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Development of Digital Diary for Enhanced Parental School Involvement in Tanzania

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ABSTRACT

The study examined the use of digital diary as a tool for enhancing parental school involvement in Tanzania. The development of the digital diary followed eXtreme Programming agile method where 87 parents and 6 teachers from St. Florence school were involved. Parents and teachers were given six months to use the tool before testing for its effectiveness using data from 7 teachers and 156 parents through semi-structured interviews and questionnaires respectively. The study found that the majority of respondents (84.4% of parents and 96.7% of teachers) indicated that the digital diary was useful tool as enabled them to track children's progress via their smartphones. Moreover, computer generated reports showed that messages to/from parents were delivered with approximately 90% success rate. This research argues for schools to adopt and use digital diaries for easy, engaging, and effective for better parental school involvement.

Keywords

Digital diary; parents; teachers; schools; parental involvement

INTRODUCTION

Parents and teachers are the main educators in majority of children's academic life (Karibayeva & Bogar, 2014). A good relationship between them is a key to the success of children academic achievements. Studies have shown that children academic performance and social competence are positively influenced by parental involvement in children school related activities (Ho, Hung, & Chen, 2013). Moreover, those children tend to have fewer behavioral problems (Child-Trends, 2013; Galindo & Sheldon, 2012; Henderson & Mapp, 2002; Olmstead, 2013), and better language skills (Hill & Taylor, 2004).

Given these advantages, many schools in Tanzania have been organizing parent meetings, talking with parents on the phone, and visiting parents' homes as strategies to enhance parental school involvement.

Moreover, some schools have been sending bulletins, letters, and paper-based diaries with information such as test results, announcements, and children behavior. Despite these efforts, many parental involvements have continued to be low. A report by TWaweza of 2012 conducted in 20 schools with 222 children in Dar es Salaam found that, 56% of parents were neither helping children in doing homework nor attending parent meetings (TWaweza, 2012). This lack of parental involvement has been due to work commitments (Karibayeva & Boğar, 2014), busy schedules, and lack of time to establish effective school–parent relationships (Bauch, 1998).

Despite these challenges, many schools have continued to adopt and use paper based diaries as a solution to parental involvement. Teachers write issues in the diaries and expect parents to comment or work on issues raised in the diaries. However, one of the main weakness of paper-based diaries is that they rarely reach parents on time. Even those reaching home on time, parents may not read them if they are not at home (Karibayeva & Bogar, 2014). Therefore, lack of effective parental involvement has continued to be a significant problem.

The emergence of computers and proliferation of mobile telephony which have been accessible to the majority of parents and teachers makes feasible to be used as a means of enhancing parental involvement. The cost of mobile devices has dropped to as low as US\$ 30 and are affordable to the majority of Tanzanians (Mtebe & Kondoro, 2016). Moreover, nearly 20 millions of Tanzanians have access to the Internet accounting for 40% of the total population (TCRA, 2017). Therefore, it is inevitable that parental involvement should change in response to these developments. So far however, relatively few schools have been utilizing the potential of ICT to facilitate parental involvement. In this study, the use digital diary as a tool for enhancing parental involvement in children academic life was examined. More specifically, this study aimed to:

- i. Establish requirements for developing a digital diary.
- ii. Use the developed requirements to design and develop digital diary
- iii. Evaluate the effectiveness and usefulness of the developed digital diary in enhancing parental school involvement.

The developed diary was piloted at St. Florence Academy Kinondoni district involving 7 teachers and 156 parents using both qualitative and quantitative research methods.

LITERATURE REVIEW

Studies have consistently shown that parental school involvement increases parents information which makes them better equipped to assist their children in their school-related activities (Hill & Taylor, 2004). Generally, there are two types of parental involvements: school-based involvement and home-based parental involvement (Pomerantz et al., 2007). The school-based parental involvement represents practices on the part of parents that require them to make actual contact with schools. The school-based parental involvement include attending school meetings, talking with teachers, attending school events, and volunteering at school (Epstein, 2001; Hill & Taylor, 2004; Hornby & Lafaele, 2011; Karibayeva & Bogar, 2014; Pomerantz et al., 2007; Porumbu & Necşoi, 2013). On the other hand, the home-based parental involvement include helping children with homework, course selection, and talking to children about academic related issues (Epstein, 2001; Pomerantz et al., 2007).

