A system development methodology guidance tool for supervision of IT projects

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Abstract

Top universities in the world have shown that successful research activities can be the largest source of value and revenue for a University. However, many universities in Kenya still over-rely on tuition fees such that a low intake of students has a substantial negative impact on the state of the University. There is an urgent need for such teaching-centred Universities to rely more on valuable research activities. For this to happen, the success rate of research activities must be increased. One of the main factors that leads to low success rates in research is poor application of a formal methodology. This research investigates on how a web-based application can be used as a guidance tool in Universities to guide students on how to apply a system development methodology for the success rate of IT-based research that involves software development. The web-based application can as well be used by supervisors to track the progress of the IT-based research that they are supervising. Questionnaires were used to collect data from the researchers and the supervisors. The scrum framework, which is a subset of agile methodology, was applied to guide the development of the application. This methodology supports the collection and analysis of constant feedback from the end users and controlled improvements; and this leads to higher user satisfaction. HTML5 and CSS was used to develop the front end and PHP was used for server-side scripting for the backend. A MySQL DBMS was used to store the project details, student and supervisor details and project progress data. The expected outcome is a web-based project management application for students and Faculty supervisors. This application is expected to promote the success rate of IT-based research in universities through the correct application of system development methodologies.

Keywords: *system development methodology; guidance tool; software development.*

Introduction

The main goal of software engineering is to produce good quality, maintainable software within a reasonable time frame and at an affordable cost. Therefore, an effective production process is required, one that will determine how much time and effort will be needed. This process is a system development methodology. (“Importance of Software Development Methodologies,” 2016)

The problem is poor application of system development methodologies and supervision of IT projects. It is experienced in many educational institutions. This problem exists because the benefits of using a methodology have not yet been fully appreciated. Hasty documentation, development and “cookie cutter” approaches have become the norm.

Currently, the number of institutions that lack seriousness to consistently apply and follow a process is baffling. More so, within Universities whereby students develop Information Systems through projects. Some of the problems that result from a poorly applied methodology include lack of proper communication between the researcher and the supervisor, delivering an unstable system and lack of motivation to produce successful systems. Most researchers opt for the “cookie cutter” approach. (“Benefits of adhering to software development methodology concepts,” 2015) Thus, a system that will guide the researcher through the system development methodology stages will be valuable.

A research by Russo, Wynekoop and Walz (1995) was conducted on the use of system development methodologies in organizations for their IT projects. It mainly focused on the extent of the methodology use and the organization’s satisfaction. The conclusion indicated that 72% of the organizations reported increases in development productivity, and 83.3% reported that the system quality improved. They also reported better cooperation and communication between developers. This clearly expresses the importance of well implemented methodology.

This research is important because there are too many projects that fail to reach their expectations. Many systems are built with little thought to process. Coding begins almost immediately, and this lack of attention causes user requirements to be ignored, code to be rewritten and cost overruns. The methodology selected matters as long as the project is organized in a consistent way. A sound methodology is one of the keys to project success. (Dorsey, 2005)

This guidance tool can be used by students and project teams in universities. The purpose is to enable them to follow documentation and to develop a system by practically following the system development methodology selected, as well as to improve execution and supervision of IT projects. This will be more beneficial than the traditional way which involves specifying predefined theoretical system development methodology phases without practically implementing them. It provides phases, goals and tasks that the student must follow according to the methodology. A schedule is provided in order to guide the student based on the deadlines of their IT projects. The supervisor can view their supervisee’s project progress based on the current phases of the system development methodology.

The domain of execution is web-based. This is because it can easily be accessed from a laptop or personal computer. This makes it convenient since the user will be working on the project on the same device. In addition, a web-based domain of execution supports a central point of interaction between the supervisor and the student. The web application will consist of a student and supervisor module.

Methods

The purpose of this research was to develop a guidance tool that will assist developers to properly implement system development methodologies and manage supervision. Structured systems analysis and design methodology was applied to this project due to the fact that it improves quality and productivity by meeting product needs, encouraging on-time delivery and responding to changes. It covers all aspects of the system development lifecycle from feasibility to physical design. The Scrum framework was applied to develop the proposed project. This methodology was appropriate because it insists on frequent updating of progress through meetings and constant feedback from end users. Issues can then be identified well in advance and it also becomes easier to make changes.

