How serious do we need to be? Improving Information Literacy skills through gaming and interactive elements

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Introduction

Nowadays technology makes information accessible for everyone everywhere. The art of selecting the best information in a short period of time and use it correctly is called information literacy. Information literacy training provides students with the tools necessary to efficiently find and correctly use the information needed for learning purposes. Acquiring these skills is a process that takes time: during the whole academic period, learners need different information types that require other ways of information seeking and processing. The Millennials, the new generation of students that now populate the universities have a new way of processing information. They have a very short attention span and they are more critical about the what, when and how they learn [Oblinger, 2005]. Classical learning methods, where teachers tell students what they need to do are not attractive. Students get bored quickly, not paying attention to the lesson. How can libraries offer those lessons in such a manner that students get motivated to learn and use it every time they search for information? The challenge for academic libraries is to motivate students to acquire information skills, so that they use these skills in their academic study and keep looking for new tips and tricks on information retrieval. The approach to how to get students to this point is a concern for academic libraries. Learning methods can be used to improve educational materials on information literacy. Many libraries are making efforts to develop more effective ways of teaching information literacy. This paper aims to contribute to this issue, describing a research project on the learning effects of students using a game and a web-based tutorial on Information Literacy developed by the Vrije University Amsterdam.

Facts influencing learning effects in information literacy

There are different kinds of environments where information literacy is taught that need to be considered when a library intends to maximize student learning effects. For example the kind of students libraries deal with, the learning methods and the skills of the library staff itself are all relevant factors that influence the effect of information literacy training.

The Millennials, the new generation of students who were born between 1982 and 1991, use internet as part of their daily lives. A 24/7 approach is the best way to describe it: they use it everywhere and for everything, from dawn to dusk, for learning and for pleasure – and actually mostly just for pleasure: meeting friends, listen to music or gaming. This digital generation knows how to use the internet. The huge amounts of hits they get when using a search engine makes them believe that they can find relevant information. It's a *net* generation, not only because they use the internet for everything in their lives, but also because they interact intensively with others of their age, making connections very fast when they need it [Boschma and Groen, 2006]. They are not intimidated by people they don't know, interactive multiplayer games on the internet teaches them to meet others for particular purposes and forget about them when they don't need them anymore. When they start scrolling on the first page of results they found and they don't know where to start reading, they ask their colleagues how to do it, asking for help immediately. Visualization is another key word for this group. Video's and pictures easily catch their attention. Librarians need to consider these characteristics of the new students when they decide to improve their information literacy courses. A common scenario is that students get bored quickly when the lessons don't trigger them to pay attention [Doshi, 2006; Smith, 2007]. Using methods that fit their way of thinking and acting is a powerful way to motivate students to get engaged in the course.

The number of teaching hours that is assigned to a librarian by a faculty is usually limited. That means that librarians have a relatively short time to teach students information literacy skills. The average time academic librarians get to spend with their students varies between 45 minute and 2 hour sessions. There are different reasons for this. An important one is the lack of library personnel that can give full attention to training students in information literacy [Taylor, 2006]. Another one is the lack of interest by faculty members to get information literacy embedded in their academic courses [Ducas and Michaud-Oystryk, 2004]. At the Vrije Universiteit Amsterdam information literacy is not embedded in all faculty courses yet. The range of involvement of faculties varies between a link in the learning environment to the course material to a full student supervision process on information literacy during

different stages of the students' education. Information literacy skills help students to improve their capacity of searching and evaluating information. It is not, however, a kind of knowledge that students need to learn by heart. If a student is unable to type well for example, he will spend more time typing than others, but eventually he will get there. The same is true for a student that doesn't use his information literacy skills. This is the main reason why faculty members often don't see the importance of information literacy training in their curricula. Even in the courses where information literacy training is embedded, there is a lack of specific evaluation of students on their abilities to find and use relevant information sources. A learning tool on information literacy needs to fit all these realities. It needs to be an environment where students learn, practice and are evaluated simultaneously.

