Survnvote: A Free Web Based Audience Response System to Support Interactivity in the Classroom

Teddy Mantoro[1], Media A. Ayu[2], Emir Habul, Ana U. Khasanah,
INTEG Research Group, Kulliyyah of Information and Communication Technology
International Islamic University Malaysia, Kuala Lumpur, Malaysia
[1]teddy@kict.iiu.edu.my, [2]media@kict.iiu.edu.my

Abstract— Survnvote is a free Audience Response System (ARS) for surveys and voting using the web, sms and mobile devices (PDA or smart phone). This paper proposed some improved features of a web-based ARS which replace the clicker with mobile phone and use the web instead of specialist software and infrastructure. Survnvote solved the main problem of traditional ARS which is high cost and need to physically install the receivers in the room. This system offers a more user friendly approach and improved features, e.g. the introduction of crowd management, Survnvote panel that is easy to use, crowd group voting, and several ways to participate in voting. This system gives a better result representation by providing several data formats such as graph, PowerPoint, Excel. Survnvote also provides data analysis to the user. ARS users will experience valuable services by utilizing this system to support interactivity in their classrooms, seminars and conferences. A test-case of the use of this system in a lecture class is provided in this paper.

Keywords—audience response system; web-based survey; open source system; classroom interactivity.

I. INTRODUCTION

Electronic Audience Response System (ARS) has been around since midst nineties [1]. It has been used in the classroom setting to engage students for improving the active learning environment. Using ARS, students are able to respond to the question made by lecturer and get immediate feedback and result. The type of questions asked usually a multiple choice question, seeking correct answer for a problem, or open ended question with simple text message.

Mostly, ARS uses clickers and requires specialist infrastructure and software. Some thought that this system is considered expensive to be provided, needs time to set the system, increase the stress of the audience if there is failure and it takes time to make audience familiar with the clicker [2,3,4]. Others believe that although clickers are expensive and require a good maintenance, it gives the anonymous type of response and make respondent more likely to participate and give honest response to the question posed [5,6,7,8]. However, still these benefits did not make ARS widely adopted in education environment. Some still find it is

inconvenience to use, since they need to do the set up and other technicalities [2,3].

Votapedia [7] is the first web-based ARS developed to overcome and minimize the difficulties of implementing ARS in the classroom which replaces the clicker with mobile phone and use the web instead of specialist software and infrastructure that needs to be installed. Votapedia system is an open source system, free of charge and it has been used by many users, especially the ones in the educational environment. However, the system is still not yet perfect. There are many rooms for improvement in Votapedia. One of them is the user-friendliness of the interface design for survey creation by the user. In terms of flexibility and usability, the user is unable to reuse the same survey, there is no user configuration in the survey setting to guaranty one man one vote.

Survnvote has been built as an extension to Votapedia system with a better approach to provide a better ARS service to the users which use a wiki based application. We identify five contributions in this study. First, the weakness in user-friendliness interface has been looked after in this study so that user can use the panel without knowing the wiki syntax. Second, Survnvote introduces a new concept of crowd group synchronization to make a respondent only can use one way, either phone, web or sms, to cast her/his vote in the participated survey. It promotes the principle of one-man-one-vote which makes Survnvote able to provide more accurate and reliable service.

Third, Survnvote give flexibility to create survey by providing more types of questions, handles mathematical equations and graphics. Fourth, the presentation of results in Survnvote give more options in displaying the data ranging from the statistics, raw data, and various types of graphs which have background that can be customized. Lastly, in order to bring the result on public presentation, the progress of the survey is able to be seen on PowerPoint slide using LiveWeb enabled plug in. Lastly, the results are also made available in .cvs and .xls extensions to make the documentation and interpretation of the data easier.

This paper describes the development and the use of Survnvote. Section 2 discusses the design specifications of the Survnvote followed by Section 3 which presents an overview, including services provided and how to use

them, which covers a brief description about the improved features provided in Survnvote system. Section 4 shows an example on how the improvement made the system performs better in providing service to the user is also provided. The paper closed by a brief conclusion in Section 5.