A questionnaire intended for 3rd and 4th year students in Strathmore University and 3 other universities, was distributed to find out which system development methodology they have used in their current or previous IT projects, how they apply it and the extent of its application throughout the project. Data was collected to measure the impact of their supervisors on their project success. Collection of data from the student's questionnaire was critical in order to satisfy their needs through the system. An additional questionnaire for graduates and supervisors, identified the relation of applying a system development methodology and the success rate of IT projects. In this case, success rate implies a high final grade in the project, meeting deadlines, a complete final system demonstration and ability to implement the system in the real world. Information regarding supervisors and their current methods of supervision was also collected.

Usability testing and functional testing will be applied. Functional testing will be used to test the web pages. This includes ensuring that the web page links are working, cookie testing, form testing and the database connection testing. Usability testing will test whether the web pages are user friendly. This also includes checking that content is easily understandable, easily navigable and that all the links are working. (Ghahrai, 2017) Besides that, user testing will be done by evening class students undertaking BBIT, who will be doing there Information System project 1 from September.

Results

3rd and 4th year IT students, graduates and graduands questionnaire results

95% of respondents were undergraduate BBIT students from Strathmore University and Technical University of Kenya. Meanwhile, 5% of the respondents were graduates from Jomo Kenyatta University of Agriculture and Technology and Strathmore University. Responses from the student's questionnaire showed the most commonly applied system development methodologies for IT projects.

This was critical in order to understand which methodologies to offer guidance on. The largest number of students (28%) prefer to apply Rapid Application Development methodology which is, one of the most widely used methodologies in the world today. This is for the reason that it allows prototyping which leads to faster development of systems. Alternatively, 26% of students prefer to apply Agile methodology.

This methodology includes a light framework that enables developers to focus on rapid delivery whilst delivering a system that meets the user's needs. Finally, 19% of students prefer the waterfall methodology. This is one of the simplest and easiest methodologies to understand and apply.

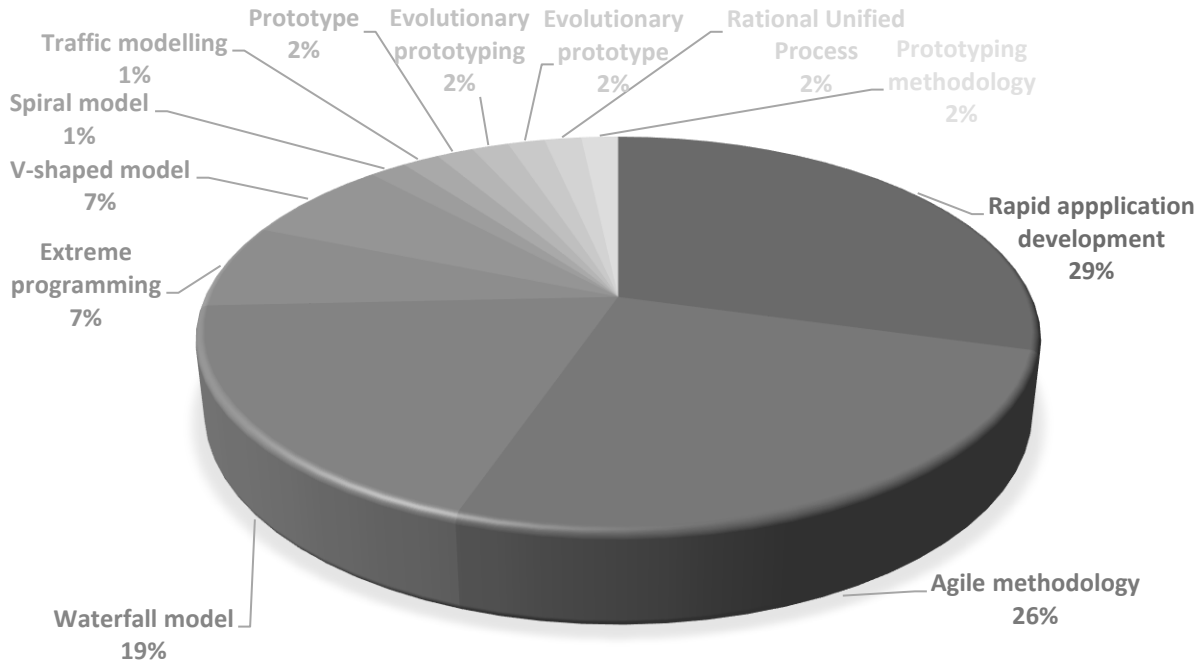

Figure 1. Results from the student's questionnaire on which methodology they prefer to apply to their projects. 58 responses.

