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# Usability of Academic Management System

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**Abstract:** The usability of system lies on the effectiveness and ease-of-use of a system. The main function of Academic Management System (AMS) is to assist university staff to manage students' records. A student record embodies in various and numerous courses management, finance, examination, accommodation and other essential information. The purpose of this paper is to evaluate the concept of system usability. It subsequently observes and analyzes the usability of AMS at a university by applying Nielsen's heuristic evaluation method. As a preliminary study, the usability of AMS at one of the Institute of Higher Learning (IHL) in Malaysia has been chosen and assessed. The results obtained can be served as comparative guides for future betterments and references to the IHL. The study shows that the usability constructs selected are not being fulfilled in AMS. Recommendations to improve the usability of AMS are also discussed.
**Key words:** Academic System; Usability; Usability Construct; Human-Computer Interaction; Standards

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# INTRODUCTION

The tertiary educational system in Malaysia has relatively transformed from small colleges to university colleges and finally to large full-fledged universities. These circumstances are spurred by the enormous enrolling of students. In response to this transformation, the functions and qualities of academic management at the university have been raised and questioned. Furthermore, these issues have gained prominence especially under the state of limited funding for higher education. One good criterion is the extent of Academic Management Systems (AMS) implementations at universities. Having the AMS, managing and retrieving information of thousands of students is more efficient and effective. As credits go to technology, computer and the Internet, the access is no longer limited within campus but could reach parents and financial sponsors for them to make decisions. Despite the great advantage, there is a fundamental need for using AMS.

The term 'usability' is not unexceptional in today's system development and evolution. Traditional view of usability that is popular among software developers is the attributes of the user interface that makes a product easy to be used (Bevan, 2009). This view of usability is also consistent with the first International Standard Organization (ISO) definition of usability as part of software quality in ISO/IEC 9126 (Bevan, 2009) as a set of attributes that bear on the effort needed for use and on the individual assessment of such use by a stated or implied set of users. The definition of user interface usability is contrast with the system perspective of usability defined from an ergonomic point of view in ISO 9241-11 (Bevan, 2009) as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use. In this context, the term usability is a maturing area that addresses interfaces, usability and interaction from human-computer interaction (HCI) (Ssemugabi, & Villiers, 2007). HCI is the study of how people interact with computer technology and to make this interaction effective is by providing the theoretical basis for applying usability concepts to software applications and computer interfaces (Battleson, Booth, Weintrop, 2001). Usability is a question of how well the users can use the functionality offered by software(Tanaka, Bim, & da Rocha, 2005). Usability engineering involves studying and designing 'ease of use' into a product (Battleson, Booth, Weintrop, 2001).. Probably, the best known definition of usability is by Nielsen: usability is about learnability, efficiency, memorability, errors and satisfaction (Nielsen, 1993). While formerly focusing solely on functionality, software development houses presently are wiser and more aware to the importance of addressing their customers' needs in order to stay competitive in market. Software developers are getting concerned with this usability issues including easy and efficient to learn, use and remember, few errors and user's subjective satisfaction(Tanaka, Bim, & da Rocha, 2005). The houses also gain benefits by reducing training and supporting costs while increasing productivity. The higher the usability of AMS would provide the user a better access to specific records. Several usability evaluation methods were proposed in the past to assist the system developers. The methods are either based on empirical and analytical (Blandford, et al., 2004). Empirical methods involve testing systems with users whereas analytical methods involve usability personnel assessing systems using established theories (Blandford, et al., 2004). Their selections are influenced by time, cost, efficiency, effectiveness and ease of application (Ssemugabi, de Villiers, 2007). Among all, Nielsen's heuristic evaluation method is most popular due to its expert review, easy to learn, fast and inexpensive (Tanaka, Bim, and da Rocha, 2005). This method involves evaluation by experts with expertise in the domain area and/or HCI. The objective of this paper is to evaluate the usability of the AMS in applying Nielson concept.

