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GAMIFICATION FOR LIBRARIES:
Improving information retrieval teaching through gamification

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ABSTRACT

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Gamification, in other words the use of game elements in non-game environments, is a rapidly growing field in the past decade. It is often associated with increasing participants' engagement in activities and attracting them to organisations. In modern society, libraries are seeing a decrease in visitors and users. Thus, they are searching for new ways to improve their services and satisfy more patrons with new and innovative services.

The desired outcome of this thesis is to investigate whether the use of game elements in the information retrieval teaching provided by academic libraries can positively affect the learning outcome for the first-year students. After investigating theories of play and previous research on the topic, a field experiment was designed to examine how the existence of gamification can improve the benefits of information retrieval teaching sessions. The results of this thesis were not what was originally anticipated. They are reflected on the tradition of play and gamification and used to propose ideas for future research on gamification's effects on library services.

Keywords: gamification, information retrieval, libraries, motivation, library teaching, learning

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

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1. INTRODUCTION

In our modern world, the needs of library patrons have changed. As a result libraries are in need to adjust to this shift and evolve, in order to survive and continue to thrive. In the past libraries were the information centres and the librarians were the information moderators. Nowadays, we have easy access to an abundance of information, and we may turn our back to the libraries. The libraries are in need to re-evaluate their role in the community they serve and rediscover their goals (Woodward, 2009).

The Deakin University in Melbourne or Australia conducted a research with the goal to discover the real needs and wishes of their patrons. For the purpose of that study, 23 researchers from all faculties and research fields were interviewed. To everyone's surprise, there were many similar points and arguments in their answers. According to the results, the majority of the researchers prefer to work from home, instead of spending time at their office and other spaces of the university (including the library). They rarely use the library, instead they prefer to use online resources. At the same time, there was a part of the researchers that claimed printed material is more useful to them. While flipping through pages, they can get ideas and inspiration for their work. (Moncrieff, 2007)

Another very interesting result of the study was the participants' thoughts about the libraries' future. Many stated that they would be saddened if the university library would close. Even the ones who rarely visit it, enjoy the interaction with the staff and other researchers or students while searching for material through the shelfs. For example, a researcher mentioned he only visits the library premises to enjoy a moment of networking and stimulating discussion at the coffee corner. In the future, such practices can bring new life to the libraries and help them and their patrons in the long run (Moncrieff, 2007).

In many countries, academic libraries are known for the information literacy and information retrieval teaching sessions they offer to new students. The purpose of these sessions is to provide the students with tools and skills that will help them succeed in their studies. The matter of the information divide is much more complex than to be susceptible to one technological solution. Providing access to databases, is not enough for the academic library to succeed at the task of satisfying the needs of its patrons. In an information intensive society, the real problem is the great gap between those who have the skill to understand and use knowledge and those who do not. (Baro, 2013)

Our information heavy society has raised a new generation of learners that respond better to a more dynamic and interactive teaching approach. Nowadays, game elements are often used to engage students of all ages and shape their behaviors in the classroom (Wintermeyer, 2015). The purpose of this masters' thesis is to study the effect of gamification in information retrieval teaching sessions that academic libraries provide to first year students. My goal is to examine the impact of Play and the use of game elements in an information retrieval teaching session.

Such a teaching session was designed and facilitated for the purpose of this thesis. A field experiment with the method of A/B testing was followed with the use of a control group to help measure the effects of gamification in the teaching session. The participants were assigned to groups in random, without focusing on educational background. With random assignment of groups, the results of field experiments like this one can be more reflective of the real-world reality. A pre- and post-survey was given to all participants at the beginning and end of the session to measure effectiveness of the teaching in the participants' skills and confidence in using these skills for their future research needs.

2. BACKGROUND

The purpose of this chapter is to introduce the reader to the topic and the gap in the academic world this study is aiming to fill. In order to achieve this, former research relevant to the topic of this thesis is presented. Firstly, there is an attempt to present shortly the history of libraries, their purpose, contribution and evolution through time. Secondly, definitions of gamification are explained. Lastly, previous adaptations of gamification in the world of libraries are discussed.

2.1 Libraries

Even though the origin of libraries is not known, findings indicate that they began appearing after the prehistoric era. According to Harris (1984), a library is a collection of graphic materials arranged for relatively easy use, cared for by an individual or individuals familiar with that arrangement and available for use by at least a limited number of persons.

In ancient times the libraries were protectors of knowledge. They were archives accessible only for important researchers. With the passage of time, libraries became an organized collection of documents in different formats available to the community for referencing and borrowing. Nowadays libraries' main focus can no longer be content and information, while the web has become an endless source of information for all fields and disciplines. Thus, the values and goals of libraries are changing. In order to survive this age of information the libraries need to evolve. (Schmidt and Etches, 2012)

Such as every other aspect of the society, the libraries are affected by social, economic and political conditions. The social factors include the level of literacy and education provided in a society, as well as the possibility of leisure activities. Economic prosperity is linked with the flourish of libraries. Libraries work as storehouses for business records and offer research assistance for future technological and commercial growth. The political factors generally mean the existence of a government that allows access to immense volumes of national and international information. To summarize, it appears that economic prosperity, secure life and stability, and governments that stimulate literacy are needed for the thriving of libraries. (Harris, 1984)

Johann Guttenberg's invention of the printing press, in 1450, could have been stimulated by the news of the "block printing" which was used in China and Japan since the eighth century. Within fifty

years, printing spread through Europe and more than 250 printing presses were established in Italy, Germany, Switzerland, and France among others. According to Briggs and Burke, 27.000 editions were reproduced by the year 1500. This can mean that approximately thirteen million books were distributed in the Europe of 100 million inhabitants. The most significant and busy centers of printing were in Venice and Paris. (Briggs and Burke, 2002)

This outburst of information began to affect scholars, who faced problems with information retrieval and some complained that the number of titles was so great one could not read all the printed books. Libraries saw the need to adjust in this new reality and became larger. Book retrieval was difficult and catalogues became crucial. Librarians needed to classify the collections and keep those catalogues constantly up to date, in an attempt to better service their patrons locate the preferable or needed books. (Briggs and Burke, 2002)

Nowadays, offering the best UX to a library's patrons is becoming crucial. Rethinking and rearranging the library's space may be a difficult and time consuming task but it can help refresh the library's brand. However its benefits will be outstanding in the long run. In such projects collaboration with the library's patrons can have a tremendous positive impact on the outcome (Schmidt and Etches, 2012). In Kreodi's article (2012) one can learn about the effort of Laurea UAS Library to upgrade their services in the Kerava unit using eye tracking technology. Using the eye tracking device students were asked to perform basic tasks within the library such as retrieving material from the shelves. Their comments were recorded and analyzed afterwards. The useful feedback of the university students resulted in various changes in the library space. Some of the material was moved to a location preferred by the students. At the same time, signs became color coordinated to visually assist students locate the books they need. The natural continuation of this customer feedback research was a space development project. The majority of the participants commented on an empty space within the library being dull and depressing. Thus the library in collaboration with a team of students worked on developing the space into an attractive sitting room area. After the creation of this corner the library started hosting small events during the international week of the Laurea UAS Kerava unit. Students' library visits increased and many more students started using their laptops in comfortable armchairs rather than in the library's computer room. According to Catalano et al (2014), nowadays, there are two kinds of behaviors presented by the libraries' patrons: study behavior and leisure behavior. Academic students often tend to use the library's premises for non-study purposes. In order to facilitate this new patron behavior, the creation of sitting areas is essential. A comfortable and pleasant space within the library can attract more visitors that can eventually become regular library users.