Innovative teaching styles can improve learning effects. Active learning techniques are specifically successful for effective learning [Bonwell & Eison, 1991; Prince, 2004]. Learning is an active process, where students need to get engaged in the lesson, participate in the lecture and analyze the way concepts have been created. It's important that students don't just listen to what teachers want to explain; they need to write, ask questions and get involved in class discussions. Accordingly to Bonwel and Sutherland "students are simply more likely to internalize, understand, and remember content learned through active engagement in the learning process" [Bonwel & Sutherland, 1993, p.3]. Students are better motivated to learn when they know why they are learning and when they will need it [Smith, 2007]. The new generation of students even need more attention if libraries want them to engage. These visually-oriented students have trouble listening to a teacher in front of the class for 2 hours, however they are eager to learn in collaborative activities where they need to work in groups rather than listen to a teacher [McGill, 2004].

There are different examples of active learning methods being used by libraries for classes on information literacy. Problem-based learning is a method commonly used to get students to participate in the lesson by solving a real-world problem. The Purdue University Libraries use newspapers and magazines to select real-life problems or situations on different topics that need a solution. Students read the article and formulate a hypothetical solution. They search for information related to the problem given [Smith Macklin, 2001]. Ward describes a course where students find information to help a local business solve a problem in its organization [Ward, 2000]. At Williams College in Massachusetts first-year students need to solve the mystery of the theft of a rare book by searching the Proquest Historical Newspapers database [Doshi, 2006]. These examples demonstrate how to embed information literacy training in a real-world context. This method links information literacy skills to daily life issues . It makes the relation between learned content and the need for students to adopt a methodology for information seeking stronger.

Other examples illustrate how interactivity might improve online course material. As Dewald et al. points out: "interactivity in online education makes the difference between an information source and a learning experience" [Dewald et al., 2000]. When a web-based instruction doesn't have interactive elements that invite students to think about the content they are reading or listening to, the learning effect is suboptimal, and is a passive learning method that appeals to people who prefer text-based learning styles,because it looks like an online book that can be read from the screen. Even if the online course material uses video or other visual elements where students can watch how to use an electronic database, there is still a lack of interactiveness unless students can get some hands-on experience during or after the explanation. An example of an online tutorial with interactive elements is the Internet Scavenger Hunts, a platform where students of all ages need to locate information using key words and different websites and search engines [Eagleton et.al. 2003]. The online tutorial from the University of Illinois at Chicago gives directions on how to use Boolean operators. By moving the pictures of birds and other animals to the categories: Africa, birds or "Africa AND birds", students learned the notions of the Boolean operator AND. The web-based instructions at the Vrije Universiteit of Amsterdam offer multiple choice questions during the online courses so that students can check if they understand the information given. These are good examples of interactive elements helping students to exercise with the information learned.

Institutions that use educational games are positive about serious gaming since it fits active learning principles, it emphasizes cooperation and gives a stimulus to better learning [DeKanter, 2005; Ebner & Holzinger, 2007; Martin & Erwing, 2010; Oblinger, 2005; O'Leary et al, 2005]. It can be another way to introduce interactivity in information literacy courses. Gaming is a powerful method for teaching Millennials. It fits the learning style of this generation of gamers who prefer learning-by-doing instead of listening to explanations by a teacher in front of the class [Veen and Vrakking, 2006; Boschma and

Groen, 2006]. Digital natives (another term used to define the Millennials) love using technology and that gives them an extra impulse to play a game and learn from it [Oblinger, 2003]. A game is based on the principle of trial-and-error. If you make a mistake you can try again till you get it right and then you continue. Usually gamers don't read the manual before they start playing. They just start playing and see where they go. When a level turns out to be difficult, they get help from peers on the internet, for example through video's on YouTube where other players explain how they proceeded. They trust the information of other players and they don't turn to the makers of the game for instruction.

