, document analysis was done as documents on Transparency Seal reports exist.

For objective 3, the website traffic was analyzed using Google Analytics in terms of a) demographics; b) behavior; c) technology; and d) mobile.

Behavior

Behavior refers to new and returning users regarding their frequency and recency of their visit to the website, engagements particularly, session duration and page views.

Technology

The technology refers to browser and operating system used, and also to the network or the internet service providers of the users.

Mobile

Mobile refers to the brand and screen resolutions of the devices used by the users to visit the school website.

For objective 3, Google Analytics was used because it has been utilized many times in the past by other authors like: a) Measuring website performance (Plaza, 2011); b) Case study to improve library website content and design, for it could provide insightful information about how visitors find and interact with their websites (Fang, 2007); and c) measure library website effectiveness by tracking hits or visits (Turner, 2010).

Data Analysis

For objective 1, the data obtained from the document was interpreted using quantitative content analysis.

For objective 2, the data from the respondents were interpreted using quantitative content analysis.

For objective 3, the data obtained from the visitors were interpreted using quantitative content analysis, frequency count, and percentage.

RESULTS AND DISCUSSION

The Transparency Seal requirements

Based on the DBM guidelines, a national agency must maintain on its website the: a) Agency's Mandate, Vision, Mission and List of Officials; b) Annual Financial Reports. For NGA/SUCs, it must submit 2013-2015 FAR No. 1: SAAOBDB or the Statement of Appropriations, Allotments, Obligations, Disbursements and Balances, 2013-2015 Summary Report on Disbursements, 2013-2015 BAR NO. 1 or the Quarterly Physical Report of Operations/Physical Plan, 2013-2015 FAR No. 5 or the Quarterly Report on Revenue and Other Receipts, and 2013-2015 Financial Plan or Detailed Statement of Current Year's Obligations, Disbursements and Unpaid Obligations. While for GOCC/WD, it must submit the 2013-2015 Annual Report; c) DBM Approved Budget and Targets; d) Projects, Programs and Activities, Beneficiaries, and Status of Implementation; e) Annual Procurement Plan 2015**;** f) System of Ranking Delivery Units and Individuals; and g) Quality Management System Certified by international certifying body or Agency Operations Manual. This implies that the agencies must have to divulge to the public matters that pertains to financial aspect of the transactions and its procedures on front-line services.

The ASIST responsive website

The ASIST website was developed in two (2) Phases. The First Phase was laying out the web page using a Rapid Application Development (RAD) tool called Bootstrap and a custom build Cascading Style Sheet (CSS) (see Figure 3).

```
<meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="bootstrap.min.css">

  <script src="https://ajax.googleapis.com/ajax/libs/jquery/1.11.3/jquery.min.js"></script>
  <script src="http://maxcdn.bootstrapcdn.com/bootstrap/3.3.5/js/bootstrap.min.js"></script>

<link rel="stylesheet" type="text/css" href="asist.css"/>
<script type="text/javascript">
```

Figure 3. Website initial scale

Bootstrap is a sleek, intuitive, and powerful mobile-first front-end framework for faster and easier web development. It is one the most popular HTML, CSS,

and JavaScript frameworks for developing responsive, mobile-first web sites. Likewise, it is completely free to download and use. Moreover, the custom build CSS was used to display colored and rounded image holders on the website landing page.

The viewport of the device was set to initial-scale equal to 1 to make it responsive. The width of the screen of the user's device is detected to provide the appropriate page. This technique means that the page can be viewed using a mobile device (see Figure 4). However, it can also be viewed in bigger sizes like the Desktop (see Figure 5).