Studies have shown that there are a lot of barriers for parental school involvement. These barriers include parents' education, busy schedules, and lack of time and work commitments (Karibayeva &

Bogar, 2014). As such, many studies have been utilizing ICT to enhance parental involvement given the fact that many parents and children have access to computers and the Internet. For instance, many schools have been using websites as a means of promoting parental involvement. For instance, Holcomb, Castek, and Johnson (2007) found that more than 180 websites were developed in different countries to enable parental school involvement. The majority of these websites have features such as contact information, welcome message, teacher bio, syllabus, homework, calendar, links, classroom rules, and resource list.

Additionally, some information systems dedicated to provide a parental school involvement in various contexts have been developed. For instance, Khan et al. (2007) developed an Awareness System to support communication between parents and children at school. The system was installed in a classroom for two weeks and connected five families with their children. The findings indicated that the system was useful in enhancing parental school involvement. Similarly, Ozcinar and Ekizoglu (2013) developed a Blog-Based Parent Involvement Approach (BPJA) to secure parent involvement in education by strengthening school-parent communication. Through observation and interviews with parents, the study found that BPJA effectively supported parental school involvement.

Winkler (2016) investigated the feasibility of virtual parent-teacher conferences in facilitating parental school involvement in the middle school setting. Using a sample of 94 parents, the study found that time could be saved by using virtual conferencing with parents as a tool for facilitating parental school involvement. Similarly, Bauch (1998) developed a voice-mail messaging application that enabled parents and teachers to exchange messages asynchronously. The author found that the system increased information exchange between teachers and parents.

In Tanzania, few attempts have been made to use ICT to engage parents in school related activities. In review of literature, few schools have been found to use Class Dojo mobile application to facilitate parental involvement. These schools include International School of Tanganyika, International School of Zanzibar, Feza Primary School, and Kiwengwa Independent School. However, there are few teachers who are currently using the system due to its complexity. The majority of schools have less than 2 teachers involved per school (Chaudhary & Don, 2017). In this study, the use of digital diary was examined to enhance parental school involvement in their children's academic life.

METHODOLOGY

Development Process of the Digital Diary

The development of the digital diary followed agile software development methodology. The agile methodology has been increasingly adopted due to many problems associated with traditional software development methods. Traditional software development methods such as waterfall model requires a thorough analysis of the requirements and a detailed design before implementation (Xu & Rajlich, 2006) which tend to fail in keeping up with rapidly changing software requirements (Boehm, 2002). Consequently, the agile methods such as eXtreme Programming, Crystal methods, Lean Development, Scrum which concentrate only on the functions needed at first hand, delivering them fast, collecting feedback, and reacting to received information have been preferred (Abrahamsson, Salo, Ronkainen, & Warsta, 2002).

Amongst agile software development methods, eXtreme Programming (XP) is the most adopted method (Beck, 1999). XP emphasizes on the testing the software at the early stage in the development phases while keeping short development cycles with incremental design and planning (Sharma & Hasteer,

2016). Users are normally involved from the beginning of the development project to the completion of the final product.

Given these benefits, XP was adopted for the development of the digital diary where teachers and parents were involved from the development of user stories to the evaluation of the system. The development process involved five phases: Exploration, Planning, Iterations to Release, Productionizing, Maintenance and Death phase (See Figure 1). The exploration phase involved reviewing various digital diaries and existing class websites in order to develop initial system requirements. The paper based-diaries of various schools were also visited. The features of the proposed were then identified and listed.