There are different kinds of games that have been used to explain elements of information literacy. Some of them are easy to make and can help to reinforce lectures in the classroom. Crossword puzzles on Boolean Operators and the Copyright Tic Tac Toe (which pinpoints issues like plagiarism and academic integrity), are games used by the University of Nortre Dame to test the information skills of students. It brings variety to classroom sessions [Smith, 2007]. These games are printed and distributed during the lecture to give the students a moment to think about the subjects learned [Smith, 2007]. Different libraries in the United States[1] have developed a Jeopardy-style game and have used it at the beginning or at end of lectures [Leach & Sugarman, 2006; Krajewski & Piroli, 2002; Walker, 2008; Ury & King, 1995]. The Library Jeopardy consists of questions on information skills and library concepts [Walker, 2008]. When the librarian starts the course with the Jeopardy game, he can test the information skills of the students [Walker, 2008]. Used at the end of the class, the game becomes a review of the content explained by the librarian [Walker, 2008]. The students can answer the questions during class, raising their hands [Walker, 2008]. One negative aspect of this method is that not all the students need to answer the questions, making the assessment only partial to those that are actively involved in the lesson. Students that don't want to participate are not trigged to do so and learn less than the students that are involved answering the questions. In Germany, different university libraries make the game Letterheinz available through their library websites. Letterheinz is a jump'n'run flash game where the worm Heinz needs to make his way through different obstacles and eat the letters shown on the bookshelves. At the end of each level the gamer gets some information or tips on using the library. This game has not been integrated into lessons on library skills. Students are free to play it outside their study hours. Again at Williams College, students need to solve a macabre mystery: discover what happened to the skull of the university founder Ephraim Willem which is missing from his grave. To introduce the mystery, the library produced a video with the plot. To solve the problem students in groups need to search in archival content and online resources. According to a news item on the Willem College website, the responses have been very positive. Students like this way of getting introduced to library resources, meet another students and have fun.

Though different libraries are using interactive elements and games to improve the attractiveness of their course material, and the fact that the first reactions have been positive, there is a lack proof that those elements actually improve the learning effect of students. This paper aims to contribute to this discussion showing the results of a research project that compared the effectiveness of a web-based tutorial to an online game on information literacy at the Vrije Universiteit Amsterdam.

Methodology

The research project aimed to measure the learning effects on students using the web-based tutorial Information Literacy, and compare this to students using the online game called "Saving Asia". Methodologically the research is based on a quasi-experimental design that measures the causes and effects between variables. In a quasi-experimental design is it not possible to choose the students according to criteria like background and experience; the groups were chosen by chance, students could determine in which group they wanted to make the test. The research has taken place in a test environment, which means that students have not been tested in their real study environment. First-year students from different faculties were invited to take part in the test and were paid a small amount of money for their efforts.

The quasi-experimental design measures the students' knowledge at the beginning and after the experiment with a pre- and a post-test. A pre-test shows what the students already know about information literacy before they start the game or the web-based course. By comparing the results of the pre- and post-test that is taken after the student completes the game or attends the tutorial, is it

[1] As known: Georgia State University Library, Pennsylvania State Berks, the Northwest Missouri State University and the Simmons College

possible to measure learning effects. Comparing the results of the two groups, is it possible to distinguish the group that achieves a better learning effect. The research model is illustrated below:

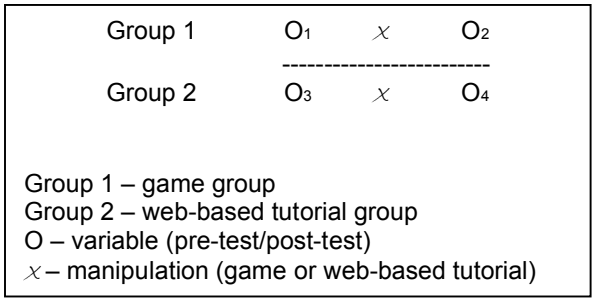

Figure 1: Diagram of a quasi-experimental design

Variable O (the test) is the same for both groups, before and after manipulation takes place. Manipulation *X* is the knowledge that students absorb while playing the game or attending (?) the tutorial. Measuring the students' achievement is an excellent way to detect if the learning method used achieves the expected results. Is the approach used to explain the topic effective? How can libraries know that the way they explain the *content* is getting through? Do the students understand the explanation that has been given? Students' achievement is not only affected by the attention they give to the explanation and to the efforts they make to learn, but also by the way the explanation has been formulated and presented. For academic libraries and faculties, measuring learning effect is the ultimate way of evaluating learning materials and teacher performance.

