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Improving Students' Reading Comprehension Achievement through Sharing Annotations in Peer Learning Environment

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Abstract: *Many students suffer of online reading difficulties because of their low abilities of text comprehension. Several educators tried to set strategies to support learners during their online reading. In current work, we present an online reading environment where students can enroll in virtual reading class, to read and annotate their documents. Based on students' annotation traces, we build their personality profiles which reflect their level of reading performance. Given the students' reading abilities, we share the annotations of skilled readers with those having problems of text comprehension. The experimental results show the efficiency of the proposed approach to support learners with low reading abilities.*

Keywords: online reading comprehension, collaborative learning, annotations, personality profile.

1. Introduction

Many students face difficulties in reading because of their poor ability of text comprehension. An individual's ability to comprehend text means his capacity to read text, process it and understand its meaning. In "face-to-face" reading class, teachers assist students to develop their reading abilities using appropriate pedagogical strategies (Zhao, 2015). In online learning context, instructors and learners are separated physically, so it is challengeable to diversify instructions according to students' characteristics and abilities. Effectively, we need to implement an effective online instructional system based on proven and sound theories from science of learning that help students to overcome their reading difficulties in online learning context. Annotation activity is viewed as an effective strategy that could be used to improve students' abilities of reading comprehension (Garrett-Rucks, Howles & Lake, 2015). Other method is shown as effective strategy used where the immediate intervention of a teacher is absent in distance learning context, it is the peer learning method where students learn with and from each other (Spörer & Brunstein, 2009). Certain researchers try to combine the two strategies cited previously (annotation and peer learning) in one collaborative reading annotation environments (Jan et al., 2015). In present work we consider such approach to improve students' reading skills. To assess readers' ability of reading comprehension we consider the students' personality traits derived through their annotation activities (Omheni et al., 2014; Omheni et al., 2015). The presented computational model is a personality-based e-learning system of virtual reading class which we called "i-Read" environment, where students can enroll, read online, annotate and share their annotations. In what follow, we review briefly the related literature. Then, we present the architecture and the functionalities of the proposed reading environment. Thereafter, we present the conducted experimentation to show the effectiveness of our system's functionalities to support students suffering of reading comprehension difficulties. Finally, we discuss our results, we draw some conclusions and we suggest certain possible directions for future works.

2. Background

The emergence of reading online technology leads to changing the nature of literacy to comprises the skills and competencies needed for reading, writing and participating on the web which makes understanding reading in the 21st century more complicated (Leu et al., 2013). For lifelong learners worldwide who aren't enrolled in a traditional institutional frameworks but subscribed in online learning environments where no teachers; no supervision; nor entry requirements; thousands of students in a single course; students teaching each other and grading each others' work, the process of teaching online reading strategies is more challengeable. Further studies show that online collaborative reading is an efficient strategy to improve students' reading comprehension. Indeed, reading in groups provides students with opportunities to develop their abilities to construct meaning and knowledge from text which helps them to achieve a deep understanding of reading material (Kiili et al., 2012). Several researchers show that using annotations of such experienced readers as experts or senior students may be helpful to those having reading difficulties or seeking for deeper understanding of text (Marshall, 1997; Agosti & Ferro, 2007). In sum, based on the previous review of the online reading comprehension literature, we saw that the reading strategies used to achieve high level of reading performance vary all depends to different factors such as: students' skills, presence of instructor, online technologies, and context of reading. In present work, we are interested to overcome the shortcomings of online reading comprehension through collaborative reading and annotation strategies.

3. I-Read: A Collaborative Online Reading Environment

To overcome the shortcomings of reading online, we propose a collaborative reading environment called "i-Read" where readers can read the same text separately and make separate annotations of the text. The system builds the learners' personality profiles based on their traces of annotation, after which readers will be classified according to their scores of neuroticism and consciousness traits, to good reader, medium reader, and poor reader. Those suffering of reading comprehension difficulties will receive the annotations of skilled peers.

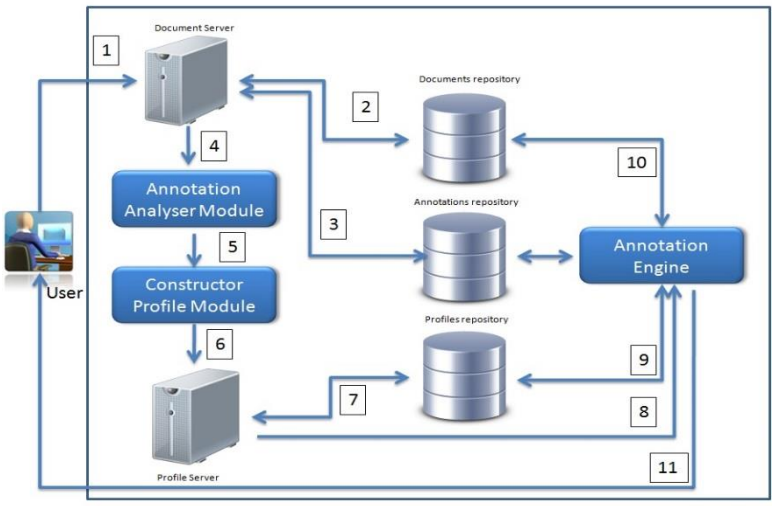

Figure 1. Architecture of "i-Read": Collaborative Online Reading Environment

The figure above (Fig.1) illustrates the interaction between the various modules of "i-Read" system along with the flow of information/data. The system's architecture consists of user annotation interface, the annotation analyzer module, the profile constructor module, the annotation engine and three databases with two servers. These components contribute to model learners' personality profiles and derive consequently their reading abilities.