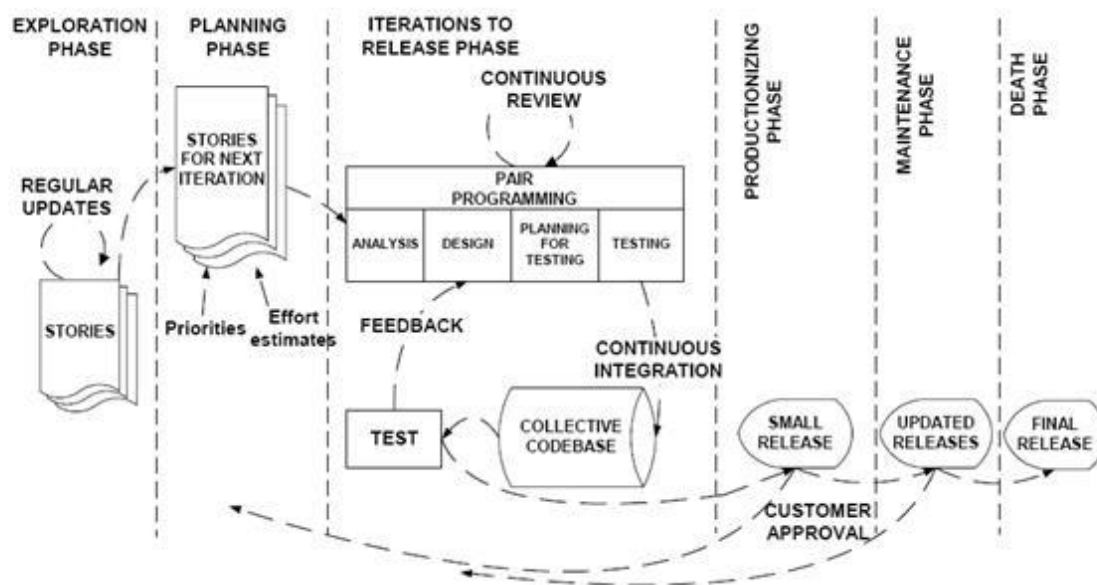


Figure 1. Phases of XP process (Abrahamsson et al., 2002)

In the planning phase, a questionnaire consisted of proposed features obtained from examining class websites, and paper-based diary was prepared. The questionnaire was sent to 160 parents where 87 (54.4%) of them were able to complete the questionnaire. As shown in Figure 2, all proposed features received more than 50% ratings, and therefore they were included in the proposed system.

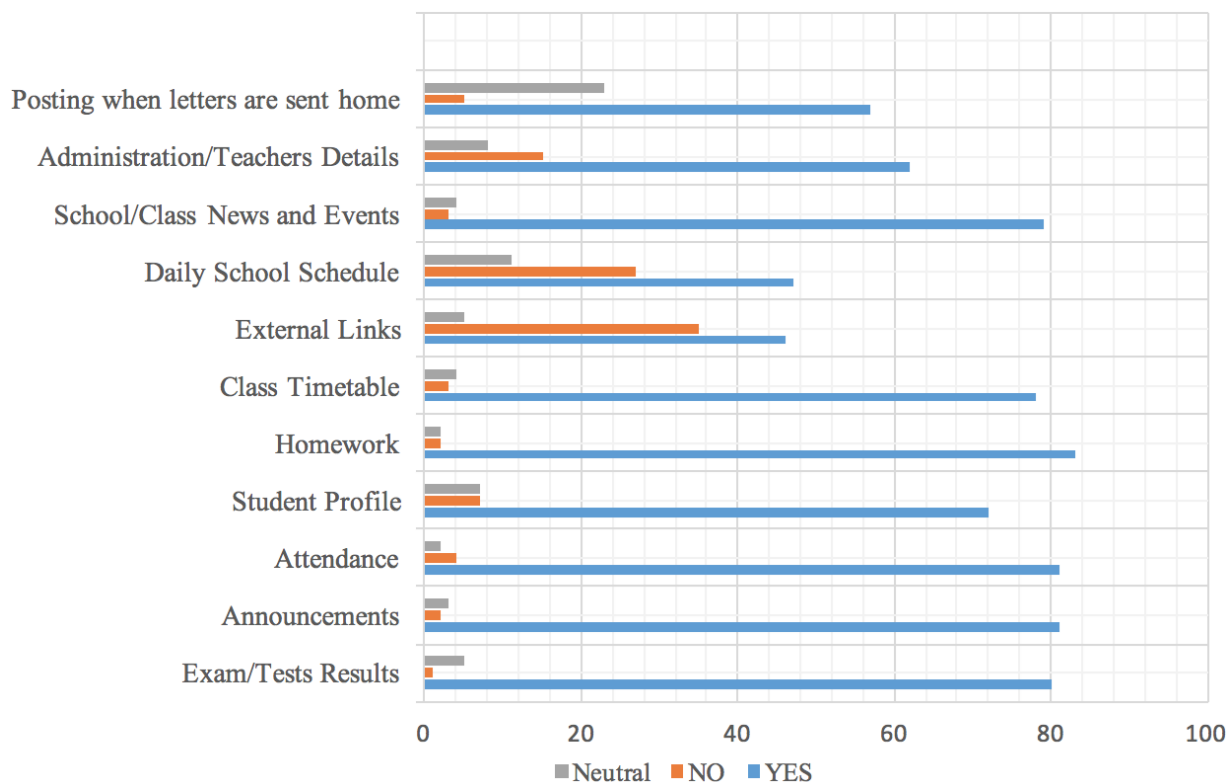


Figure 2. Proposed features of the digital diary

The team of developers then set with teachers to develop user stories of each proposed feature. Teachers were asked to prioritize which feature they would like to be developed first. The Iterations to release phase involved the development of the system based on developed user stories. The development process followed pair programming where two programmers were involved in each of the user story. The first programmer was writing the code while the second programmer was reading and testing the code to check for bugs and evaluating the system if it meets requirements per user stories document.

