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RA-Concierge: Gamification for Enhancing Research Activities

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Abstract: There is a variety of research activities carried out every day in a research laboratory, including investigations, seminars, experiments, analysis, and writing papers, but all of this activity is steady, methodical work that does not produce immediate, visible results. For this reason, a mechanism to maintain motivation when research is not going as expected, or to help students get on track with research when they have just been assigned to a laboratory could be useful. In this research, we have proposed and prototyped the "RA-Concierge" which introduces a comprehensive gamification for general research activity.

Keywords: Gamification, research activity, motivation, visualization, smart devices

1. Introduction

Research consists of a variety of activities. For example, it begins with a survey of related research, includes seminars giving progress reports and discussing future plans, implementations involving programming or construction, experiments, analysis, and writing papers. However, looking carefully at these activities reveals that the everyday activity is very steady, sometimes going well and other times not so well, and often must continue on without immediate visible results. Motivation for research increases naturally when it is on track and the every-day tasks become more interesting, but when it does not go as expected, or for students that have just been assigned to a laboratory and do not know which way to turn, it can be difficult to maintain a high level of motivation.

On the other hand, Gamification—the use of game design elements in non-game contexts (Deterding et al., 2011; Werbach and Hunter, 2012)—has attracted enormous interest across a range of different areas. There have been some recent efforts to apply gamification to education (Cronk, 2012). Ohira et al. (2014) also incorporated gamification into a seminar setting, and found that motivation to speak better was markedly improved in students and verified that the ``capacity to argue" of these students saw significant improvement. In this research, we introduce a comprehensive gamification platform for general research activities.

2. Research Activity

Introducing a mechanism to increase motivation for research activity could be useful. However, if issues and tasks are not clear, even with such a mechanism, it is not likely to work effectively. For this reason, we first focused on discussions as the place to clarify what must be done in everyday research activity, and to organize issues and tasks based on opinions and advice obtained in the discussion.

Our laboratory is developing and operating a system to record seminar content. Generally, proceedings of a seminar consist of an abstract and hand-outs, but seminar content can also include a summarized transcript, audio or video recordings of the seminar, or the slides used in the presentation. After a seminar presentation, students use a Web application called Discussion Browser, for searching and viewing seminar content, to review and organize what was discussed. Reviewing seminar content in this way is a significant hurdle for students, so a mechanism is needed for increasing the value of and actively promoting this activity.

When issues are organized and tasks performed, the process and results are usually recorded in a laboratory notebook. Depending on the details of the issue or task, new digital data may have been created, or annotations added on paper media. However, not all of this detailed information from research activity will necessarily get recorded in the laboratory notebook, and meta-information such as what motivated each activity, or cause and effect relations among activities, is in the heads of the researchers involved, or embedded in the activities themselves.

Generally, tools such as ToDo managers and MindMaps are used to address this sort of issue, but they do not necessarily provide adequate support. For this reason, a mechanism that can record in detail, results from performing issues and tasks and the state of initiatives, and associate it with the basis for that activity, and visualize them quantitatively is needed.

3. RA-Concierge System

In this research, we have proposed the "RA (Research Activity)-Concierge," a comprehensive help system for general research activities, introducing a gamification platform for organizing issues and tasks based on seminar content, and visualizing research activity based on performance of the tasks. The system provides a service that seamlessly connects seminar content with research activity. We introduced eight types of game elements including "Goals," "Visualization," "Rules," "Design," "Social," "Tutorial," "Difficulty adjustment," "Play cycle." Students gain a range of experience in research activities by setting and performing actions subdividing research activities into step-by-step elements. To assess the level of achievement of goals, we prepare three types of evaluation method: self-assessment, mutual evaluation, and mechanical estimation. We provide virtual rewards such as badges and other items as a mechanism for giving appropriate feedback and producing a sense of accomplishment. As shown in Figure 1, the RA-Concierge system consists of three basic tools: the Research Activity Organizer (RAO), the Research Activity Visualizer (RAV), and the Research Activity Watch-dog (RAW). RAO is a tool for organizing issues and tasks based on seminar content, and RAV is a tool for visualizing research activity based on performance of issues and tasks. RAW is a tool that constantly monitors the information input and output from RAO and RAV, describes the current state to the user and makes recommendations for action. It is also used to give information feedback and provide visualization for gamification.