Supervisor's questionnaire results

The respondents of this questionnaire were supervisors, who are in fact lecturers in the Faculty of Information and technology. Responses from question 3: "Based on your experience of supervision of IT projects, do you believe improper application of system development methodologies is a cause of low success rates of projects?" show that most supervisors (66.7%), expressed that improper application of system development methodologies is one of the main causes of low success rates of IT projects. The consequent main reasons expressed for low success rate of IT projects was lack of effective communication from the supervisor to the student and poor monitoring of project progress.

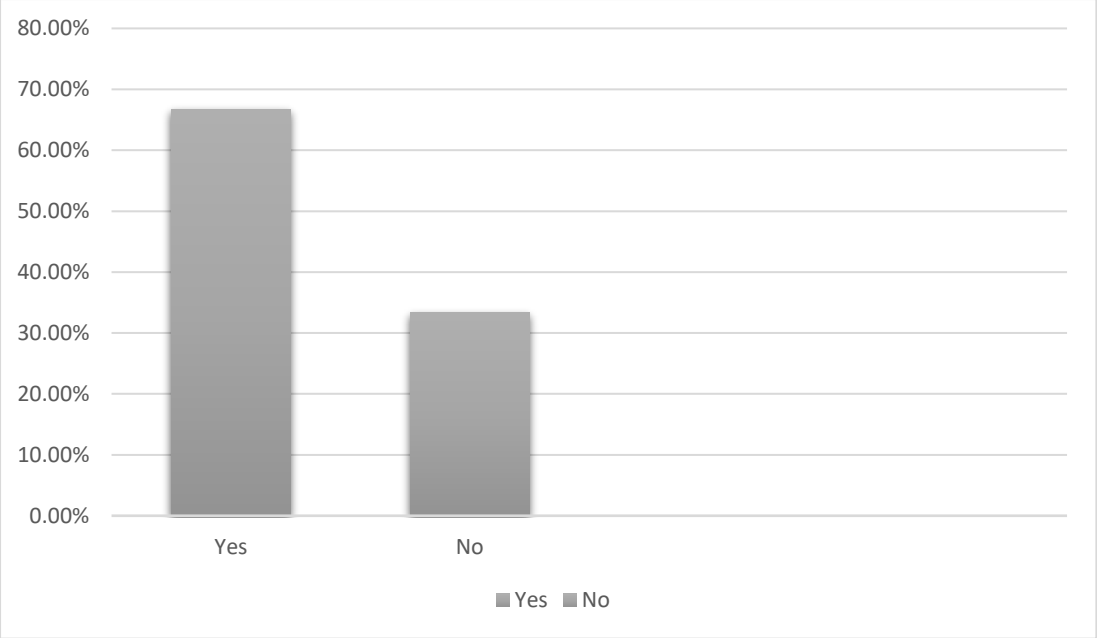

Figure 2: Results from supervisor's question on improper application of methodologies and success rate of IT projects 6 responses

Discussion

This research confirms that improper application of system development methodologies is one of the many drawbacks to the success rate of IT projects. Importance of these methodologies is yet to be fully realised, especially by students. Research on the relation between the choice of the system development methodology to be applied and success of the project can be analysed from the results of the guidance tool. This will provide more understanding on particular methodologies contributing to success, and some contributing to failure. The findings of this study have expressed emphasis on more student and supervisor communication as well, which is another factor in the success of IT projects. The guidance tool, by allowing tracking of the supervisee's project progress will improve communication and feedback where necessary. Furthermore, data on the success rate of IT projects can be recorded, analysed and applied in future research to guarantee an even higher success rate.

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