Each developed feature was subjected to extra testing and checking of its performance before being released to teachers and parents for testing. During testing, teachers and parents proposed new requirements for some user stories whereas developers later incorporated. The features were again brought to teachers and parents for testing. If there were no new requirements, the feature was perceived to be complete. Iterations continued until all requirements of teachers and parents were met per each feature of the digital diary. The development of the new diary took 6 months from the time user stories were developed.

Once teachers and parents had no more requirements for each proposed feature of the system, then the system was at death phase. The developed system was then uploaded from the local repository together with a signature key needed to create the final android binary. The final release APK (Android Application Package) file was then generated. Finally, the digital diary was uploaded to the Google Play Store in order to be accessible to teachers and parents. A user would simply download the application enter their credentials and automatically connect to the digital diary without the need to configure anything else. Figure 3 shows the interface of digital diary in the Google Play.

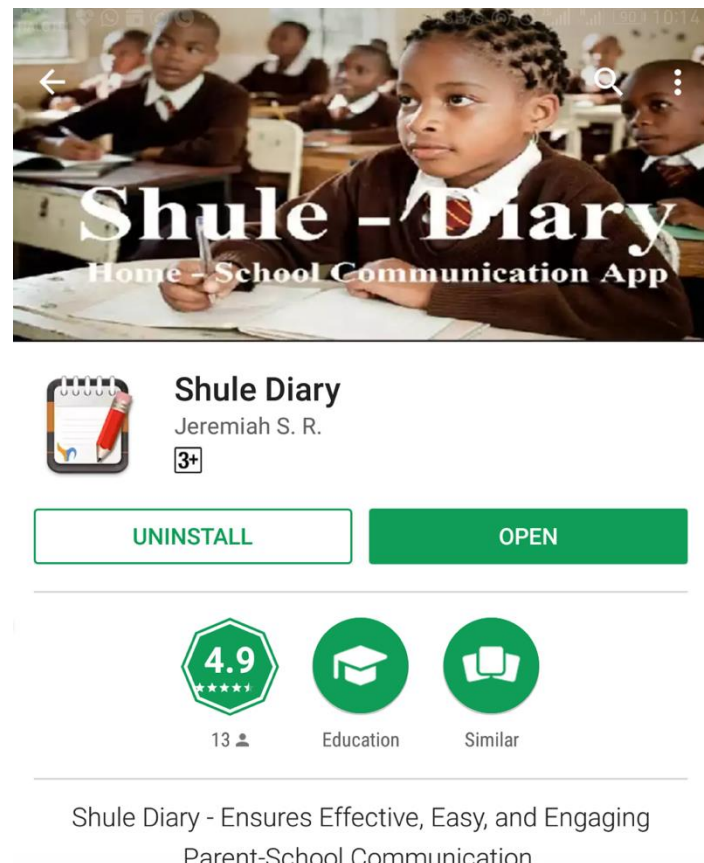


Figure 3. The interface of digital diary in the Google Play.

Once user login, they will find the following screen (Figure 4) indicating various features of the system.