# METHODOLOGY

A questionnaire was constructed to get the initial assessment of the reliability of the usability view from the participants. The participants are academician and non-academician from a State Government University in Selangor that adapt Academic Management System which is known as Bestari System (BS). The participants are frequent user of AMS and from four major units and six faculties in the main campus of the selected university.

The questionnaire was distributed to 150 respondents (50 male, 100 female), consist of academic and non-academic personnel. However, there are only 78% which is equivalent to 117 respondents (34 male, 83 female) return the questionnaires. The questions are constructed to focus on the aspect of usability attribute which may give impact on the quality performance of the information. The characteristics of information quality are referring to the time, the content and the form dimensions.

The questionnaire is categorized into three sections which are Section A, B and C. Section A is the demographic information such as respondents' gender, age, faculty/ department and category. Questions in Section B are on the Information System (IS) usage, the usage of data and frequent duration used of IS. This section is to ensure that only regular and literal user of IS are entitled to answer the question since user knows better about the information quality of AMS. In Section C, the questions are about the five dimensions of usability constructs that are learnability, efficiency, memorability, error and satisfaction. The answers are ranked according to the Likert scale (5, Strongly Agree to 1, Strongly Disagree). The data was analyzed using Statistical Package for Social Science (SPSS).

# RESULTS AND DISCUSSION

Table 1 shows the learnability constructed in AMS. The construction measures the user's ability to learn the system where the user can start doing something using the system (Nielsen, 1993). One negative attribute was recorded changes from negative to positive scale for analysis purposes, particularly for attribute 4. In attribute 1, the acceptability of the system is denied at 59.6%. From the questionnaire, in attribute 2, 73.4% respondents disagree that the AMS form is difficult to understand, while only 11.9% of them are not sure. Other criteria measured are on the stability of image, graph & presentation in AMS. For this criterion, 37.6% of the respondents agree with the stability of information in AMS and 31.2% both in either not sure and disagree. In the information organization of attribute 4, 49.5% of the respondents agreed that AMS information is not well organized and about half of the respondents are either agree or not sure. Due to the complexity to understand and inequality output type in attribute 5, users found out that the comprehensible is only at 16.5 %. The findings on learnability attribute shows that the user strong need of ease-of-understanding and readable information is not achieved.

**Table 1: Learnability Attribute**

| No | Attribute Description | Disagree | Not Sure | Agree |
|---|---|---|---|---|
| 1 | The information can be accepted by all users | 59.6 | 25.4 | 14.7 |
| 2 | The information provided is in a form that is easy to understand | 73.4 | 11.9 | 14.7 |
| 3 | The information is balance with the image, graph & text | 31.2 | 31.2 | 37.6 |
| 4 | The information is not well organized | 21.1 | 29.4 | 49.5 |
| 5 | The information is readable | 59.6 | 23.9 | 16.5 |

**Table 2: Efficiency Attribute**

| No | Attribute Description | Disagree | Not Sure | Agree |
|---|---|---|---|---|
| 1 | The information is provided when it is needed | 67.9 | 20.2 | 10.1 |
| 2 | The information is provided as often as it needed | 57.8 | 25.7 | 15.6 |
| 3 | The information provided with clearly stated date | 57.8 | 28.4 | 13.8 |
| 4 | The information provided is for a specific recipient & situation | 69.7 | 24.8 | 5.5 |
| 5 | Only the information that is needed is provided | 11.9 | 10.1 | 78.0 |
| 6 | The information is appropriate for all users | 50.5 | 22.9 | 26.6 |
| 7 | Bestari System provides inadequate information | 21.1 | 40.4 | 38.5 |
| 8 | The information is specifically for all users | 57.8 | 24.8 | 17.4 |
| 9 | The information is convenient, and can be used effectively | 60.6 | 22.9 | 16.5 |