Of course, one should not forget that a library's e-services are a big part of the Library UX. In their book "User Experience Design for Libraries" (2012), Schmidt and Etches explain how integrated library system (ILS) vendors offer unattractive products. Since all products in the market are similar, there is no big variety of possibilities for a library to choose from. At the same time, libraries do not have the time, interest and budget to run a complicated data migration project from one ILS to another. Schmidt and Etches suggest the use of layer overlays over a regular ILS. Those overlays can allow the library to customize the display of the data. In this way, the users are experiencing a friendlier environment while the library continues to provide them with the same value data.

Moreover, many students are avoiding using an academic library's online services for e-material (e.g. the Finnish Nelliportaali) because of its unattractive layout. Google is the most successful search engine on the World Wide Web. Many believe the secret of its success is the minimalistic layout and the simplicity of its use. On the other hand a library's online services are often cluttered with explanatory text. Their use is more complicated to a new user and discouraging.

2.2 Play

Throughout history, play is often defined as an activity, either physical or mental, taken up during leisure time entirely for enjoyment and entertainment. In the following paragraphs I will attempt to understand a legacy in Play Studies. Play is an extremely multidisciplinary field of studies within the social sciences. There is the attempt to present the main argumentations in David Myers, Thomas Henricks and Mary flanagan's books. In specifics, this essay attempts to showcase the difference in the conceptualization of play presented by each researcher.

The pioneer on Play Studies appears to be Johan Huizinga. The Dutch historian and cultural theorist's study on the importance of Play in society and culture is cited in all three books presented in this essay. Huizinga acknowledges that play can never be so precisely classified and catalogued as other forms of thought in which we express other aspects of life within the society. However, he sets five characteristics that define play. Firstly, play is voluntary as it is not part of the natural instincts for survival. Players need to pause real life when they choose to participate in Play activities. The activities are based on pleasure and not duty or survival. Secondly, Play is an escape from ordinary or real life.While the play activity is in progress, the participants are aware that they are doing something temporary and different. They are fully aware that the experience is only pretending. Thirdly, play is secluded and limited. In play activities the demands and time of the outside world are

set aside and ignored. Play entails its own set of course and meanings the participants need to follow. Furthermore, play is an act that creates order. Challenges and obstacles are set and then resolved during the play activities. A set of rules allow the participants to focus on tasks at hand, repeat the activity if needed and communicate with one another. Lastly, play surrounds itself in secrecy. There is a shared awareness amongst the participants that they have separated themselves voluntarily from normal life. (Myers, 2009)

2.2.1 Thomas S. Henricks

In his book "Play Reconsidered" (2006), Henricks focuses on a sociological point of view during his study on Play. He presents the works and theories of his predecessors as argumentation for his own theory in Play Studies. The most precious points from the legacy of Play Studies presented in Henricks' book are the works of Georg Simmel, Max Weber, Erving Goffman, etc.

An interesting example of Henricks' presentation of the legacy that came before him is Georg Simmel's work on the role of play in society. Even though Simmel never organized his topics and observations in a comprehensive way, there are some interesting points on his take on how play is presented an essential role in a society. He believes that people make the decision to participate in social life after calculating the potential costs and benefits. He has created five types of participation in social life:

1. The Individual

People are to participate but at the same time also respect societal roles and purposes put in place. He emphasized how our involvement with other people's lives and with society in general is always based upon personal interest.

2. The Expressive

Unlike other animals, humans can acknowledge the concept of time. Also, physical needs and instincts are understood and people act upon them with full conscience.

3. The Flirtation

It follows a pattern of social relationship in which two parties feel close and distant at the same time. It is filled with the desire to manipulate one's emotions.

4. The Adventurer

An adventure is an event happening within a specific time frame, outside of ordinary life. An adventurer seeks out such experiences often as occasions to test character and enrich identity.

5. The Sociability

Events where participants gather to celebrate a common meaning are placed in this category. Just like in play, sociability entails not other reason beyond the event in question. The participants reaffirm their connections and role in the community.

Henricks created the following set of criteria that characterise play. First, play exists for its own sake. Players do not actively look for a purpose in play. In fact, trying to force play to an end ruins it, making it less and less "play". Second, players play following their own agreement. Third, play is special and set apart. Usually players create a special setting for play to take place, and no matter what their name is "stadium", "field", "court", they all serve as playgrounds. Fourth, play is fun, a standard more complicated than it seems because people can find fun in very different activities. And finally fifth, players play by rules. Rules are set in place to organize games and keep them going, while making them fun and interesting.

According to Henricks's study, any activity that fails to meet one or more of the criteria mentioned above violates the standards of play. This helps us clear the air about what is play and what is not. For example, it is difficult to picture an activity that is overly purposeful, ordinary, compulsory, random or unpleasant as play. We may play crossword puzzles, but we toil at double-entry bookkeeping. In the same way, competitive marksmanship counts as play, but one cannot make the same claim for a firing squad.

2.2.2 Mary Flanagan

In her book, Critical Play (2009), Mary Flanagan comments on how game studies' researchers often focus on computer gaming. In her research she instead focuses on artists and activists' use of critical play in their work.

She analyzes in depth the critical play of the Fluxus artists that emerged in 1960s and 1970s, where they toyed with the idea of the stage and performance. Their theatre usually consisted of vague instructions. The rules were loose and created opportunities to play. They also broke the fourth wall and toyed with the concept of the "performer". The artists in public spaces doing something bizarre is a performance, but so is the surprise or confused reaction of the passerby. Fluxus wanted to create art that can be understood by every member of society, not only by other artists or art knowledgeable people. They chose to create a more interactive form of theatre, including the audience in many more ways than conventional theatre often does. Fluxkits also made their appearance at that time. They

consisted of ordinary objects that allowed everyone to play with. The creators of Fluxkits wanted to create interactive and playful art and protest against “the idea of a framed piece of art on the wall”.