3.1. System Operation Procedure

The functional scenario of "i-Read" system consists on the following. In fact, the learner can upload his/her document to read and annotate. The Annotation Analyzer Module captures learner's annotations and extracts certain features useful to compute his personality profile. According to the derived scores of learner's traits, the Profile Module determines his level of reading performance (high, medium, poor). For poor readers, the system sends a request to Annotation Engine to search the annotations of skilled readers which sends the annotated documents of expert learners to the active user who suffers of reading comprehension difficulties.

3.2. Evaluation of "i-Read" Environment

To evaluate our system, we invite 32 students (11 male and 21 female) of the first year of computer sciences from the high institution of computer sciences and management of Kairouan University. We ask them to subscribe in "i-Read" environment to read and annotate a document about the origin of C language. Based on the students' annotations we construct their personality profiles and we classify them accordingly into three categories of readers: "Good Reader", "Medium Reader" and "Poor Reader". In second step, we are interested to determine whether the reading abilities of poor readers will be improved, as the result of receiving the annotations of skilled readers. To do, we asked unskilled readers to summarize the read document. The written summaries were evaluated by an expert in C language. Thereafter, we recommended annotations of skilled readers to poor readers (fig. 2). Then, we asked those students to re-summarize the reading content. We utilize the t-test statistical method to study if there is a significant difference between summaries of the first and the second tests.

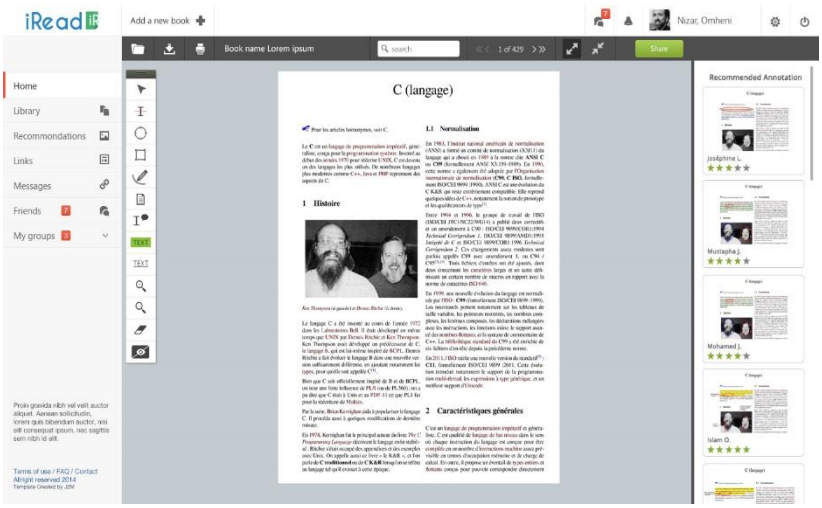

Figure 2. Recommendation of Skilled Readers' Annotations to Poor Readers.

4. Results and Discussion

The results presented in table 1 indicated that the quality level of the poor students' summaries written before recommendation of annotations (Mean= 7.38, SD = 2.19) was significantly lower than the quality of their summaries written after they received annotations of skilled readers (Mean = 9.63, SD = 2.7), with *t-value* (15) = -4.32, and *p-value* < .001. These results are consistent with the findings of many research studies have shown that sharing annotation may foster the exchange of knowledge and learning experiences and has the potential to have a positive effect on reading outcomes. One shortcoming of current work is the sample size which is very limited. We expect in the future, to spread our online reading environment among students of different academic fields to assist them in their online reading activities.

Table 1. Quality level of Readers' Summaries Before and After Sharing Annotations.

	Mean	SD	Diff	*t-value*	*p-value*	Confidence +95%	Confidence-95%
First Summaries	7.38	2.19		-4.32	0.0006	-1.14	-3.36
Second Summaries	9.63	2.75	-2.25	.	.	.	.

5. Conclusion

In this research we present a new tendency to assist students having troubles of reading comprehension in online environment. Our contribution is twofold: first of all we try to assess the students reading abilities based on their personality profiles constructed with reference to their annotation activities. Secondly, we share annotations of expert readers with those suffering of reading problems. The experimental results show the potential role of annotation to enhance students' learning experiences and their academic achievement, which is very promising and constitute a step forward to overcome students reading difficulties in distance learning context. As a future direction, we expect to zoom more on students' online reading behaviors as a way to extract certain learning parameters (motivation, style of learning, interest, etc.) that help to assist them during their learning experiences.

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