The efficiency attribute in Table 2 shows the particular percentage of productivity. Two attributes were recorded changes from negative scale to positive scale, particularly in attribute 5 and attribute 7. There are three factors in attributes 1, 4 and 9 which are not preferred by the users respectively related to the information needed, information for specific recipient and situation; and convenient with effective information which is measured at more than 60%. Additionally, there are 3 other factors in attributes 2, 3 and 8 disagreed at 57.8% which are information often as needed, information provided with stated date and information specific for all users. The appropriateness of the information in attribute 6 is not preferred at the rate of 50.5%. In attribute 7 show negative indication of less than half or 38.5% agree on the adequate information. However, the positive indication for efficiency attribute derived from attribute 5 on providing needed information gaining the score at 78.0%. The findings clearly show most of the attributes in efficiency attributes are rated at negative scale.

In Table 3 of memorability construct, attributes 1, 2 and 3, more than half of the respondents disagree on the consistency of information representation, the summarize form of the reporting and the arrangement of information in predetermined sequence. In attribute 4, more than half of the respondents are either agree or not sure on the numeric, graphic and other presented forms. However, attribute 5 with 49.6% of the respondents agree that the information is developed in order to enhance the overall experience. For this attribute, 3 out of 5 attributes derived negative indications on the memorability in AMS.

**Table 3: Memorability Attribute**

| No | Attribute Description | Disagree | Not Sure | Agree |
|---|---|---|---|---|
| 1 | The information is represented consistently | 50.5 | 30.3 | 19.3 |
| 2 | Bestari System provides in summary form | 52.3 | 33.0 | 14.7 |
| 3 | The information is arranged in a predetermined sequence | 51.4 | 33.0 | 15.6 |
| 4 | The information is presented in numeric, graphic and other form | 41.3 | 32.1 | 25.7 |
| 5 | The information is interestingly developed to enhance the over-all experience | 28.4 | 22.0 | 49.5 |

The errors constructed in Table 4 measured the number of errors at tolerance rate and recoverable. Two negative attributes, attribute 2 and attribute 5 are recorded for data consistency and analysis. Attribute 1 shows a positive indication in which 38.5% of the users believe that they can obtain 100% accurate information. This is supported by attribute 4 which the users' positive rate on error free information is at 56.9%. In addition, the finding also showed that 31.2% users obtaining data on time. However, the users are between not sure or to reject view in attribute 3 on verifiability of the information which is respectively at 32.1% and 48.6%. In attribute 5, most of the users also believed that uncommon information missing at 61.5%. In particular evaluation for errors attributes shows more positive interpretation compared to other constructs.

**Table 4: Error Attribute**

| No | Attribute Description | Disagree | Not Sure | Agree |
|---|---|---|---|---|
| 1 | The information is 100% accurate | 37.6 | 23.9 | 38.5 |
| 2 | The information requested is always delayed | 21.1 | 47.7 | 31.2 |
| 3 | The information is verifiable | 48.6 | 32.1 | 19.3 |
| 4 | The information is free from error | 21.1 | 22.0 | 56.9 |
| 5 | Missing information always happen | 17.4 | 21.1 | 61.5 |

Satisfaction attribute measured the pleasant use of the AMS so that users will reach satisfaction with the system. In addition, we measured users' perceptions in the presentation and usefulness of the information. Table 5 shows the result on satisfaction attributes. In attributes 4, 5, 6 and 7, more than 65% of the users denied respectively on information provided are meaningful, useful, practical and reliable. The high

percentage in earlier construction on information accuracy in attribute 1 (Table 4) is consistent with the less percentage of doubtfulness of the information at positive rate of 30.3%. The findings of attribute 10 also suggest that more attention should be focused on the presentation of the output to various media form. In overall performance of satisfaction, the findings show that the usefulness of the information as the importance criteria has to be fulfilled for obtaining higher score for other constructs in satisfaction attribute.