For Flanagan a very basic example of critical play transpire naturally is playing with dolls. Dolls are usually the tools used to enforce gender roles and stereotypes. As an act of revolution, many young girls since the birth of the doll industry would use dolls to break free from social roles. They performed violent fantasies and macabre funerals, and overall changed the way dolls were initially designed to be played with.

Flanagan finishes her book by comparing the classical play design method to her critical play design method. In both play design methods, firstly a clear goal and a set of values for the project is necessary. Secondly, one develops necessary assets and basic roles for the participants. The designer needs to rough out a framework for the play, tokens, props and character for example. The next step is to create a playable prototype and playtest. Finally, the designers ought to revise their work, verify the values and goals of the activity and repeat the process until the play activity’s results are optimal. The big difference is that in the critical play design, the designer of the activity needs to design thoughtfully for different play styles and playtest with a diverse audience. Critical design requires the shifting of authorities and power relations among the participants in the play activity.

2.3.3 David Myers

Myers’ book “Play Redux” (2009), is a multidisciplinary work. Using theories from cognitive science, literary studies and other fields in the effort of studying the nature of computer games.

Play is considered valuable for the society and its members as individuals. However, Myers tries to research how bad play, breaking the rules or fighting the code of video games can affect participants and be treated by the community of players.

Mostly used in literary work, specific formal characteristics of objects are set in place to determine their identity, consequence or essence. Contextualization and opposition have common attributes. In contextualization, the same number of elements establish game objects at the same contextual level. Each of these game elements has a finite range of values and each value decides specific game ramifications. On the other hand, opposition is a process activated by player ambition. Oppositional values are only valid among play objects existing at the same contextual level.

Myers' focus is on the relationship of objects and participants within the context of play and its rules. In the same way, real life objects (dogs, trees, etc) can become objects of play when it is needed.The bond between the objects and their representation within play has a special and constant set of design. The rules of the play session determine said bonds and create the objects' value. Play is considered as a self-reflexive and formal process that operates undoubtedly on its own form.

Myers' effort in "Garfinkeling" a MMORPG and its results are remarkable. "Garfinkeling" is a method for documenting how members of a community maintain social balance. Harold Garfinkel and his students created a set of experiments whose main goal was to disturbed social protocols. Myers from his side, decided to break social rules established by the gaming community while not breaking the rules established by the code of the PvP zone of the MMO game City of Heroes. While playing in the PvP zone, he used game features to his advantage. Game features that the players had agreed should not be used in order to balance the game for all player levels and skills. However, Myers' character broke this agreement and upset the order of the community of players in the server. During battles he attacked other players with methods that were considered as cheating by the players even though the game developers had willingly introduced such features in the game. Throughout the duration of his competitive play inside the game, opponents petitioned to have him banned from the server. Even the members of his clan, who at first were helped by his tactics, eventually opposed him. The players' community first made an effort to persuade him to stop his misbehavior, but soon became very aggressive and eventually got him banned from the server. Myers went forward and tried this experiment in 2 more servers of the game, only to see the same results every time.

2.2.4 Play in conclusion

Play is nowadays used in active learning from preschool to the University. Broadest interpretations suggest that play tends to allow people and animals to develop a range of skills fostering a greater flexibility in the face of changing environmental conditions. Play exhibits structures very similar to those found in other aspects of social life. To play with others is equal to entering a realm of new connections that is much more complicated than the play activities of an individual with the material world.

The focus of different researchers throughout history can differ when studying play. However, their main conclusions on play are very similar. Play is an evanescent creature. A play activity can happen suddenly and disappear just as quickly. Work differs from play because it emphasizes on products

and outcomes. On the other hand, play is a celebration of process rather than product. Even the participants who do not care about winning the prize, still enjoy the playfulness. The consequences of the play are separate from its purposes. Play focuses on seclusion and limitation, disconnection from real life and commitment to secrecy.

In conclusion, it is difficult to compare the works of Myers, Flanagan and Henricks. Their conceptualizations of play are difficult to stand and be compared side by side. Henricks focuses on structures and behaviors within the context of society that display play behaviors. Myers analyzes conditions of bad play and breaking the rules in videogames. While at her book Flanagan displays how activists and artists have used critical play methods in their work. At the same time, these three pieces of work are important in many disciplines and research fields. They have paved the road for many researchers who will follow.

2.3 Gamification

The term "gamification" started trending in 2010, according to Google Trends. Although, this does not mean that it is something new. Game elements have been harvested decades ago to be used in marketing campaigns, education, health, offices, etc. In the late 70s and early 80s, marketing scholars started researching new ideas for marketing, concentrating on services. The need for new marketing ideas was born due to the fact that the existing marketing axioms were created for the exchange of goods and could not apply to services. (Huotari and Hamari, 2012)

According to Bohyun Kim's opinion which was described in his article (2012), gamification can be used from the libraries for two different reasons:

- Creating fun activities for the library

Academic libraries might be able to afford keeping a stiff profile, as the students will continue visiting and using the premises and special collections. On the other hand, public and children libraries ought to find ways to attract patrons by creating unique services and an interesting atmosphere in the library's premises.

- Using game elements to make a boring learning process a little enjoyable

In a world where we are daily bombarded by news and information, it is crucial to offer information literacy modules from an early stage in a person's life. Such workshops are evidently more efficient

than simple lectures. Making the workshops more fun can improve their impact on the participants' competences. A gamified information literacy module, modified for each target group, could assist the teaching of young children but also adults.

While in the past people had to be serious and get a "proper" job once they were adults. In modern society, our lifestyle has changed and allows us to keep so-called childish leisure habits. A result of this is the gamers who never stopped playing. This generation could be the reason the need for gamification has appeared. Since nowadays games are mainstream and trendy, more and more people are used to game elements and prefer them over boring everyday tasks.

The evolution of networks has helped build all those gamification applications one can use. Global networks allow the user to share his status updates and progress with friends around the world. On the other hand, one may wonder if there can be gamification without technological gadgets. The ideas behind gamification go a long way back though. Scoring points and gaining badges are very visible part of gamification and those methods can be traced back to 1960's token economies. The use of badges and points were part of behavioral modification experiments aimed at long-term psychiatric patients in America. (Raczkowski, 2013)

But focusing on points and badges has been criticized. For example Robertson (2010) has argued that gamification should be called "pointsification". Focusing too much on points is not the only pitfall when designing gamification services. Power- gaming and cheating are part of the gaming culture as a whole and those behaviors need to be taken into consideration. (Raczkowski, 2013)

2.4 Games and gamification in the library field

Gamification is associated with increased motivation and engagement of learners. For this reason is it increasingly being incorporated into education (Capdarest-Arest, Opuda, Keiko, 2019). Even though libraries have been thinking of gamification the last few years, not much research has been published on the matter. In this chapter the issue of gamification in libraries is being examined from the point of view of success and fail stories. The criteria with which the success or failure is judged are simply the tone of the writer. The researchers and professionals are very clear in their opinion and suggestions of what can lead to a successful gamified service.