II. SURVNVOTE DESIGN SPECIFICATIONS

Survnvote is a further development of Votapedia which is developed by Intelligent Environment Research Group (INTEG) KICT-IIUM. The service is available on the Survnvote website (http://www.survnvote.net/). Until this stage, the system is available for web-based and SMS survey, the phone line voting is still under development, since currently the VOIP phone line in Malaysia still under our investigation to be integrated in Survnvote.

Survnvote was developed using client-server approach. The server was designed to receive vote or survey data from phone lines, SMS and the internet, and at the same time to deliver survey result through the web by using several open source applications (Figure 1). The server requirements are as follows:

1. A server which connect to the internet has Survnvote application installed.
2. A mobile phone is connected to the server, to be used by Gammu smsd to receive and send sms.
3. An asterisk server is connected to 100 digital phone lines and it connects between Asterisk server, Survnvote server and campus PABX (on progress).
4. When a web server, using apache server, is running, the survnvote application is also running by utilizing several programs including Mediawiki and a plug-in Mobileskin, PHP and MySQL.
5. The survnvote server will be online and in listening mode, waiting to respond to a user request.
6. When there is a response from the participant, the server will collect the data and show immediate output in form of graphics based on current user participation.
7. When the survey has finished, the survnvote server will calculate the statistical report, preparing the csv or xls files to be exported, and record the survey.
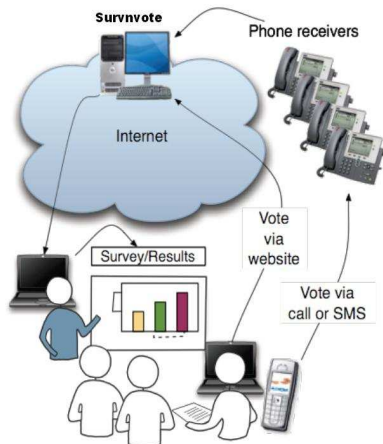

Fig.1 : Survnvote General Architecture

As for the client, it was designed by implementing several open source applications and has the following requirements (Figure 1):

1. the survey creator will log-in to Survnvote web and bring up his survey.
2. The survey will be active in front of audiences, showing the questionnaire or quiz including 3 modes of participation, i.e. through mobile phones, sms and web.
3. The participants can use their mobile phones, by sms or dial, based on their selection, or they can browse from their mobile phone and select their answer.
4. The participant can use any regular PC that is connected to the internet for selection using web based only.
5. It is also possible for the participant to use their regular hand set if they know the number that they are going to select (This is usually for long time surveys and the participants are spread out in different geological locations).
6. The survey can be closed in two ways: stopped by survey creator or by time setting.
7. During the survey, the survey creator can add more time on the fly.
8. After the survey is stopped, the creator can continue the survey.
9. The creator can re-run the same survey several times for different audiences without any need to worry that the previous survey will be missing. He/she can compare the results at the end of the survey.

III. SURVNVOTE: AN OVERVIEW

Survnvote has several main functions to allow the user to use the 4 (four) key features of the application i.e. creating a survey, running a survey, data representation, and user registration process. The following sections describe the key features and services provided in Survnvote.
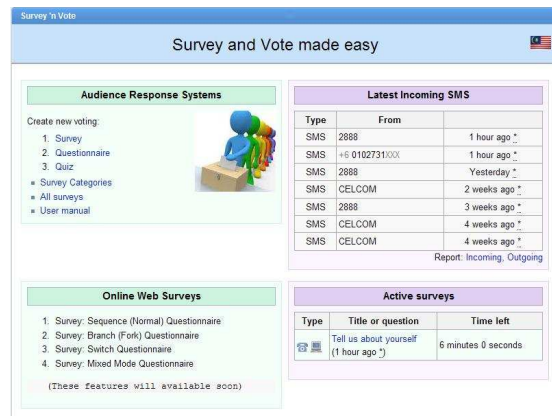

Fig.2. The front page of Survnvote

A. Creating a survey

There are three types of survey offered by Survnvote as shown in Figure 2. The first type is a simple survey which can create only one question with the answers.