**Table 5: Satisfaction Attribute**

| No | Attribute Description | Disagree | Not Sure | Agree |
|---|---|---|---|---|
| 1 | The information provided is up-to-date | 36.7 | 32.1 | 31.2 |
| 2 | All the information needed is provided | 45.9 | 27.5 | 26.6 |
| 3 | The information is always doubtful | 30.3 | 44.0 | 25.7 |
| 4 | The information is meaningful to user | 78.9 | 16.5 | 4.6 |
| 5 | The information is useful | 85.3 | 6.4 | 8.3 |
| 6 | The information is usable | 78.0 | 10.1 | 11.9 |
| 7 | User relies on the information | 69.7 | 21.1 | 9.2 |
| 8 | Bestari System provides detailed information | 45.0 | 28.4 | 26.6 |
| 9 | The information is interesting to look at | 25.7 | 28.4 | 45.9 |
| 10 | The information is provided in a form of required media such as printed paper or s/copy document | 55.0 | 26.6 | 18.3 |

A great deal of time, money and effort had been invested for the realization of BS. Users' observations and their comments in the assessment were invaluable in revealing where and why BS failed in some aspects and helped developers and maintainers to identify and prioritize the gross usability problems to be addressed. In entirety, out of five constructs, BS is poor at learnability, efficiency, memorability and satisfaction. From the findings gathered, most users highlighted the attributes of readable and ease-of-understanding which are vital in learnability of the AMS. The system acceptability is low due to the factor of the varied intended users of academic and non-academic groups. For the efficiency attribute, the users' productivities are most affected by the lack of ad-hoc information required for specific purposes. Another possible reason could be shortcuts and accelerators are not provided to speed up interactions and task completions by frequent users. Most of the aspects in the memorability attribute are not fulfilled by BS except enhancing the overall experience. A low frequency in using AMS among academics is believed a part of contributing factors that affects towards reductions in this memorability attribute. Satisfaction is a freedom from discomfort, and positive attitude to the use of the product (Jokela, et al., 2003). In respects of satisfaction attribute, the usefulness of information is imperative to meet users' overall satisfactions. The satisfaction attributes of BS however are almost all not favored by the users. Regarding the error attribute, the findings illustrate that system development in nature have always paid much attention on reducing errors. Uncorrected errors will impact on successful task completion, and corrected errors will contribute to task time and reduced satisfaction(Bevan, 2009). BS is designed such that the users cannot easily make serious errors. In case a user makes an error, BS gives an appropriate error message. This helps the user to recognize, diagnose and recover from errors. Apart from the reliability test conducted, informal comments and opinions of users were also enlightening. For instance, asking users their overall impressions of BS resulted in very useful opinions and observations on their part. After concluding the test, they seemed more relaxed and willing to give honest impressions on factors like esthetics. Finally, this study reiterated the fact that usability testing be a continuous and integral part of AMS development. Results of testing lead to recommended changes, which in turn, need to be evaluated, implemented and tested again. As Nielsen states, usability testing is an iterative process (Nielsen, 1993). This is consistent with (Granollers, 2003) where the usability should not be considered as at a very low level and too late. As such, the success or failure of the AMS usability will also depend on ease of learning and use, as well as general user satisfaction along with quality and comprehensiveness of content and functional capabilities (Granić, et al., 2004). In addition, design alternatives from simulation and analytical modeling should be helpful before

committing to the software development (Ivory, & Marti, 2001). The usability standards (Bevan, 2009), users' perceptions (Wallace,& Yu, 2009) and perceived aesthetics (Lavie, Oron-Gilad, Meyer, 2011) are other determining factors to increase usability scale provided that the ideal usability evaluator (Hombaek, & Frokjaer, 2008) is fulfilled.

# CONCLUSION

This study concludes that four usability constructs on learnability, efficiency, memorability and satisfaction are not being fulfilled in AMS. However, the construct of error in AMS show positive outcome. This is due to the nature of locate and remove errors in a common system development. This situation occurs because of the system's usability factor that is being less considered in AMS system development. Therefore, in any development of a system, more consideration should be focused on the involvement of users at the early stage especially in the design process. Our future research will focus on providing the checklist for usability in the case of software development especially during the requirement engineering process.

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