Libraries are not archives of print and digital publications. They offer support for researchers and educational programs. Recently, it has been indicated that gamification and game-based learning can have positive outcomes. Even though game-based technologies are used more and more in several areas and games are becoming an important part of everyday entertainment, the use of technological advances in game-based learning hasn't been adopted as rapidly. Games are still considered to be a new and radical form of information technology, which explains why many educators don't understand their value and avoid them. (Hamari & Nousiainen, 2015)

In his article, Raymonf Pun describes methods for successfully gamifying library services. He emphasized that gamification can improve the library user experience when it is used to improve library instructions, drive participation and awareness and increase attention and engagement.

2.4.1 Success stories

According to the literature, some libraries are trying out game based library orientation tours, believing this can help the patrons engage more to the library's environment and services. For example, the classic library tour can be redesigned as a scavenger hunt. In the same way, academic libraries' patrons can follow QR-codes inside the library premises to locate special material that may help them in their field of studies. The current research indicates that libraries mainly use games rather than game elements in their operation (Becker, 2013).

- Use of games

Some libraries are trying out game based library orientation tours, believing this can help the patrons engage more with the library's environment and services (Farkas, 2014). For example, the classic library tour can be redesigned as a scavenger hunt. In the same way, patrons at academic libraries can follow QR-codes inside the library premises to locate special material that may help them in their field of studies.

Even though a library cannot increase revenue from new or return patrons, this does not mean the library will not benefit from new ways to attract an audience. In 2011, the New York Public Library offered an online mobile game, an all-night library scavenger hunt, designed to guide the players via engagement with the library's special collections.

Another similar approach is the case of a librarian from the UK. Recently, Andrew Walsh created the information skills teaching games called “Seek!” and “Sources” (2014). These card games for between 2 and 8 players are designed to be used as a part of an information literacy teaching session in order to accommodate the learning process. At the end of the game, the teacher facilitates a discussion to help the students understand their results.

- Use of game elements

Achievements are included within games to stimulate the players to not simply complete a game, but to reveal its secrets. Certain achievements may refer to other achievements - many games have one achievement that requires the player to have gained prior achievements.

Libraries can reward their patrons using achievements the same way videogames do. Tools and options get unlocked by leveling up or completing special quests. Such game-like design could be offered to acknowledge and reward researchers who use the library’s services. For example, virtual badges for completing tasks or demonstrating mastery can make one’s learning visible and motivate for further accomplishments. In her article, Kim (2012) suggests the introduction of library points or currency: the more material one borrows and returns on time, the more points/currency can be collected, which can later be used for purchasing library merchandise or a cup of coffee at the library’s cafe. Of course, the same way that patrons can be rewarded for completing information literacy modules also the staff could be rewarded for completing modules or workshops associated with competence learning and work skills improvement.

In the process of gamifying services, the libraries may face several difficulties. Practical thinking can simply solve some problems. Due to budget issues academic libraries, worldwide, are currently trying to limit their printed collection. They buy licenses from database providers making sure their patrons have access to a great collection of e-material to support their studies. Unfortunately, it is not easy to change the patrons’ habits to use e-material over printed material. A system for level-up experience could encourage students to use more electronic publications. The more a patron is browsing the databases, borrowing ebooks and e-journals the more points he scores. Some sort of score is kept which gets the patron to level up as a researcher in the library’s score system. (Kim, 2012)

In the context of MLA ‘18, the 2018 Medical Library Association annual meeting in USA, Capdarest-Arest, Opuda and Keiko Stark (2019) designed a session for library database instruction using a low-

tech game design. The session was targeted towards library professionals. The participants of the session reported high confidence and enthusiasm to implementing gamification into their library services' instruction sessions to their patrons. Their session's planning was interestingly designed for more complex reasoning. They identified 5 desired outcomes for the participants:

1. To leave with basic understanding of game design
2. To explore ideas for how to incorporate low-tech games into library instruction
3. To experience collaboratively designing and building low-tech games
4. To explore ideas for assessing games and gamified instruction
5. To develop components of a game, or the idea behind a game.

This is very different from my research, as my only desired outcome is to investigate whether the use of game elements in the information retrieval teaching provided by academic libraries can positively affect the learning outcome for the first year students.

2.4.2 Fail stories

Many believe that all games can be fun and thus gamification can always be successful. Designing a game for the library can never be a guaranteed success; often gamification fails for various reasons .Game design is a very difficult and time consuming process. It is important to keep in mind that the majority of games produced are poorly designed, thus they are bad games. (Kim, 2012)

On some occasions gamification can fail when there is no efficient plan. It is crucial to implement the game elements at the first stages of designing a service. Simply adding game elements in an existing service might seem easier, but it is the wrong method of gamification. Without initially planning desired goals for gamifying a service, the players can easily get sidetracked and the game can get out of hand. (Becker, 2012)

It is also crucial to understand that one has to be careful not to gamify all of library services. It is believed that if there is a great offer of game-like experiences in the library, the patrons might quickly get tired and frustrated. It is advised that a library introduces small gamification projects one at a time, and monitors the patrons' reactions for future development. According to Kim everything cannot be turned into a fun game. If a game is mainly focused on learning, the players will soon

realize that they are being manipulated. If they are not entertained at all they will eventually stop playing. (Kim, 2012)

3. METHODOLOGY

For the purposes of this research, I decided to focus on quantitative research, rather than collecting qualitative data with the method of empirical study. Pre-coded response categories were created, with only one open-ended question in the feedback section of the second questionnaire provided to the participants. This process was inspired by Blaikie's book, "Analyzing Quantitative Data (2003). Questionnaires were chosen as structured tools to collect quantitative data for this research. The questionnaires were implemented on Google Forms, for easier collection of data. The graphs shown in this chapter were generated by Google Forms. Two questionnaires were given to the participants. The first, at the beginning of the session to assess demographic of the sample population and their information retrieval skills. The second, at the end of the session to assess knowledge obtained during the session and the session's enjoyment and feedback.

This causal-comparative quantitative research was designed to better evaluate the effect of gamification in the information retrieval courses academic libraries provide to an institution's students. This research method mainly depends on the factor of comparison and it is often used by researchers to conclude a cause-effect equation between two or more variables. The one variable is clearly dependent on the other variable that remains independent. The independent variable is established and not manipulated. It is used to observe its impact on the dependent variable. In the case of this research, the independent variable is the lack or existence of the gamification elements, and the dependent is the information retrieval skills at the end of the session.