Second is questionnaire which user can create many questions and options. And lastly the quiz type which has the same feature with the Questionnaire but the user can specify the correct answer before the survey is started and give a point (mark) for the correct respond. In all of the create survey page, there are three tabs which are New Survey, Voting Options, and Display Setting.

New Survey tab is to create new survey. This function built to handle more survey under the same title. Survnvote gives a chance to create the same survey several times, and record the previous result neatly. The questions will be numbered automatically and the options can be adjusted, e.g. move the third option to be the first option and vice versa is possible (Figure 3). This survey creation interface is very user friendly and easy to use. The creator is not required to understand wiki syntax to edit his/her survey.
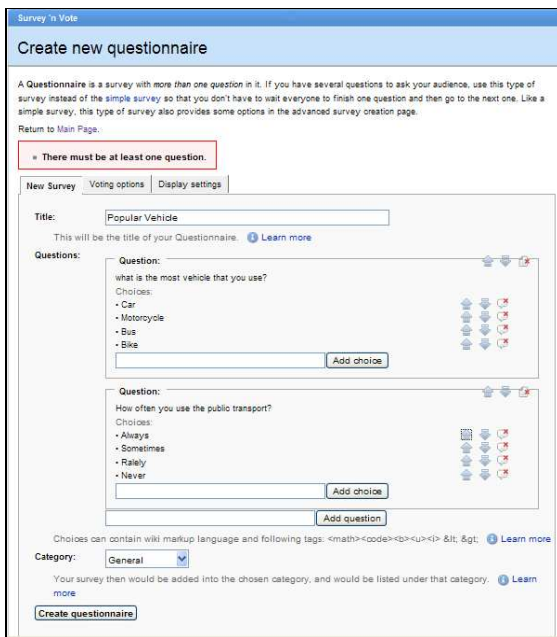

Fig.3. New Survey tab to create new questionnaire on the Survnvote website

The voting option tab gives the lecturer an advance voting option (please refer to Figure 4). The survey privacy can make the survey is limited to a particular group called crowd or a public survey that everybody can participate on the survey. For the crowd member, they need to be registered and login to Survnvote website. This feature helps the lecturer to conduct the same survey for different classes and repeat it again as needed. The duration of the survey can be changed, maximum 5 hours for phone line based and 5 days for the web based survey.

Interestingly, Survnvote can limit the way respondents give the vote. The lecturer (creator of the survey) has the options to enable or disable the phone voting and web voting. This is an example of the flexibility of the Survnvote that allows users of the system to personalize their settings to their preference. The phone line voting has several limitation. Once the creator enables the

Phone Voting, the amount of questions and the options will be limited. It is because the phone lines that are available need to be shared with other active survey(s). When a creator opts to have the caller ID to be enabled, he/she will be able to have the information on who the respondents of the survey are. From outside Malaysia, it is recommended to use the unidentified voters since most of caller ID from other countries cannot be recognized.
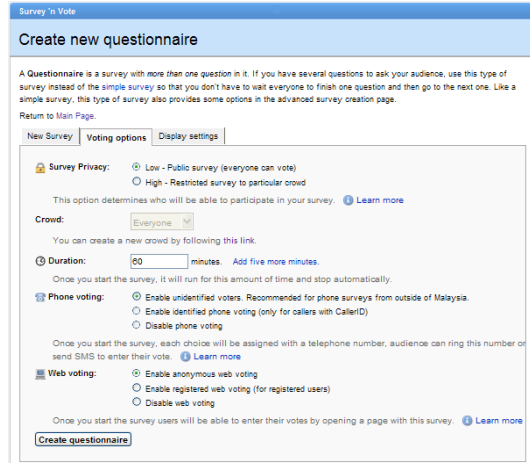