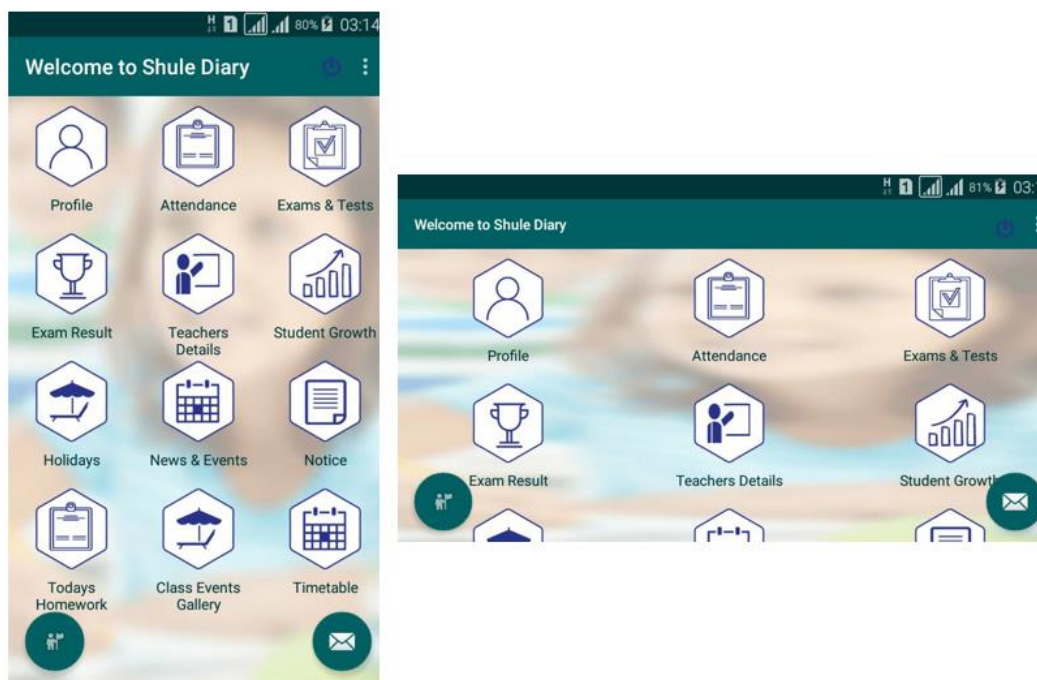


Figure 4. Home Screen in All Orientations with Scrolling in Landscape.

The next section explains how the system was tested for its usefulness and effectiveness after users were given the system to use for a period of six months.

Research Design

The research employed both qualitative and quantitative research designs. The quantitative design was used to obtain data from parents and teachers through questionnaires and system generated reports. System generated reports constituted to quantitative data that would measure the effectiveness of the digital diary in accomplishing what it was intended to do. The qualitative research design involved semi-structured interviews to elicit teachers' opinion on the usefulness and effectiveness of the developed digital diary.

Study area

The pilot study was conducted at St. Florence Academy in Kindononi, Dar es Salaam Tanzania. The choice of this school was based on the fact that, it has already been using paper-based diary for Grade I-VI for almost 5 years. Moreover, the school has computers connected to a good Internet connection.

Population

The studied population was sampled on convenience basis. Teachers who participated in the study were from 3 sixth grade streams and 3 fifth grade streams (1 class teacher for each stream) whereas the parents involved were those whose children were selected for the study (i.e. grade V & VI).

The invitation letter was sent to 156 parents requested to fill in the questionnaire after using the system for six months. Out of these parents, 52.5% of them completed the questionnaire. The background information indicated that 50% of parents were mothers, 25.6% were fathers, 2.4% were guardians, and

21.9% were both parents (father & mother). In addition, 7 teachers were interviewed to elicit their opinion on the usefulness of the developed digital diary. The data collection process was conducted between July 2017 to September 2017.

Data Analysis

Data cleaning and entry was a continuous process undertaken daily in the course of data collection. This was to ensure quality and reliability of data. Quantitative data collected from questionnaires and system generated reports were imported to excel spreadsheet and SPSS for analysis. It was then cleaned to take care of inconsistencies and errors, which may have occurred during coding and entry. Analysis was undertaken by computing the necessary statistics such as means, frequencies, and percentages and in some cases cross-tabulations. These were then presented in descriptive formats such as graphs and narrations. The analysis of the interviews was done through reading and reviewing each interview transcript several times for the purpose of content understanding and identification of useful comments and analyze them. From the common responses, themes within the responses were identified, then the results were interpreted and explanation was made to provide the meaning of the interview results. This was presented through inferential narratives and anecdotal quotes.

Parents' Education Level and Age group

The current study found that the majority of parents had bachelor degree (70%) while few of them had doctoral degree and certificate of secondary education contributing to 5% each. It was also found that 9.2% of teachers had diplomas and 10.8% had master degrees from various institutions within and outside the country. In terms of age groups, the results showed that the majority of parents who participated in the study were aged between 30 and 39 years amounting to 44.1% followed by those who were aged between 40 and 49 years amounting to 22.6%. Very few participants (1.1%) were aged below 24 years.

FINDINGS

Level of Difficulty of the Digital Diary

According to Davis (1989), the system usage is likely to increase when people believe that using the system would be free from effort. In fact, if users perceive the systems is difficult to use they tend to spend more time learning how to use it rather than using (Lanzilotti, Ardito, Costabile, & Angeli, 2006). Therefore, it was necessary to collect feedback from parents on how they perceived the application in terms of level of difficulty. Parents were asked to rate the levels of difficulty of the digital diary on 5-Point Likert scale [1=Very Difficult: 2=Difficult: 3=Neutral: 4=Easy: 5=Very Easy]. Overall, the majority of parents (97.3%) indicated that the digital diary was easy to use while few parents (1.9%) indicated that the diary was difficult to use (Figure 5).