The aim of this chapter is to present the steps followed to conducting this particular research on gamification for academic libraries. Firstly, the population is presented. How was the sample of academic students selected and what personal data are collected for the study. Secondly, follows a description of tangible materials used for the purposes of the empirical test. Thirdly, the materials and methods used for the data collection are described. Lastly, the procedure is described including The plan for the gamification is explained. In these paragraphs, the tasks and reward system are portrayed in detail.

3.1. Participants

When conducting a field experiment with the A/B test, we compare two versions of a single variable. The two versions (A and B) need to be identical besides the one variation that is expected to have an effect on the participants' behavior (Kohavi, R. , Longbotham, R., 2017). In this case the gamification and absence of gamification. Version A is the commonly used version of information retrieval courses offered by most academic libraries to first year students, and version B is the same course with game elements to add playfulness to the learning experience. Since the hypothesis of my thesis is that the gamification can enrich the information retrieval courses, I decided to follow an A/B testing method when designing the research.

When selecting the participants, it is necessary to ensure a wide range of cultural, study field and overall background for the participants of this experiment. In the case of my thesis' research, both degree and exchange students were welcome to participate in the research. The participants were guaranteed complete anonymity. It needs to be noted that it will be required that the participants are enrolled in either a University or University of Applied Sciences.

In an effort to collect accurate data the existence of a control group is essential for the experiment. The control group will better resemble the average information retrieval seminar students receive from academic libraries around the world. The participants will be randomly divided in groups of 20 for each session.

The 40 participants were divided into two groups of 20, gamification and control group. Each group was further divided into two sub-groups of 10 participants. There were two reasons behind this decision. Firstly, it became clear early on that it is difficult to organize the sessions' timetable for 20 individuals with different work and study schedules and priorities. Secondly, the PC room used for all sessions has the capacity of 13 students. The participants were randomly divided into groups, according to their availability. Whoever was able to participate at a specific day and time, was assigned to a group.

Locating willing participants from my personal network of acquaintances proved to be difficult early on. Participants of different age groups, family situations, career or study focus have different routines in their everyday life. People's willingness to participate and assist with the completion of this research, was often overpowered by life's responsibilities.

The aim of this research was to simulate the experience that first year students have when receiving the information retrieval and library e-services training, provided by academic libraries. Due to the difficulty of locating first year students, it is obvious through the demographic questions, presented in a following chapter , that this was not achieved.

3.2. Materials

During the design process of the research there was effort to use materials already existing in an average library's premises. Libraries have some materials and resources in hand, while items from the university can be shortly borrowed during the period of the empirical study. A computer room, with a PC per participant, and internet connection was enough for delivering the information retrieval course and collecting data by questionnaires. The powerpoint presentation was printed and given as a handout to the participants. Basic office supplies were used for note keeping.

3.3. Design

Firstly, a thorough literature review helped gather background knowledge on play, games and gamification, and their applications. Previous research assists building a base upon which new ideas of enhancing a service with affordances for gameful experiences. Secondly, a gamified version of a basic library service will be designed considering the library premises' possibilities and limitations. The service selected for the purpose of this research is the information retrieval courses for new students by academic libraries. The original information retrieval course was designed based on my personal past experience in teaching information literacy in academic libraries in The Netherlands and Finland and upon the work of the Tampere University's librarians as presented in the article by Asplund, J. et al (2012).

For the purposes of my field experiment, 20 participants experienced the gamified version of the information retrieval session and 20 participants were in the control group. Due to classroom size, the participants were divided into four groups of ten students each. Two groups experienced the gamified version of information literacy seminar, while two groups received the original information retrieval session. After the completion of the sessions, the participants were given a short questionnaire where they were asked to evaluate the overall experience. This questionnaire was

designed with the intention to record the participants' experience and engagement during the information retrieval training, as well as the level of motivation for future use of the library's services. Each group was given the same questionnaire. By answering the same questions, it was hoped that the impact of gamification would be more clear.

I originally aimed to implement game elements in the classic information retrieval course that are applied in one or more academic libraries in Finland. Academic libraries were the first choice for this empirical test, because they gain new patrons every academic year. First year students arrive at the same time as the new exchange students. Usually, all these students are provided with library tours and information literacy sessions. These library services are crucial in giving a good first impression and motivating the students to use the library and its resources in a successful way during their studies. However, I was not able to collaborate with a library for the purposes of my thesis. This is another point where my participants' recruiting efforts failed.

3.3.1 Tasks

Firstly, the participants answered a short questionnaire collecting demographic data and assessing their information retrieval skills. Secondly, they were given a short powerpoint presentation on how to use the library's e-services to locate, access and cite articles for their research purposes. Thirdly, the participants were asked to complete an exercise. During which they had to complete a search in the library's databases, and limit their search using appropriate search filters. Lastly, the participants answered a second questionnaire. The purpose of this questionnaire was to question whether they obtained new skills and knowledge during this process, and also examine their intention for future use of the library's services.

3.3.2 Gamification

The goal of this research is to reveal if the introduction of game elements can benefit the information retrieval course provided to the new coming students of Tampere University. For this reason, gamification elements were introduced to the classic information retrieval course provided by libraries. The game elements were added in both the lecture and the exercise part of the session. The PowerPoint presentation while having the same information for both groups, in the gamified group memes were used. Also, in the gamified version the participants were given references to pop culture

and animals in the examples. Lastly, during the exercise, the students participating in the gamified version of the information retrieval course, were rewarded for the speed and accuracy of their search. They were awarded with candies.

3.4. Procedure

The course is broken down into 4 parts, explained below. During the course, I, the facilitator and researcher, will not change appearance or attitude. My behavior will remain the same for both control and gamification group. That is done in an effort to not affect the results of the research.

Part 1 – before questionnaire
Its aim is to see their knowledge and skills.
Part 2 – powerpoint lecture
A PowerPoint presentation of information retrieval techniques.
Part 3 – exercise
The participants are asked to do an exercise where they use everything they just learnt.
Part 4 – after questionnaire
Its aim is to demonstrate if their skills have improved during the course. This questionnaire displays their experience and evaluation of the course.

Two aspects will be measured. The learning outcome of the session and the overall experience. Data for the learning outcome will be collected by the "skills assessment" part of the questionnaires and by observation during the exercise part of the session. The questionnaire before and after the session will show if they acquired skills during the course. Data for the experience will be collected by the "feedback" part of the second questionnaire. The feedback part of the questionnaire hopefully will show a difference in the preference of the experience.