Fig.4. Voting options

For a web-based voting, the respondents can cast their vote by accessing the website. If the creator wants the respondent to be identified, the setting should be changed to "enabled registered web voting" so that the website can track the unique IP address of the respondent. In order to be able to identify the respondents, they need to log in to the website before participating in the survey.
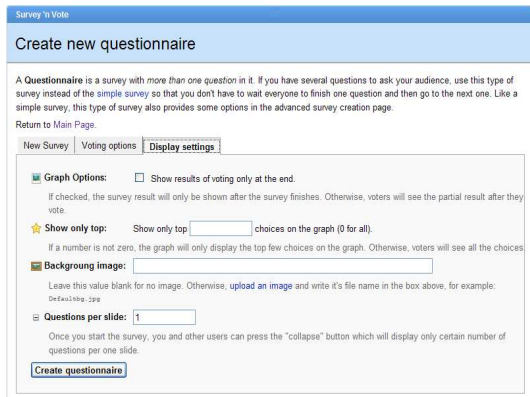

Fig.5. Display Setting

Survnvote display setting is very useful to produce the result of the survey and represent it in statistical and graphical display (Figure 5). The respondent can see the progress of each vote if the option is enabled. However, for the quiz type, the user can only see the results when the survey has finished. For the user satisfaction-like survey, Survnvote displays only the certain number of top result. For example, there are four brands of mobile phones and it only displays the two most popular brands. For the representation of the survey, the user can upload

the additional background. The final result of the survey will be presented on the PowerPoint and the number of questions on each slide can be specified on this option tab. It gives Survnvote powerful features in producing, conducting and representing the survey.

Survnvote system also caters surveys which need to display complex mathematical equations (Figure 5). Creator will need to use math tags to be able to display the correct mathematical formula. However, the user friendly interface provided in this system make the creation of this special display easy. Every time the user writes the script, the preview can be seen on the field which is provided below it.
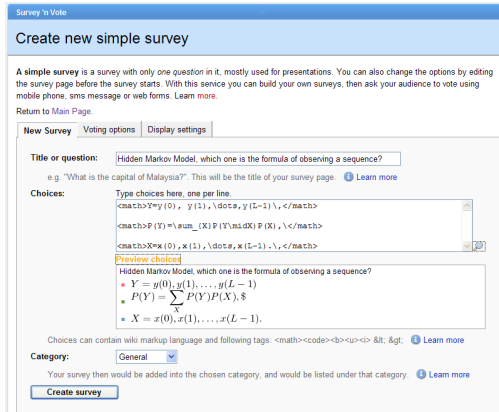

Fig. 6. The example of mathematical notations used in the survey.

B. Running a survey

A survey created in Survnvote can be run for many times. Thus, a lecturer can use a survey or a quiz that he/she created in different class sections that he/she teaches. The results from each running of the survey can be accessed easily by the creator. This makes the creator does not need to go back to the creation page every time he/she needs to edit because of the incorrect display of the formula.
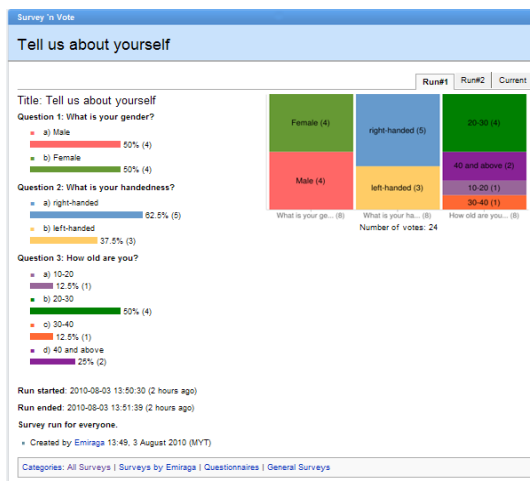