In the pre-test and post-tests the students answered identical questions. The test was divided into four subjects that were both part of the game and the web-based tutorial. For each subject the students needed to answer five questions. The subjects that were measured are:

- Formulating a research question
- Identifying key words, synonyms and key phrases
- Combining key words (Boolean operators)
- Quality criteria of information: evaluating the information found

Students were invited to be part of this research. They could choose if they preferred following the game or the web-based tutorial. Students chose one of the groups based on different individual aspects: time schedule, number of hours, fee, etc. Students chose moments that did not impact their schedule. Some students preferred the web-based tutorial because they did not want to spend many hours doing research. Some students chose the game instead of the web- based tutorial because the game test was planned for 8 hours, which meant a higher financial remuneration. The web-based tutorial last 3 hours. Students were not allowed to do both tests because the learned content gained in one test could influence the learning effect of the other test.

In this research only the influence of cognitive aspects of the learning effect has been measured . The effect that emotional aspects can have on learning is much more difficult to determine. An emotional aspect that is known for influencing the quality of learning is for example social activity in the group. The test groups were only together for a couple of hours. Only the students that already knew each other had intense social interaction during the time they were reading (attending?) the tutorial or playing the game. Social activity is part of the game because students compete with each other, but we couldn't compare this social activity with the activity of the group using the web-based tutorial. Another aspect that has not been measured is the attractiveness of the course content. This aspect is already part of the yearly student evaluation of the information literacy course.

The learning methods

The web-based tutorials on information literacy were developed by subject librarians of the University Library of the Vrije Universiteit Amsterdam in 2006. Ever since it has been kept up to date. There are

web-based tutorials for various levels, academic disciplines and languages[2]. A web-based tutorial contains four to seven sections. At the end of each section a number of multiple choice questions is presented to the students in order to see if they understand that particular section. Students receive instant feedback on their answers; they can immediately see if their answers are correct or not and why. The web-based tutorials have three different levels of complexity: beginners or A-level, intermediate or B-level and advanced or C-level. Level A is for the bachelor freshmen and provides them with practical knowledge on the library and teaches them how to work with academic information. Level B is for students who need to write their first essay. Students learn how to do a systematic literature search, how to evaluate the information found and how to incorporate it in their essay. Level C is meant for master students who need to write a master thesis. Students learn how to keep track of scientific developments in their field, administrate the information found and keep up to date using rss-feeds, email alerts and discussion groups. Each web-based tutorial lasts about 2 hours.

The tutorials are given to students in cooperation with faculty teachers. Faculty teachers can choose to remove some sections or add content from other course levels so that the tutorial exactly fits into the faculty educational program. For different academic disciplines specific sections are available in cooperation with the faculty teacher.

The web-based tutorials can be followed individually. No guidance of a teacher or library staff is needed. The tutorial is freely available on the internet and students can follow it from home if they like. Most faculties choose to schedule a computer room to make sure that students follow the tutorial during class hours. The students can be assessed by having them write an essay, or by making a test or exercise which gives them points related to the course program they are following. The way students acquire Information Literacy is strongly connected to the way faculty teachers embed the tutorial in the faculty course. If there is a direct connection between the tutorial and an exercise that needs to be made or a test that students need to pass, student motivation for acquiring information literacy increases.

The library intends to evaluate the tutorials every year with students and teachers using an evaluation form for the students and short interviews with the teachers. Every year the library staff looks to see whether new changes need to be made so that the tutorial is always up to date. A remark often made by students is that they find the web-based tutorial very useful and very boring at the same time. Interviews with teachers show us that students at the end of their academic study don't know how to cite well or identify a reliable source, topics that are part of the web-based tutorial. These comments inspired the library to look for learning methods that help students better assimilate the content.

The game Saving Asia was developed mainly as a trial to see if a game is a better tool to teach Information Literacy. To make the game useful in addition to the existing web-based tutorial, it has been developed for a different group than the regular students of the university. The purpose of the game is to teach exchange students to learn how to find free academic information on the internet. The idea emerged from the fact that some exchange students from developing countries do not have the expensive electronic databases that Western universities can afford. After a short period of time in the Netherlands, these students usually go back to their countries and then realize that access to scientific information is much more limited. Learning how to find free scientific information on the internet allows them to fill the information gap to some extent. The game has been developed in collaboration with the Institute of Social Studies at the Netherlands (www.iss.nl) which works mainly with foreign students from developing countries. In 2009 the game was tested and improved.