4. DATA ANALYSIS

In this chapter the data is presented and analyzed. The goal is to find a pattern and gather evidence that supports the hypothesis that gamification can indeed improve the experience and effectiveness of information retrieval sessions provided by academic libraries.

For the purpose of clearly presenting the data and effectively comparing the control and gamified group, a cross-sectional design is followed in the data analysis. Firstly, the demographic of both groups is presented side by side. Secondly, four questions are presented in the same manner. The goal is to showcase the participants' former experience with training provided by libraries and their use of library's services for the information needs. Thirdly, the questions meaning to examine the effectiveness of the training are presented. These questions are present on both questionnaires, at the beginning and end of the session, in order to record the participants' knowledge on information search and retrieval before and after the session. In this chapter we see first the control's groups results, while the gamified group's follow. Finally, the last questions were given to collect feedback on the experience of the session and overall outcome.

4.1. Demographic

Firstly, the participants were asked to select the gender they identify as. By coincidence, both the gamified group and control group consisted of 12 male (60%) and 8 female (40%) participants.

The majority of the participants in the control group belonged to the 19-24 years old age group, with 45%. The next 30% of the participants were 25-29 years old, while there were no participants younger than 18 years old. In comparison, the majority of the participants in the gamified group belonged in the 25-29 years old age group, with 40%. The next 25% of the participants were 35 years old and older, while closing up,with 20%, was 19-24 years old age group. The majority (65%) of the participants in the control group, are currently in their bachelors degree. While in the gamified group, the majority (45%) of the participants are currently working towards their masters' degree.

The majority (50%) of the participants in the control group, are following a degree in Finnish language. The next 30% consists of exchange students attending Tampere University for a limited period and the 20% of the participants have chosen an international degree, in English language. At

the same time, in the gamified group 40% of the participants have chosen an international degree and 40% are following a degree in Finnish, with the remaining 20% being consisted of exchange students.

Three study fields seem to be popular amongst the control group. Business, Science and IT study fields take a 25% slice of the pie each. On the other hand, the gamified groups displays a majority of IT degree students (40%), with Business degree students following with 25% and Humanities with 20%. The existence of dissimilar groups of participants can lead to unreliable results in the study. It is understandable that students during their bachelor degree and students during their masters degree can have a different level of information retrieval skills due to years of experience in academic studies and number of projects they have worked on during their studies.

4.2. Previous training & information search habits

For both gamified and control groups it is evident that the majority of the participants have not participated in previous training, 45% for control group and 60% for gamified group. It is possible that the participants may not remember receiving such training, in their first year of studies.

Question: Have you followed information literacy training before? (control, left - gamified, right)

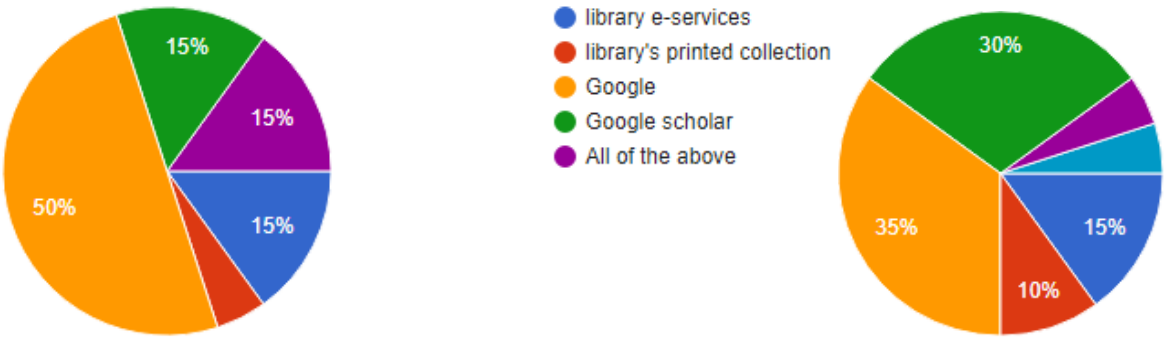
The following question asked the participants to estimate the time they spend conducting research in the physical library in person on a monthly basis. In the control group, left, 50% of the participants do not use the physical library, while in the gamified group, right, that percentage is 60%. At this point, it becomes interesting to further research the reasons and motivations behind the participants' refusal to use the physical library. A study of that sort could be crucial to the future of the academic libraries in Finnish campuses.

Question: In a typical month, how many hours do you spend researching in the physical library?

Next comes the question asking the participants to give an estimate of the time they spend conducting research in the digital library, its databases, on a monthly basis. Again the majority of participants in both groups are not using the library's services for their information needs, 40% in the control group and 45% in the gamified group.

Question: In a typical month, how many hours do you spend researching in a digital library?

In an effort to investigate the participants' habits when it comes to satisfying their information needs. They were asked to claim which service they use the most when working on an assignment. In the control group, left, the majority of the participants (50%) prefers Google, while a 15% is seen for Google Scholar, library's e-services and "all of the above". On the other hand, at the gamified group is clear that the participants prefer Google (35%) and Google Scholar (30%).

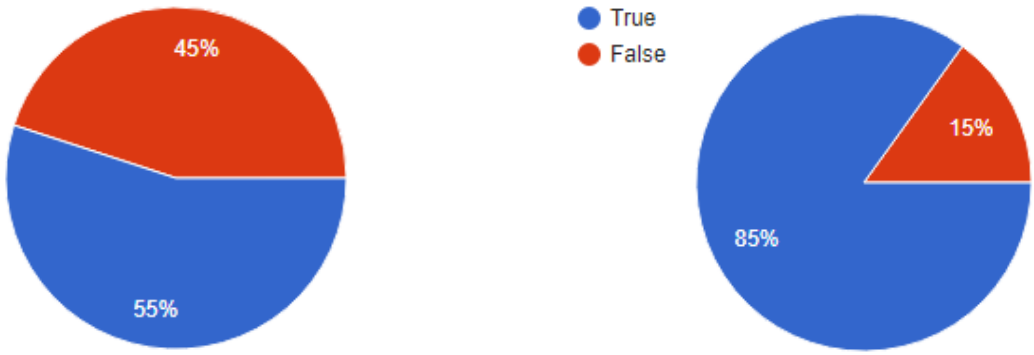


Question: When working on an assignment you mostly use…? (Control group, left - gamification, right)