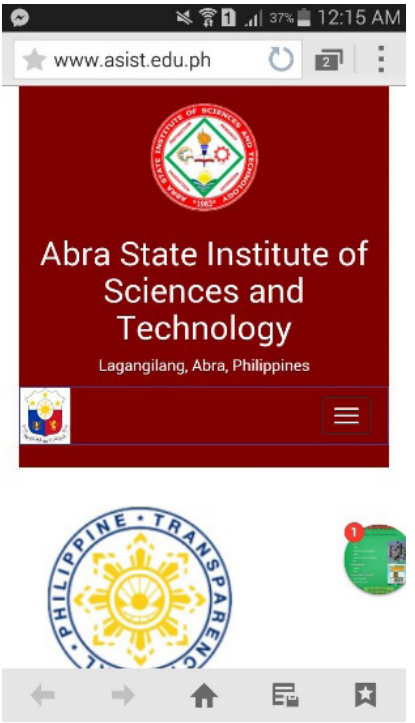

Figure 4. Website initial scale

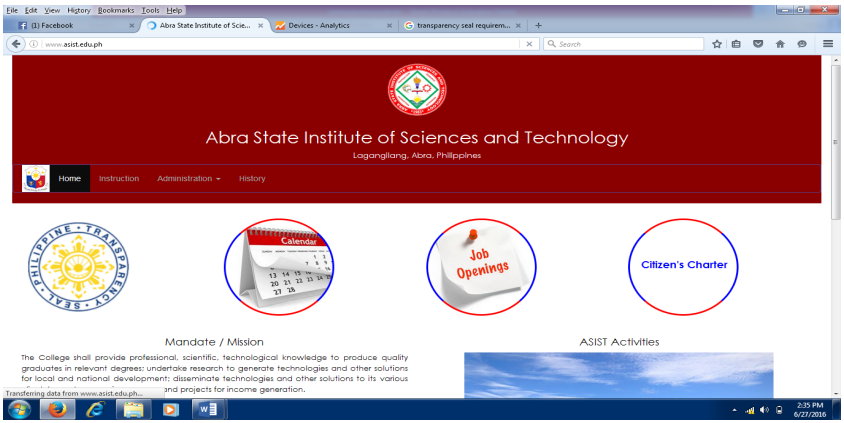

Figure 5. ASIST Website landing page in 11 inch Laptop screen.

To ensure that that website is searchable on the web, the website was optimized using the Google optimization engine. As a result, when one search by typing the keyword ASIST or Abra State Institute of Sciences and Technology, Google always show the school website in number one result. Thus, one can find the school website easily on the web.

The Second Phase is the incorporation of actual data into the webpage. The obtained Official copy of the submitted reports to the Inter-agency Taskforce from the respondents which were prepared in Portable Document Format (PDF), as prescribed, were included as attachments to the obligatory webpage links. Once the visitor clicked on the requirement, a link will open in new tab for preview as explicitly stated in the guidelines that there shall be no automatic downloading of files. Moreover, the developed responsive website was used by the Abra State Institute of Sciences and Technology to post public bids and Citizen's Charter.

The Transparency Seal of ASIST was rated by AO 25 compliant as manifested in its Management Accountability Report Card (MARC-2) as shown in Figure 5. The issuance of the Card to the Agency suggests that all necessary reports to be posted were all present.

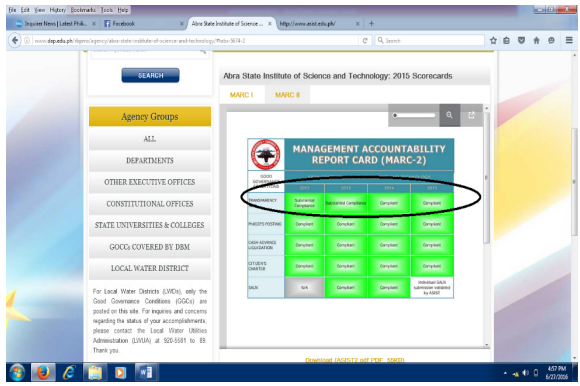

Figure 6. ASIST Management Accountability Report Card (MARC-2)

The application of Bootstrap framework in the school website ensures that the procurement plans, performance reports, and other relevant documents that detail the activities of the agency are easily accessed and viewed using mobile devices regardless of the mobile device viewing width.

The website traffic from January 2016 to June 2016

The website traffic started when a visitor entered the selected target Universal Resource Locator (URL) and the browser used by the user have established a connection with the server. The server finds the requested HTML file. If successful, the server ships back the file and close the connection. The browser, at the user end interprets the HTML command and displays the page content. According to Feit (2001), a session refers to the amount of time that two computers, a server, and a browser are connected. In the study, a session was used to measure the website traffic.

The following were the methods applied to determine the website traffic: a) Signed up to Google Analytics using Gmail account; and b) linked the school website address to Google Analytic (see Figure 7).