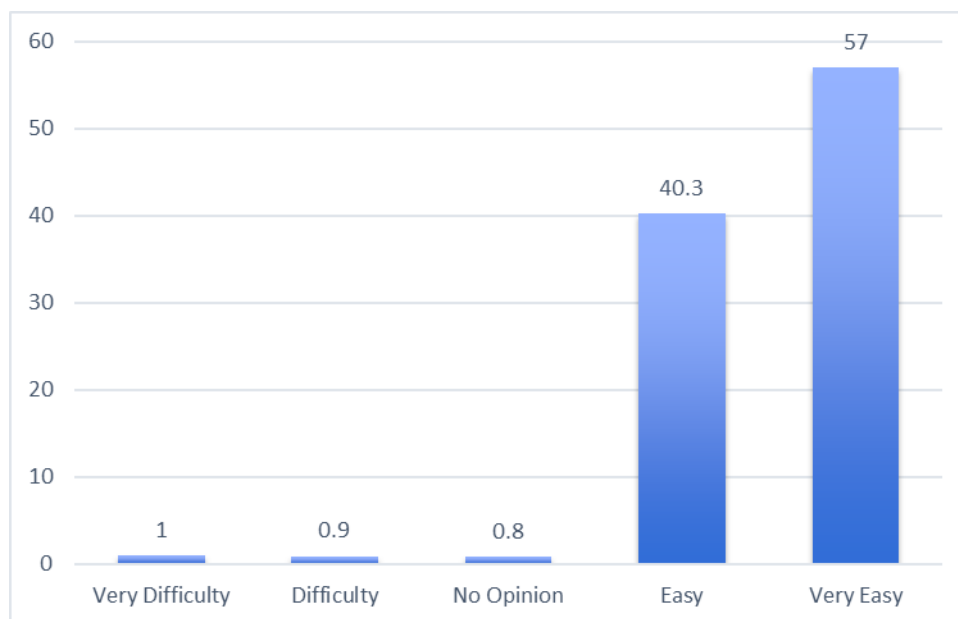


Figure 5. Levels of Teachers perceived Ease of Use of the Digital Diary

Digital Diary Usage

System usage has been described as one of the indicator of the success of the system at a given context (DeLone & McLean, 2003). Therefore, eliciting how users use the system will give us an indicator if the system is going to be successful or not. Through viewing data log in the system, it was revealed that 78% of parents used the system during six months of piloting. A detailed analysis revealed that, 39% of them used the diary several times per day while 34% used it twice per day. The study also found that 5% of parents used once per day while 1% of parents used it once per week. Interestingly, the system log showed that 21% of parents did not use the digital diary.

Perceived Increased Level of Involvement

The study also elicited parents' perception on how the digital diary enabled them to get involved with children school related activities. In this case, parents who used the system at least once were asked to respond to this question. It was revealed that 25% of parents rated the digital diary as it helped them to have very high level of involvement while 48% of parents rated it as high level of involvement. However, 6% of parents indicated that the digital diary had low level of parent school involvement (See Figure 6).