The game Saving Asia is a multiplayer game that uses the Cyberdam platform[3]. Students compete with each other to achieve the position of Junior Advisor in a country in Asia that has been hit by a tsunami. As Junior Advisor, the student is allowed to help this country recover. The students need to choose a subject, write a research question, find key words, look for scientific information on the internet and evaluate the information found according to several quality criteria. For each task students get points. The points are updated by the teacher or information librarian after each assignment and the students can do extra tasks to improve their scores. The student that gets the highest score wins.

[2] See the list of web-based tutorials on our course website http://webcursus.ubvu.vu.nl/cursus/default.asp
[3] http://games.cyberdam.nl

Because the game is developed by different educational institutions, it is quite general and can be used by other institutions as well. The game takes five hours to play. The first two hours of gaming is coordinated by the teacher or librarian. He or she explains the aim of the game and coordinates the first steps the students take. The students do their first assignment in the presence of the teacher. After that they need to complete three more tasks that can be done at home. The teacher explains the deadlines of the assignments. Each task is assessed by the teacher, who also updates the student scorecards. The teacher is able to communicate with the students through the game platform, both with the group as a whole and with individual students. It allows the teacher to give individual feedback. The last hour of the game is coordinated by the teacher who answers questions and announces the winner.

Measurement of learning effect

Thirty four students were engaged in the research. All the students were first-year bachelor students. The Social Sciences students were already acquainted with the web-based tutorial level A (for the test the web-based tutorial level B was used). Students from other faculties had no familiarity with information literacy courses at this university, but they might have had some instructions at high school. The pre-test was designed to measure the starting level of the students before starting the test, so that we could identify and take account of their starting levels and their possible influence on the test results.

The students did the web-based tutorial or the game in a test environment. These students were invited by the University Library and received a remuneration for their participation. It is possible that students got higher scores when participation was obligatory for their study and if they needed to pass the test with good grades. It was not possible to include this “motivation”-factor in the test environment. Students were aware of the fact that they didn’t need to pass the test.

The students were between 17 and 30 years old. Most of them were 18 or 19 years old. Twelve men and twenty two women participated. In total eight groups completed the test. The first four groups did the test in October 2009 and the other groups followed at the end of November and the beginning of December 2009. The group size fluctuated between 2 and 10 participants each. For the test with the web-based tutorial the amount of participants was not an issue, but for the groups that played the game it was very important to have at least four participants in a group.

The results

All students did a pre-test consisting of twenty multiple-choice questions. The questions were divided into four sub categories related to the four topics analyzed in this test: (1) writing a research question, (2) identifying key words and finding synonyms, (3) combining key words in a search query and (4) analysing quality criteria for scientific information. For each topic the students needed to answer five questions. In the post-test the same questions were used. The tests were done anonymously, thus making it impossible to trace individual learning developments. One question about the topic “formulating a research question” was ignored in the final results of the test because the pre-test showed that 90% of the population answered this question correctly. It seems that this question did not make enough of a distinction, and therefore was not included in the final results.

Group	Average score
Game pre-test	4,2
Game post-test	7,0
Web tutorial pre-test	4,6
Web tutorial post-test	6,1

Figure 2: average overall score

The average scores of the different groups give us a good idea of the learning achievement of the average student per group before and after using the instructional material. The end score shows that the game group achieved 0,9 points more than the web-based group. When comparing the pre-test and post-test scores, the difference is bigger: de game group learned 2,8 points, and the web-based

group 1,5 points, a difference of 1,3 points. With these results we can conclude that the game group learned more than the web-based course group.

To measure the learning effect, the difference between the pre-test and post-test of each group was taken as a parameter. The difference between the starting level of knowledge before having done the course or game and the knowledge they acquired during the test program was measured. The results are shown in the graph below.