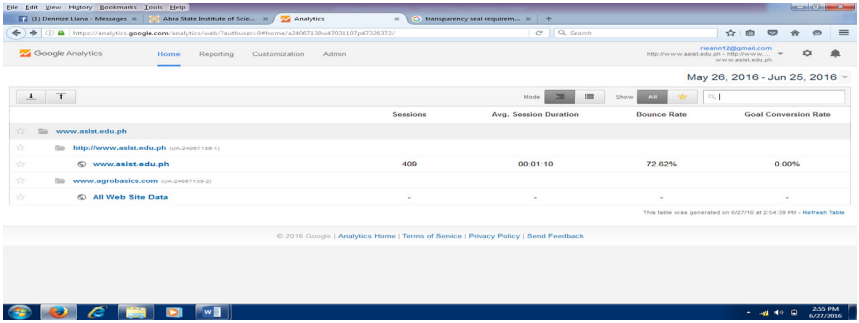

Figure 7. Google Analytics

Demographics by Country

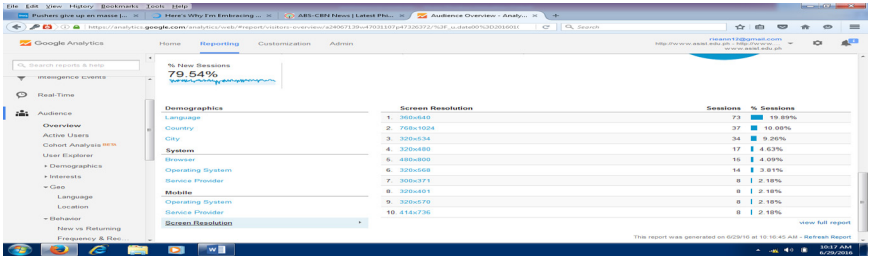

Figure 8. Visitors' Demographics Country

It can be seen in Figure 8 that the Philippines marked the highest number of sessions with 1,301 or 62.79% and Japan marked the lowest number of sessions with 15 or .72 percent. The finding implies that most of the visitors came from the Philippines.

Demographics by City

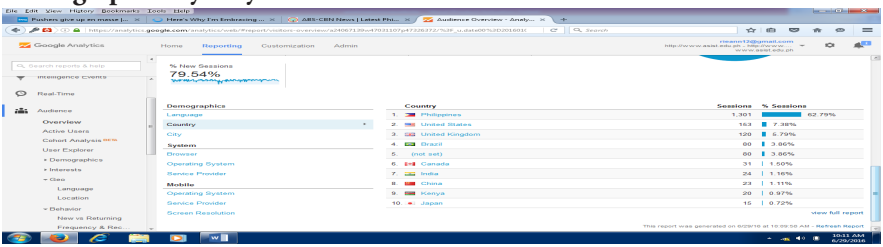

Figure 9. Visitors' Demographics City

Figure 8 shows that Quezon City marked the highest number of sessions with 493 or 23.79% and Bacoor marked the lowest number of sessions with 18 or .87%. This finding implies that most of the visitors came from Quezon City.

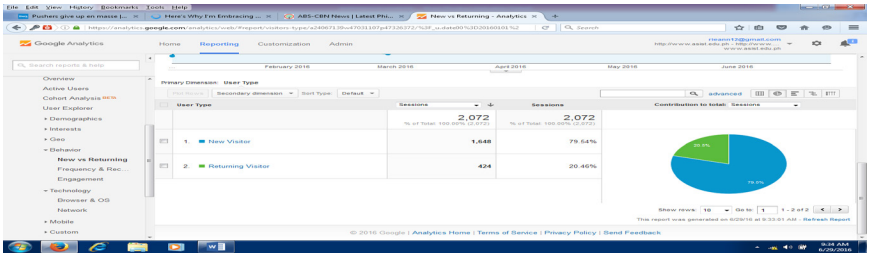

Figure 10. New and Returning

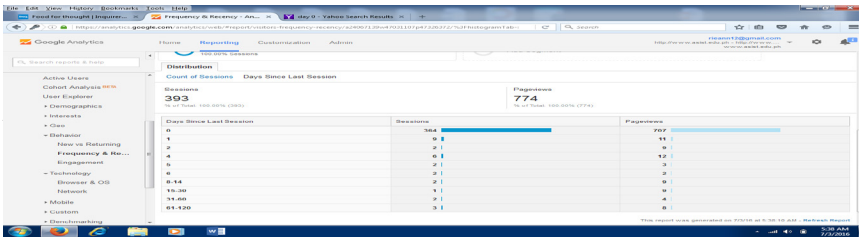

Figure 11. Frequency and Recency: Days Since Last Session

Day 0 is the first day of online publication. It can be seen in Figure 10 that Day 0 marked the highest number of sessions with 374 and Pageviews of 767 and Day 15-30 marked the lowest number of Sessions with 1 and Page views of 1. The finding suggests that most of the visitors visited the school website right after it was published online.