Fig.7. Survey page

Figure 7 shows that the survey already conducted twice, Run#1 and Run#2. The current survey is the newest survey that runs on the system. The representation of the result is not only by the colorful charts but also by giving the percentage of the final result. In "view detail" option Survnvote gives the complete representation of the data, not only for the whole result but also gives the detail of the individual question.
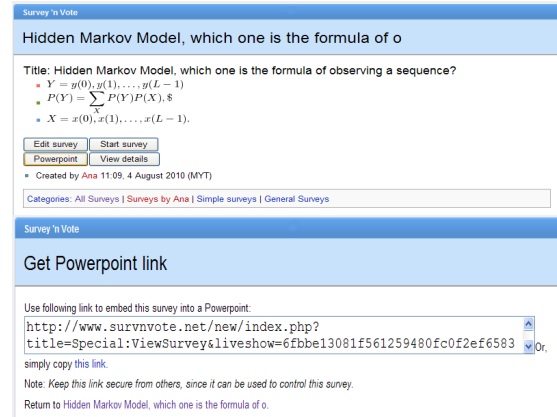

Fig.8. Embed the survey to PowerPoint

Another improved feature in Survnvote is enabling the creator to embed the survey that he/she has created to a PowerPoint presentation and control it from there (Figure 8). This feature makes the lecturer does not need to go back and forth from his/her PowerPoint slides to the survey web page.
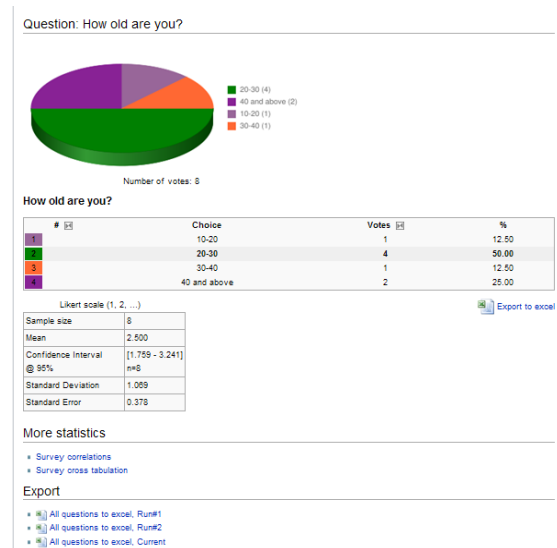

Fig.9. Result of individual question with different representation of data.

C. Data representation

There is various data representation provided by Survnvote. A comprehensive and informative data is presented during and/or after the survey finishes. The

graph is presented in the form of a pie chart and a bar chart. Statistical data analysis can also be made available in the system. Thus for each question, the final result will be provided as a pie graph, a standard statistical data, a correlation table and also a cross tabulation table (Figure 9,10,11). Answer data and whole data of the final result can be exported to Excel and PowerPoint by clicking on the option.
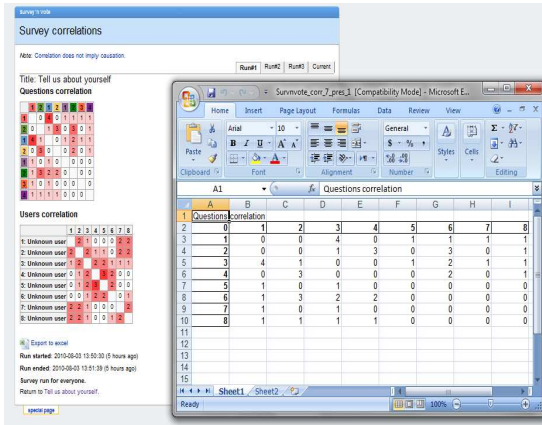