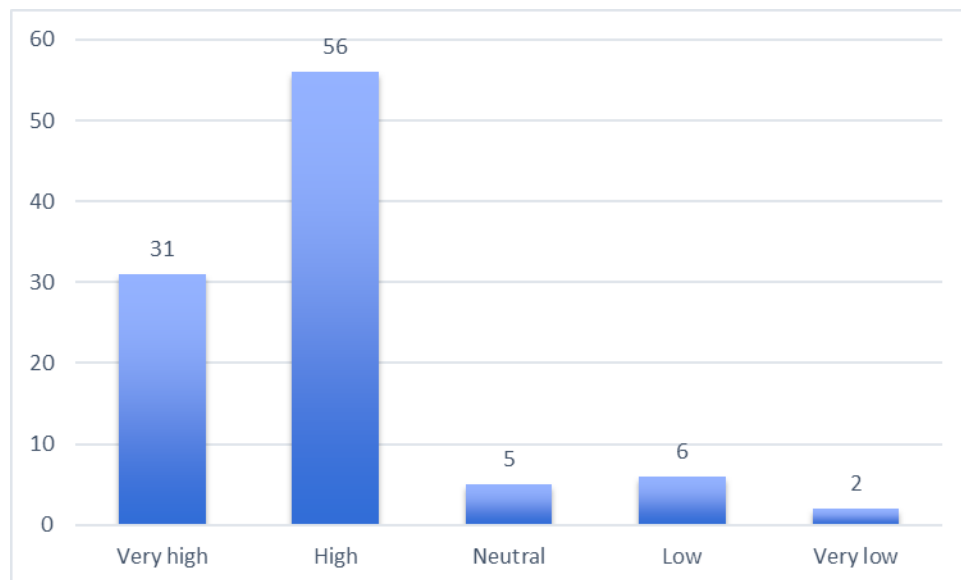


Figure 6. Parents' perceived level of involvement by digital diary

Perceived Usefulness of Digital Diary

Perceived usefulness is one of the variables that may influence system use. People tend to use or not use the system when they believe that the proposed system will help them to improve their job performance (Davis, 1989). Therefore, it was important to elicit teachers' perceived usefulness of the digital diary in facilitating parental school involvement using 5-point Likert Scale [1=Strongly Disagree: 2=Disagree: 3=Neutral: 4=Agree: 5=Strongly Agree]. The result indicated that the majority of users (84.4% of parents and 96.7% of teachers) agreed that using digital diary enabled them to get engaged in the majority of children school activities. However, the minority of users (6.8% of parents and 3.1% of teachers) indicated that the digital diary did not facilitate parental involvement as shown in Figure 7.

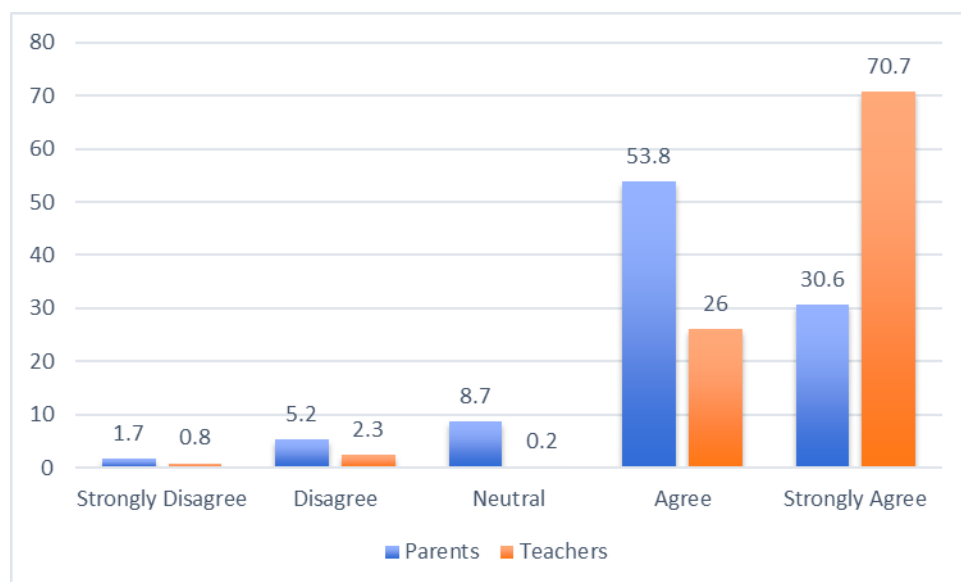


Figure 7. Perceived usefulness of digital diary

When asked which features were more useful, many parents rated Announcements, Daily Homework, Class news/events calendar, and Attendance in that order.

In addition, seven of the teachers were interviewed to find more information on how digital diary helped them to get in touch with parents about school and class happenings. The majority of teachers indicated that the digital diary helped them to send announcement to parents and many parents were able to get information about assignments and other related activities promptly via their mobile phones. For instance, one teacher commented:

“I guess it does, since parents have access to school and class announcements and list for all upcoming events and their dates, I think they revisit the page several times at their convenience since the information is always there and they cannot say they have misplaced letter or memo. For that matter, the number of calls I received from parents per day has somehow decreased”.

Some teachers pointed out that they experienced better or improved communication by using the digital diary than they had in previous methods. Since parents are busy during daytime they normally do not get time to visit the school on regular basis or speak to the teachers. One teacher said,

“I think communication has been somehow improved because parents can use the digital diary to communicate at their convenient time, something that could not be accomplished by other means of communication prior to this one, parents get home late, they have some questions or need some clarification about something but they cannot make calls after teachers working hours, and of course one of the things I really do not like is getting calls from parents after 5”.

Gender differences in parental involvement

We were also interested to find out the involvement of mothers and fathers in helping children with school related activities. The study found that 50% of the respondents were mothers followed by fathers (26%). Moreover, 22% involved both parents (father and mother) while 2% were guardians.