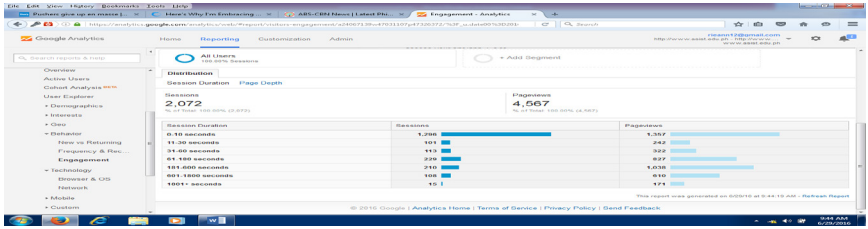

Figure 12. Engagement

Figure 12 shows the user engagements with 1,296 sessions and 1, 357 page views and 0-10 seconds session duration marked the shortest visit while 15

sessions and 171 page views with 1, 801+ Seconds marked the longest visit. The finding tells that most of the visitors spent very short time in visiting the site.

Technology

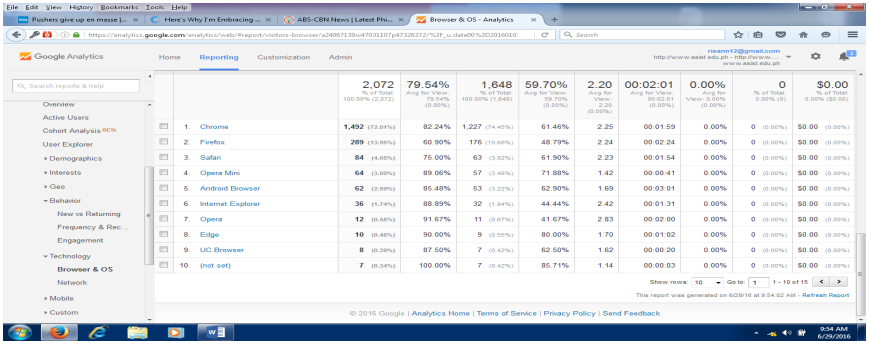

Figure 13. Browser and Operating System

It can be seen in Figure 13 that there are 10 different Browsers and Operating System used by visitors. Chrome marked the highest number of users with 1, 492 and 7 not set or unknown marked the lowest. The finding suggests that most of the visitors used Chrome browser.

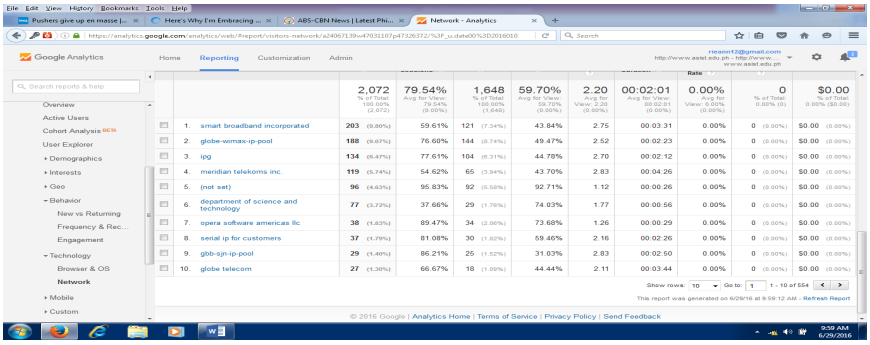

Figure 14. Network

Figure 14 shows the network used by the visitors to access the school website. Smart broadband incorporated marked the highest with 203 users and globe telecom marked the lowest with 27 users. The finding suggests that most of the visitors were Smart Broadband Incorporated subscribers.

Mobile

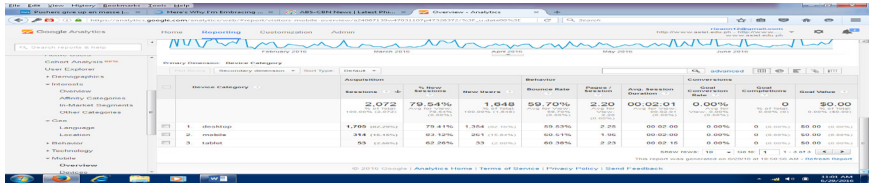

Figure 15. Device Category

Figure 15 shows the device category used by the visitors. Desktop marked the highest number with 1,705 or 82.29% users and tablet marked the lowest with 53 or 2.56%users. The finding proposes that most of the users used desktop to visit the website. However, it is also worth noting that aside from the traditional medium, substantial number of visitors used mobile devices.