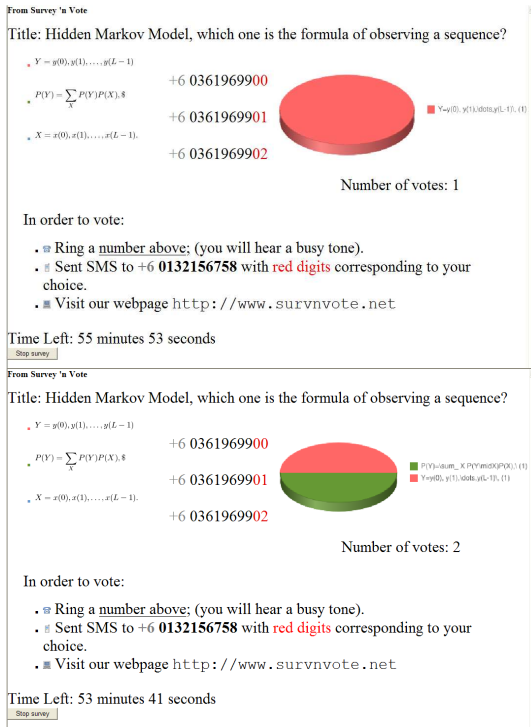**Fig.10.** More Statistic options which are stored in excel format.

Fig.11. The live survey updated on the PowerPoint slides

D. User registration process

To be a survey creator and a participant in certain survey, one should be registered as a user to the Survnvote system. There are three ways to register to this

system. When a respondent sends an SMS to answer a survey, the system will automatically create an account and send the SMS that contains username and password. By the time the respondent logins with the provided account, the phone number will be verified. This means that he/she now registered in the system with the details being synchronized.

For the web based registration, a user needs to create an account and register her/his phone number. The system will send the request code to the phone. To verify the phone number, the respondent needs to confirm the phone number by copying the code to the verification page (please refer to Fig.12). Upon doing this, the user will then be registered in the system.
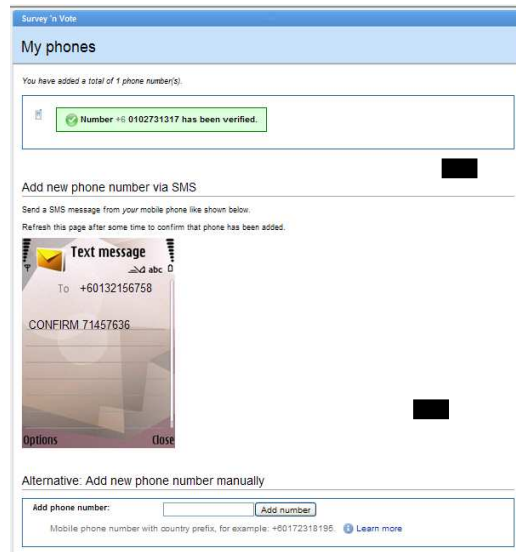

Fig.12. The verification of phone number

IV. AN EXAMPLE OF USAGE

This section provides a sample scenario of the usage of the Survnvote system in a lab-classroom setting. Using Survnvote a lecturer can pose questions in the class to get immediate feedback from the students. The questions can be a kind of question that will test students' level of understanding about the topic that just delivered. This type of question will make the lecturer aware of how the students' acceptance is in regard to the materials that he/she has just explained in the class.

The Survnvote system has been used in the Network Programming class in Department of Computer Science, KICT, IIUM. After about 50 minutes of explaining in the class about I/O Multiplexing, the lecturer then pause for a while to pose questions to the students to get their level of understanding about the topic delivered. Students are asked to go to the URL of the questions and submit their answers. In about a minute after that, the whole class have submitted their responses, and the lecturer then finish the 'survey' and get the results.