Digital Diary Effectiveness

Google firebase console and one-signal cross-platform push notification delivery platform was integrated with a digital diary to keep track of message and notification delivery as well as recording crash reports in an attempt to check the diary effectiveness. In average, each time a message was sent to parents, 90% of the messages were delivered within 5 hours since the message was sent. However, 1% of messages were found to be pending while 5% of messages were not delivered from the time a message was sent and 4% of messages were invalid.

DISCUSSION

The current study was aimed at developing digital diary to enhance parental involvement in children academic life. The development process followed XP agile method where 78 parents and 6 teachers from St. Florence school were involved. The choice of XP enabled the team to complete the

development within a short time and still develop a quality system. XP is described as more reliably to yielding great products because of its focus on rapid releases of working software enabling developers to see what the highest priority features look like without having to wait for very large systems to be implemented (Schofield, 2007). Moreover, the adoption of XP enabled the team to involve users from the requirement gathering to the testing of the final product, and therefore the resulting system had free of usability problems. This was evident from the fact that majority of parents (97.3%) indicated that the digital diary was easy to use and free of usability problems.

The developed digital diary was then piloted at St. Florence Academy involving 7 teachers and 156 parents. Through viewing data log in the system, it was revealed that 78% of parents used the system several times per day or twice per day. This shows that the developed diary was successfully implemented and has the potential to offer the long term intended benefit. According to DeLone and Mclean (2003), the increased system usage is an important indication that the anticipated benefits of the developed system are being realized. On the other hand, unused systems are normally described as failure systems (Seddon, 1997). Since the system was piloted for only six months, we believe that it will enable many parents to be able to engage in majority of children school related activities after some years of usage.

The study also found that many users (84.4% of parents and 96.7% of parents) perceived that using digital diary will enhance their parental involvement in children school related activities. This was important finding given the fact that such beliefs have strong influence on parents' attitude towards continuing using the digital diary. According to Davis (1989), people tend to use or not use the system when they believe it will help them perform their job better.

Another important finding to emerge from this study was that, many parents (73%) indicated that the system enabled them to get involved with children school related activities. Parents identified announcements, daily homework, class news/events calendar, and attendance as the most useful features in helping them to stay involved in their children education. It seems that these are the most preferred features by parents as the same features were found to be preferred by parents in class websites in studies conducted by (Holcomb et al., 2007, 2007; Unal, 2008).

Another important finding was that mothers were found to be more involved than fathers and guardians in school related activities. A possible explanation to this might be that mothers are normally more involved in children education and invest more time in children's care and academic activities than fathers. These findings are further supported by Hossain and Anziano (2008) who found that mothers invested significantly more time in children's care and academic activities than fathers.

Finally, the digital diary was tested for its efficiency in delivering messages to the parents. Using Google firebase console tool delivery notification and crash reports were recorded. It was interesting to find out that nearly 90% of the messages were delivered within 5 hours since the message was sent. This finding suggests that the digital diary was efficient in delivering messages to parents as compared to paper based diaries.

RECOMMENDATIONS FOR FUTURE WORK

This study has demonstrated how digital diary can be used to enhance parental school involvement in Tanzania. However, one notable limitation of this study is that the digital diary was tested using a small population of 157 parents and 7 teachers. It would be interesting to assess the effectiveness of the developed system using a large population of users and mostly those located in rural schools.

Another limitation of the study was that the digital diary was tested for effectiveness for a period of six months. Future research should allow many users to use the system for at least one year before evaluating for its effectiveness and usefulness. Finally, the digital diary was developed to be accessible in android mobile devices only. Further studies can extend the system in other mobile platforms such as iOS, Windows, and Blackberry. Notwithstanding these limitations, the findings from this study will help researchers to understand how ICT can be used to enhance parental school involvement in Tanzania.

CONCLUSION

This study was set to develop digital diary and determine its effectiveness as well as its usefulness in enhancing parental school involvement in Tanzania. While parents are finding very difficult to participate in their children school related activities due to several reasons, the use ICT can bridge this gap. Many parents have access to ICT devices such as mobile phone, tables, computers connected to a good Internet connection. There is a need for researchers to find ways in which they can help parents and schools with ICT solutions that can be used to enhance parents-school communications. The findings from this study provide a new understanding of how ICT can help to improve the quality of teaching and learning as well as enhancing school administration activities. Many teachers indicated that the digital diary removed the burden of children to make sure the parents read information in the paper-based diaries.

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