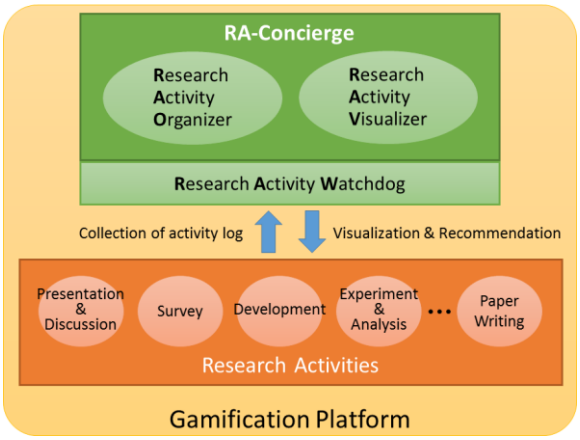

Figure 1. RA-Concierge system overview.

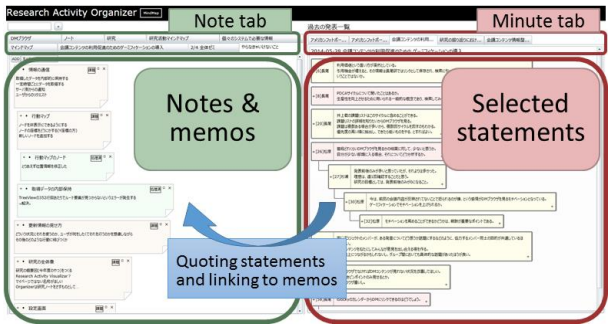

Figure 2. Research Activity Organizer.

3.1 Research Activity Organizer (RAO)

A screen shot of RAO is shown in Figure 2. The user first selects statements that need to be organized in Discussion Browser, such as those including the issue to be studied or tasks to be performed in the future or otherwise may need to be referenced in the future. The text of the selected statements are sent to RAO, and are displayed on the right side of the screen as shown in Figure 2, organized by presentation. Then, users organize the statements on the left side of the screen, while viewing them on the right side of the screen. Users can create notes for various research activities, such as surveys, implementation, or writing papers, and record detailed information in memos. It is also possible to

attach a status attribute to created memos, such as Task, In-progress, or Completed. Actions can also be selected on an action map of research activities, which is described below, and attached to memos in the form of tags. Thus, by creating notes for each issue, task and other day-to-day research activities that need to be done, and creating memos to record details, seminar content and research activities that follow from them can be linked and organized.

3.2 Research Activity Visualizer (RAV)

For this research, we used external tools and systems as much as possible for recording digital data, so that results of putting issues and tasks into practice can be handled quantitatively. In our laboratory we use both commercial software and independently developed software. An API or plug-in is used to retrieve information from each external tool or system, and when the user performs a research activity based on an issue or task, an outline of the action is retrieved by RAV.

RAV is a tool for visualizing research activity, but it is not limited to only one way of expressing activities visually. Currently, it can visualize issues, tasks, and relationships to results from related research activities organized with RAO, on a research activity map (Figure 3) that shows a breakdown of research activity issues and tasks. It can also present the processing state of such items quantitatively.

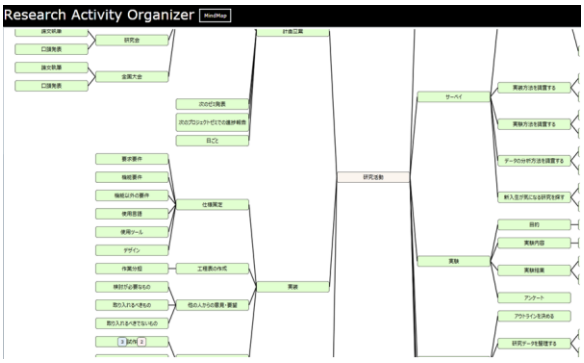

Figure 3. Research activity map.

3.3 Research Activity Watchdog (RAW)

RAW is a tool that runs on a PC, tablet, smartphone or smartwatch, sending notifications to users. The RAO and RAV applications run on a PC or Web browser, but users are not always at their PCs, so this tool can present issue and task progress or results of monitoring research activity statistics, and also recommend actions to do next, or give gamification feedback information such as awarding badges or evaluating activities. It can also be used as an easy communication tool within the research group.

4. Conclusion

In this research, we have proposed introduction of a comprehensive gamification platform for general research activity. To achieve this, we proposed and prototyped the RA-Concierge. A future task is to verify the effectiveness of gamification through practical use.

Acknowledgements

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