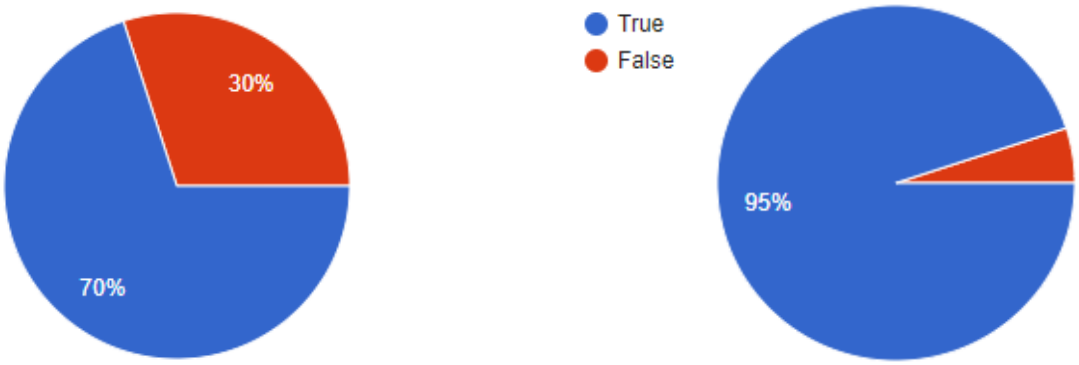
4.3. Information search & retrieval skills

In an effort to examine and compare information retrieval skills before and after the course, a set of questions were present in both questionnaires, at the beginning and ending of the session. The findings of these questions will be presented side by side for each participants' group. Some of these were true or false questions while others require specific replies. First the control group's participants' answers will be examined. Secondly, the data collected from the group that experienced the gamified course are presented.

The first question asked the participants if AND, OR, NOT are Boolean Operators used in information search queries. As seen in the pie charts below, in the case of the control group, the 45% of false answers before the session (left) dropped to 15% after the session (right). For the gamified group, the 30% of false answers before the session (left) dropped to 5% after the session (right).



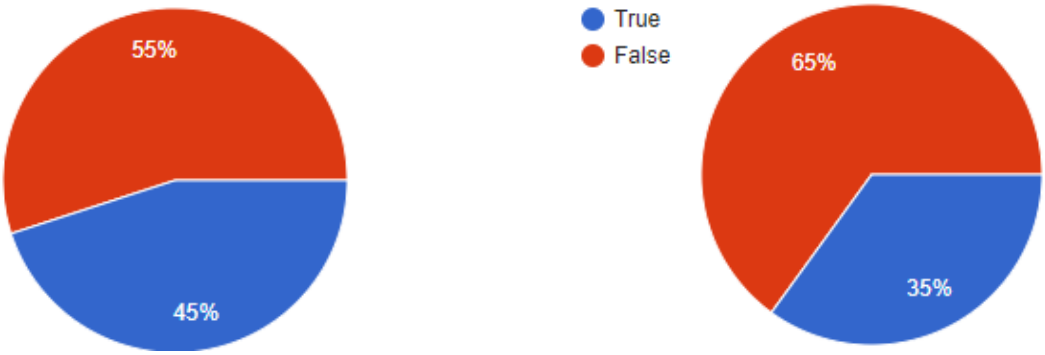
Question: Are the following boolean operators: AND, OR, NOT? (control group: before, left - after, right)



Question: Are the following boolean operators: AND, OR, NOT? (gamified group: before, left - after, right)

The participants were asked to answer if the following statement if true or false: “Using the operator AND to combine concept terms is a good way to increase the number of records retrieved in a search.” This statement is false, as the operator AND is a good way to focus the search by combining two search terms in the query. As seen in the charts below, 60% of participants in the control group answered this question wrong before the session while 70% of the participants gave the correct answer at the end of the session. In the gamified group, we see that 55% of participants answered this question correctly before the session and this number goes up to 65% at the end of the session.

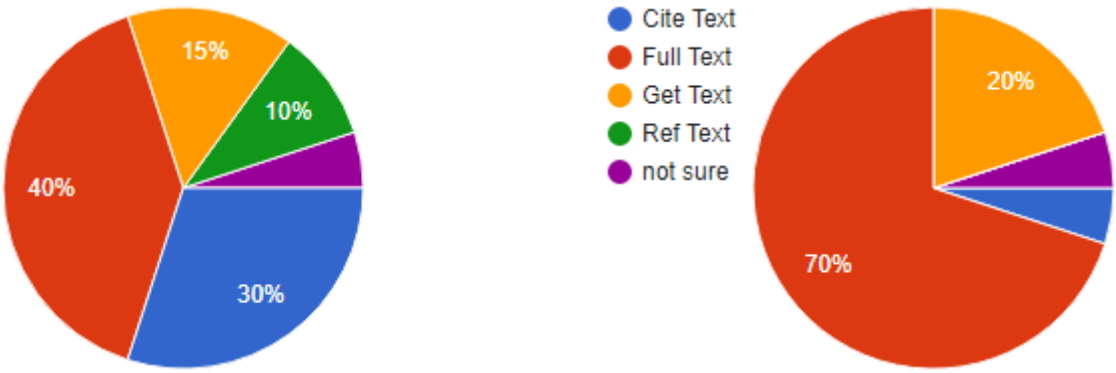
Question: Using the operator AND can increase the number of results? (control group: before, left - after, right)



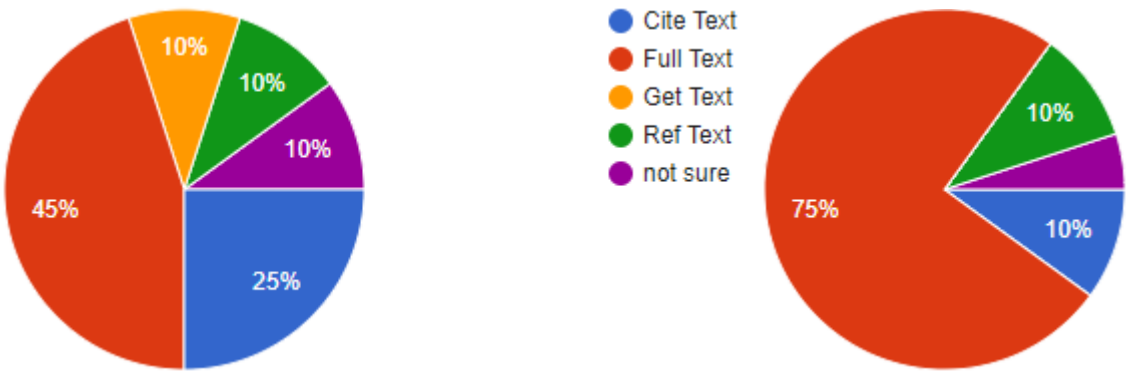
Question: Using the operator AND can increase the number of results? (gamified group: before, left - after, right)

In the following question, the participants were asked to answer if the search statement "(dogs OR canines) NOT cats", does not exclude records that contain the term "poodle" but it excludes the term "cats". In the control group, 55% at the beginning of the session and 80% at the end of the session, the majority of participants answered this question correctly. In the gamified group the 65% of participants answered correctly at the beginning of the session and there was only a small increase with 75% of them giving the correct answer after the session.