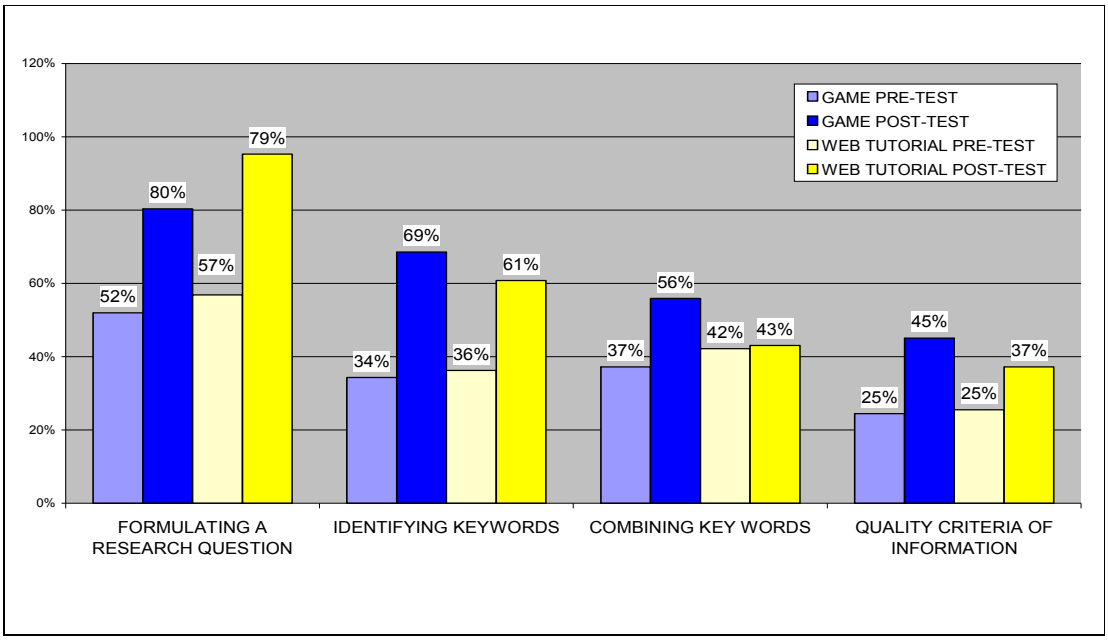

Figure 3: Table results pre-tests and post-tests per topic

In figure 3 the percentage of correctly answered questions for each topic is shown. The four pillars of each topic symbolize the groups and the tests taken. The first two columns represent the game groups. The first column shows the results of the pre-test and the second column the results of the post-test. The third and fourth columns are the same for the group that followed the web-based course. The fifth pillar shows the percentage of incorrectly answered questions for both groups together.

Analyzing each topic learned, we see that for the topic “formulating a research question” both groups answered about 80% of the questions correctly, indicating that for this topic both groups did equally well, but if we compare that with results of the pre-test, we see that the game group showed slight progress compared to the web-based course group. The main reason for this is that they had a lower starting level when they started the test than the other group. At the same time we can conclude that for this topic both groups learned about the same, which could be explained by several factors. The game and the web-based course do not explain the content in so much detail that students can get a 100% score. Another explanation might be that they are unable to process so much information at once, and thus miss some information in the final test. Also the students, knowing that this test was not going to influence their study results, just might not make an effort to think properly about the answer. Perhaps if the students had had time to organize the information and study for the post-test, they would have achieved better results. It is difficult to know why students don’t get a 100% score for the test. Furthermore, this analysis was too limited to take these factors into account as well.

Students of both groups learned the most on “Identifying key words”. We saw an increase of more than 30% for the game group and more than 25% for the web-based course group. On the topic “Combining key words” the web-based group learned hardly anything from the explanation given in the course, although this group knew the most about this subject at the pre-test results. For this topic the explanation in the web-based course will be enhanced.

As regards “Criteria for quality of information” we see the largest learning difference between the two groups: the game group learned 20% and the web-based tutorial group 12%, a difference of 8%. In

the web-based tutorial this topic is explained in a three-page long text, where you can read why it's important to analyze the quality of information and which criteria you need for the analysis. In the game there is a short explanation of the "why" and an exercise asking students to evaluate the articles found by other students using the quality criteria. With these results we can conclude that exercising with the information to be learned helps to improve student outcomes. But as we see from figure 3, students of the game groups learned only 45% in this topic, which means that they didn't learn enough to get an average grade. There are different factors that might explain why these results were not so spectacular. Firstly we see that on this topic the students knew very little about this subject before they played the game or read the web-based course, and the improvement they made in their learning was less than in other topics (with the exception of the web-based group at the "Combining words" subject). Perhaps because of the fact that the students are not acquainted with this subject, they didn't see the relevance of it. When a subject is considered not in the students' interest, they are not motivated to learn and therefore obtain less results. Secondly, comparing this topic to the others, it is more abstract and requires more critical thinking of students. The first topic on "Writing a research question" the students are already acquainted with the subject, they just improved their knowledge on the topic. The other two topics were subjects that you can use on a daily basis when searching for any kind of information when using a search engine. The practical utilization of the learned subject can be a good motivation for learning. Generally students are unaware of quality criteria when searching for information on the internet. Though in both courses the importance of being critical of the information found is explained, students still did not get the point.