The result in Figure 13 shows that the students have not grabbed the concept of the basic of I/O models, as 50% of

them gave the correct answer, while the other 50% went to the incorrect answer. Based on this result, the lecturer can respond by re-explaining the I/O concept to increase the understanding of the students, straight after the survey.
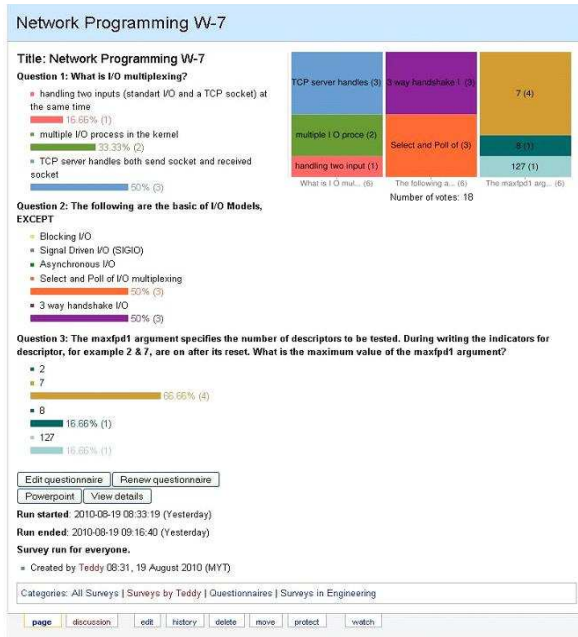

Fig.13. The Network Programming questions posed during the lecture

V. CONCLUSION

This paper proposed some improved features of a web-based ARS which replaces the clicker with mobile phone and use the web instead of specialist software and infrastructure. Survnvote solved the main problem of traditional ARS which is high cost and need to physically install the receivers in the room. This system offers a more user friendly approach and improved features, e.g. the introduction of crowd management, Survnvote panel that easy to use, crowd group voting, and several ways to participate the vote.

Survnvote provides simple survey (single questionnaire), questionnaire (multiple questionnaires) and quiz (surveyor gives answer before the survey is started). When it's used in the education environment, such as in a class-room, Survnvote can be used to evaluate students' understanding during a lecture by posing question(s) to the students and the lecturer can get immediate feedback and results. Students can vote using their mobile phone without any charge.

Survnvote provides the users with an audience response system service and a web based survey application. Survnvote allowed a survey creator to be able to create their own survey questions and the respondent can participate in the survey using internet. Also a survey creator can create questions for getting instant responses from her/his audience, e.g. a lecturer can get an instant response from her/his students regarding the question(s) he/she posed in the classroom.

In the class setting, Survnvote can be used to increase the understanding of student during learning process in the class.

REFERENCES

[1] Poulis, J., Massen, C., Robens, E., Gilbert, M., "Physics lecturing with audience paced feedback", American Journal of Physics, vol.66, issue 5, pp.439-441, 1998.

[2] Silliman, S.E. and McWilliams, L., "Observations on Benefits/Limitations of an Audience Response System", Proceeding of the 2004 American Society for Engineering Education Annual Conference & exposition, 2004.

[3] Freeman, M., Bell, A., Comerton-Forde, C., Pickering, J. and Blayney, P., "Factors affecting educational innovation with in class electronic response systems", Australasian Journal of Educational Technology, 23(2), 149-170, 2007.

[4] Fies, C. and Marshall, J., "The C3 framework: evaluating classroom response system interactions in University classrooms", Journal of Science Education and Technology, 17(5), 483-499, 2008.

[5] Uhari, M., Renko, M., Soini, H., "Experiences of using an interactive audience response system in lectures", BMC Medical Education, vol.3, 2003.

[6] Guthrie, R. W. and Carlin, A., "Waking the Dead: Using Interactive Technology to Engage Passive Listeners in the Classroom", Proceedings of the Tenth Americas Conference on Information Systems, 2004.

[7] Ayu, M.A., Taylor, K., Mantoro, T., Active learning: Engaging Students in the Classroom Using Mobile Phones, Proceedings of ISIEA 2009, Kuala Lumpur, Malaysia, 2009.

[8] Maier, H.R., Student participation in lectures using mobile phones, Proceedings of the 20th Annual Conference of the Australasian Association for Engineering Education, Adelaide, Australia, 2009.