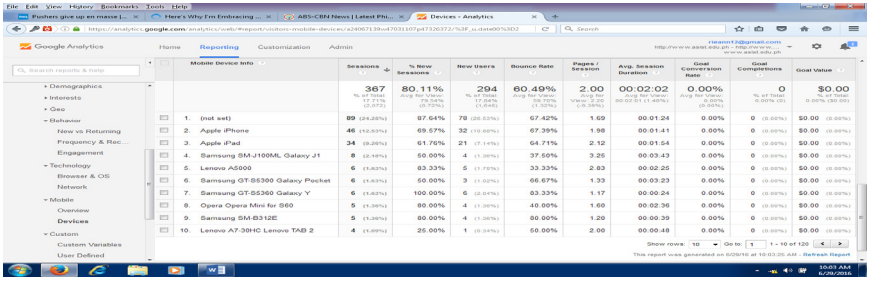

Figure 16. Mobile Devices

Figure 16 displays the mobile devices. It can be seen from Figure 14 that 89 visitors marked the highest who used not set or unknown devices and 4 visitors marked the lowest who used Lenovo A7-30HC Lenovo TAB 2. The finding tells that most of the users used unknown or not branded devices in visiting the website.

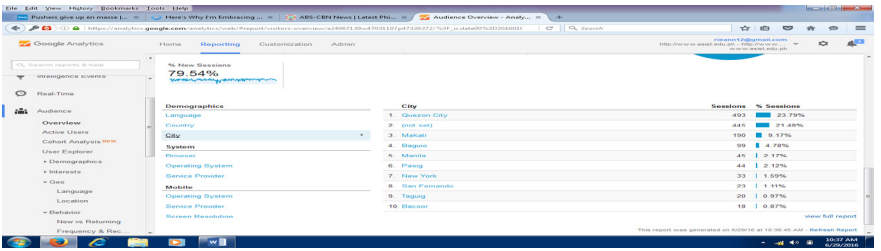

Figure 17. Screen Resolution

It can be gleaned from Figure 17 that 360x640 screen resolution marked the highest number of sessions with 73 or 19.89% and 300x371, 320x401, 320x570, 414x736 screen resolutions marked the lowest number of sessions with 8 or 2.18%. This means that visitors used different screen sizes to visit the website. The finding implies that user browsing behavior, technology and mobile preference can be tracked and analyzed. Web developers can monitor the state of the website traffic and have clear indicators that websites be developed in such a way that it can be accessed using any browser, cross flat form and viewable using any viewing width.

Google Analytics is a perfect tool for generating a complete picture of the website traffic. It is tool for Website Administrators that can be used to monitor website traffic for it provides data not only on the visitors' sessions but also to the devices used. Likewise, it can provide indicators on how to design Web page Graphical User Interface appropriate to users who prefers different screen resolutions.

CONCLUSIONS

The Transparency Seal provides an avenue for the school to divulge to the public financial statement of the school. Likewise, an opportunity to let the stakeholders know the procedures when availing its services even when they are yet to visit the school using their internet enabled devices. ICTs, social media, and collaborative e-government are interrelated in facilitating transparency and using ICTs can identify and stems out corrupt behavior (Bertot, Jaeger, & Grimes, 2010).

Developing a sleek, intuitive, and responsive website can be quickly done using a framework. Developers do not have to worry about memorizing long

lines of code as online tutorials of Bootstrap framework is clearly written and available on many websites. Bootstrap can be seamlessly combined with a custom built Cascading Style Sheets. Since the website developed was responsive, mobile users can always visit the school website without hassle as the webpages of the Transparency Seal can adjust fittingly to the width of their devices. Yet, a responsive website is just a part of the whole, a very good website is achievable only by using a model like the Enidus model, for it provides a clear perspective regarding the website development life cycle.

The very little number of ASIST website visitors, many of them used mobile devices is indicative of a light volume of traffic which can be attributed to the low level of awareness of its existence or a low interest of the people of Abra or to read the content of the Transparency Seal.

TRANSLATIONAL RESEARCH

The outcome of the study had been translated into school website of ASIST with the address www.asist.edu.ph and was used by the school to publish school documents necessary for Transparency Seal and compliance to the directives of Philippine Government Electronic Procurement System (PhilGEPS) to publish Biddings and Civil Service Commission (CSC) to let the stakeholders know about the School's procedures for front-line services. The translation of the study results was made possible by the Abra State Institute of Sciences and Technology, Lagangilang, Campus.

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