International Journal of Information and Communication Technology Education
Volume 17 • Issue 1 • January-March 2021

Powerpoint Presentation Evaluation Based on Aggregation of Quality Criteria

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ABSTRACT

Today, there is no consensus about proper timing and conditions for integration of PowerPoint presentations into the educational process. But the model-based evaluation can make a decision-making process easier when it comes to using presentations. The purpose of this study is to build a formal model to evaluate presentations. In order to build a formal model, the authors suggest employing hierarchical structure consisting of aggregation operators, such as the weighted averaging operator, minimum operator, and fuzzy Choquet integral. The proposed formal model shows experts' knowledge of the interdependencies between the criteria. The experiment described in the paper demonstrates the effectiveness of such a model as it allows to formalize expert preferences gradually, which may include interdependencies between the quality criteria of a presentation. Thus, this model will allow to store, analyze, and compare presentations properties that are necessary for their successful application.

KEYWORDS

Aggregation Operator, Choquet Integral, Partial Data, Preference Relations, Presentation Evaluation, Quality Criteria

1. INTRODUCTION

MS PowerPoint (PP) as an instrument was initially designed for Macintosh in 1984 and then it was purchased by Microsoft (Gaskins, 2012). Over the years, the number of educators who use PowerPoint presentations (PPP) for teaching has become overwhelming because PP has been the most famous means of making up presentations. Indeed, PP is installed on more than 1 billion computers (Brock, 2017).

However, no consensus has been reached if presentations are worth employing in educational process.

DOI: 10.4018/IJICTE.2021010101

On the one hand, (Fedisson & Braidic, 2007) describes an experiment dedicated to evaluation of PPP effectiveness. The results of this experiment prove that the use of PPP increases the students' level of comfort and, subsequently, improves their performance.

On the other hand, (Kedare et al., 2019) described an experiment where students who completed the course using the traditional teaching method (chalk, blackboard, lecture) showed better results compared to their counterparts who used PowerPoint presentations. This study confirms the idea that conventional lecture can be evaluated as more comprehensible and informative, since such lectures may create interactive learning environments in which pieces of slides are excluded (Cosgun, 2017).

Recent meta-analysis (Baker et al., 2018) has shown that there was hardly any difference in learning results when employing PPP or not. In (Kernbach et al., 2015) identifies some deterrent measures for PPP. In particular, full length sentences are hard to be put on the PPP slides to hold the sence (Farkas, 2009) and understanding (Yates & Orlikowski, 2007). Popular bullet lists foster an illusion of clarity and do not show the whole picture (Gabriel, 2008). Meanwhile, (Jenkins, 2012) studies the debates about the need to apply PPP.

Therefore, instead of contemplating on whether to use this tool, it appears that we should concentrate on how and when it should be used to help students in the learning process (Jourdan & Papp, 2013). Besides these two important issues, the issue of what kind of presentation it should be to help students in learning the best way is not the least important.

For example, PowerPoint can be very beneficial, but the material that is not pertinent to the lecture subject is harmful to students learning (Bartsch & Cobern, 2003). And the rise of form over content spoils the presentation (Grech, 2018). This corresponds to Mayer multimedia learning theory (Mayer, 2002). In (Hallewell & Crook, 2019) the lectures styles is analyzed and draws a conclusion that the presentation of the material should be consistent and coherent despite the individual styles of lecturers. Also the educators must use PowerPoint presentations in such a way that students understand that the presentation is supplementary to class attendance, not a replacement for it (Crawley & Frey, 2008). One way to tackle the issue is to create interactive PowerPoint presentations (Boyas, 2008).

There is a wide range of studies of PPP applications in various areas: physics (Erdemir, 2011), medicine (Grech, 2018); (Bamne & Bamne, 2016), accounting (Sugahara & Boland, 2006), astronomy (Miller & James, 2011), sociology (Hill et al., 2012), education of foreign language students (Gordani & Khajavi, 2019). Each of the disciplines needs PPP to meet its particular requirements to make students learn in the most effective way (Garrett, 2016).

To find out possible ways to improve PPP, the software engineers can be guided by scientific research carried out in various fields of activity, on the one hand, and by the students feedback (Williams et al., 2016) and students surveys (Cullen et al., 2018), (Szabo & Hastings, 2000) on the other hand.

Such surveys are usually carried out among students to find out their opinion about a certain PPP (Apperson et al., 2008). The results of such surveys are the PPP quality criteria values averaged over the students. That criteria correspond to various PPP qualities. In (Basturk, 2008), the author lists the following groups of quality criteria for a presentation: "content" and "design". These groups correspond to the same composite criteria, which, in turn, are the results of the convolution of criteria in the respective groups. To compare PPP and give preference to one of them, the less formalized experts evaluation is applied (Apperson et al., 2008, Akella, 2017, Bridges & Luks, 2016).

However, such an approach is constrained by the fact that it does not let some of the experts see clearly and in formal details the reasoning of the other experts. Moreover, the application of simple average for aggregation of certain PPP quality criteria, there is no chance to take into account their possible mutual influence that, in its turn, makes the evaluation of PPP inexact.

This brings us to the crying task of developing a formal approach to evaluate PPPs that would allow the identification of the experts reasoning and taking into account possible mutual influence of PPP quality criteria.