When looking at the overall picture, the game Saving Asia proves to be a more effective instrument to teach students on the four topics than we used. This is a promising result but we are not there yet. The game Saving Asia did not produce any students with excellent (90-100%) results. Perhaps getting excellent results without an extra moment to absorb the content is a dream that will never come true, because in general we need some more time to learn than a few hours in a course setting. Today's reality is that librarians are confronted with the problem that there is not much time available for teaching Information Literacy in the faculty curricula. That is why it is so important to provide students with the most compact and effective information literacy programs as possible. Nowadays students need to learn how to improve their information skills in a couple of hours. Getting the information and putting it into practice needs to take place at the same time. Librarians are challenged to integrate the explanation and the understanding of what has been explained – the learning as such – in one single moment. And so both the explanation and the exercises need to be integrated as much as possible.

In this case the use of active learning techniques is not only an effective way of improving student achievement; it might even be the only way of teaching information literacy in this context. In both learning settings – the web-based tutorial and the game – techniques of active learning have been applied. A game is a learning tool that starts with students focusing on acting and explanations are only given when needed. The web-based tutorial includes multiple choice questions that test how much students absorb of the content they read. Feedback on these questions is given immediately, which might lead to students that do not think very hard about an answer. Since answering these questions is not obligatory, students can skip then if they want to. Analyzing both learning methods, we can conclude that students participating actively in the game setting influenced their learning achievement positively. This conclusion doesn't mean that a game is the only solution for a better learning achievement. Using active learning methods properly can improve learning achievements in different situations, even in a classical setting.

In this test possible emotional factors where not measured. We cannot tell whether the competition component embedded in the game influenced the students' motivation. If it did, then a game should result in an better learning achievement than other active learning techniques. Our experience with the game test groups is that two of the four small groups that played the game really competed. After each task a score was shown in the game and students could see their status. In two of the groups, students started to do extra tasks to get better scores. When this happened, other students started to do the same and then the competition really got off. In two other groups this did not happen. The tests were made anonymously and unfortunately there was no way of measuring whether the groups that started competing and performing extra tasks got better results.

Conclusion

Especially nowadays, in the information age, academic students need to be aware of information literacy skills and utilize them when retrieving information. Libraries are using different active learning methods to get better learning achievements in their information literacy courses. The Vrije Universiteit Amsterdam has developed a web-based tutorial with interactive elements and a game on information literacy. To measure the learning effect of both learning methods, a quasi-experimental design research was used. Students that played the game got higher scores than students that followed the web-based tutorial. This conclusion doesn't mean that games are better than web-based tutorials, but the features on both learning methods need to be investigated more thoroughly to get a good understanding of what makes one method more powerful than the other. In the game "Saving Asia" students are actively engaged from the beginning till the end: they are involved in the game plot, being a candidate for the position of Junior Advisor in a country in Asia that has been severely hit by a tsunami. To get to the end of the game, students need to fulfill several tasks that teach them how to find free scientific information on the internet. The web-based tutorial makes students follow a course on information literacy on the internet. The tutorial offers students multiple choice questions so that they can check their understanding of the subject. These questions are not obligatory and they require less critical thinking than the tasks the game students need to accomplish.

A better learning achievement can be achieved when students get more involved in their learning, when they experience and understand the content better. The more active students get, the faster they will learn and the better their skills will be. Interactive elements can help to improve this process, a game is a way of presenting interactivity, but is not the only one. For example visual elements catch the attention of the net generation better than text-based components. When a web-based tutorial is enriched with different interactive elements that have been richly visualized, it might obtain the same results.

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