The participants were asked to select the term that can provide them with the whole article or paper from the databases' search results. Again the results show that the percentage of the correct answers increased, from 40% before to 70% after. An equal increase in the correct answers is seen in the gamified group, from 45% before the session to 75% after.



Question: Which term gives you the whole article? (control group: before, left - after, right)



Question: Which term gives you the whole article? (gamified group: before, left - after, right)

In the beginning of the session, the majority of the participants in the control group, 60%, believed that the word count of an article can be used as a search filter. At the end of the session the majority, 65% of the participants answered this question correctly, as the word count is not a search filter. We see the same balance in the answers of the gamified group. With 70% of the participants giving the wrong answer before the session and 60% of them giving the correct answer at the end of the session.

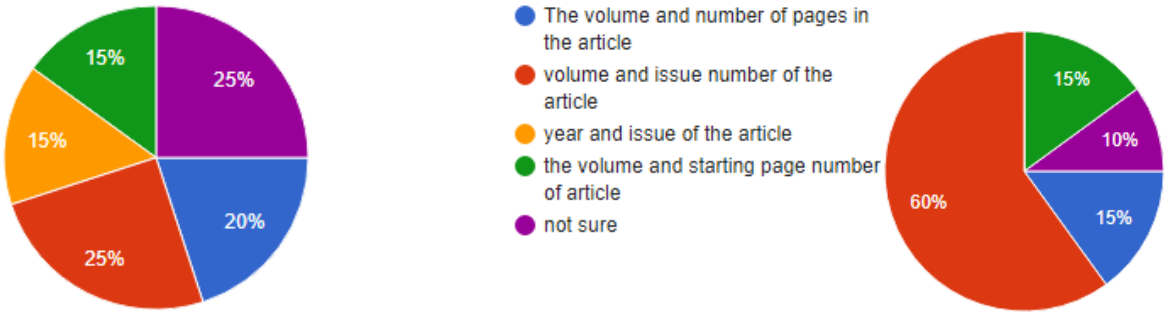
In both groups the majority of participants picked the right answer in the question "Can the year of publication be used to filter the search?" already at the beginning of the session. The correct answer was given by 75% of the control group and 85% of the gamified group's participants. The slight difference in percentages can be a because of the more academically experienced students that participated in the gamification group.

At the end of the session, the majority of the control group's participants, with a percentage of 65%, selected the correct answer in the question referring to the reviewer's name being used as a search filter. In this question there was a bigger impact on the participants' knowledge of the gamified group. Only 30% of them selected the correct answer at the beginning of the session, yet that percentage increased to 75% at the end of the session.

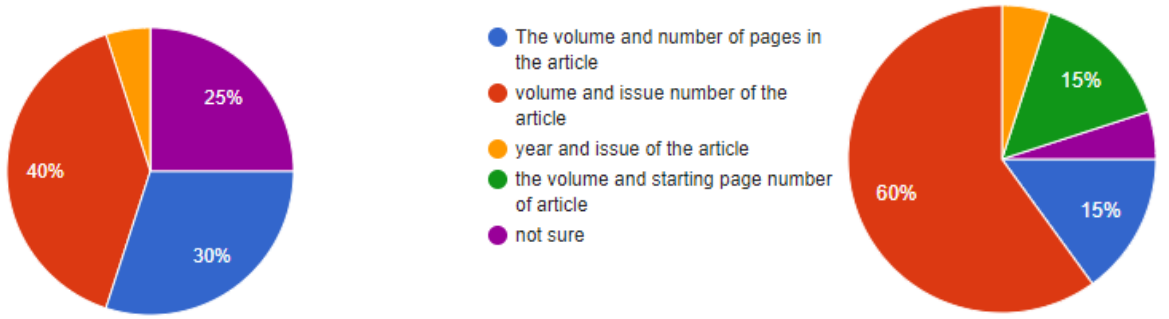
Another question that the session's impact is minimal was the one asking the participants to select which formats are called "periodicals". In the control group, the majority of participants (65%) knew that a journal, magazine or newspaper is categorized as a periodical already before the session. On the other hand, the more experienced students participating in the gamification group, also gave the correct answer before (80%) and after the session (85%).

In the question regarding the participants ability to read a bibliographical citation, the participants of the control group seemed confused as to what the "64(20)" means in the following citation *"Kors, A.*

C. (1998). Morality on today's college campuses: The assault upon liberty and dignity. Vital Speeches of the Day, 64(20), 633-637". On the other hand 60% of the participants chose the correct answer at the second questionnaire. In the gamification group shows the same balance, with only difference being that a bigger number of the participants knew the correct answer already before the session started.



Question:What does "*64(20)"* represent? Kors, A. C. (1998). *Morality on today's college campuses: The assault upon liberty and dignity*. Vital Speeches of the Day, 64(20), 633-637. (control group: before, left - after, right)



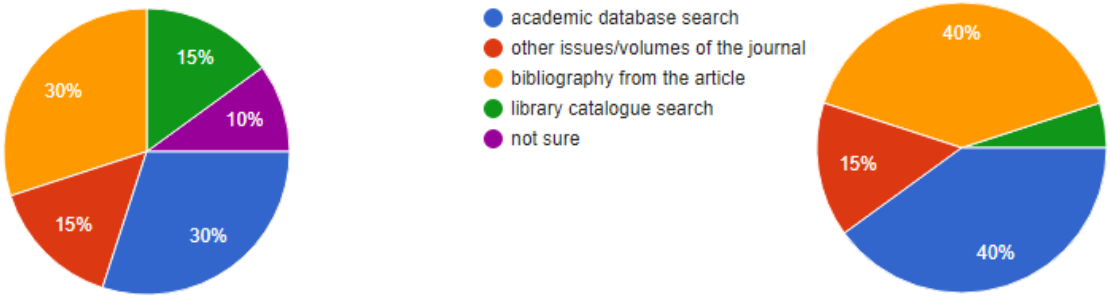
Question:What does "*64(20)"* represent? Kors, A. C. (1998). *Morality on today's college campuses: The assault upon liberty and dignity*. Vital Speeches of the Day, 64(20), 633-637. (gamification group: before, left - after, right)

In the question "Which combination of keywords below brings the biggest number of records? Cognition and emotion, cognition or emotion, cognition not emotion, cognition and emotion not feelings, not sure" the control group's participants were more decisive at the end of the session. With 75% selecting the correct answer the "cognition or emotion" will bring the biggest number of results. Same as in the control group in this question, the participants of the gamification group were more decisive at the end of the session. With 75% selecting the correct answer compared with 35% of the participants before the session.

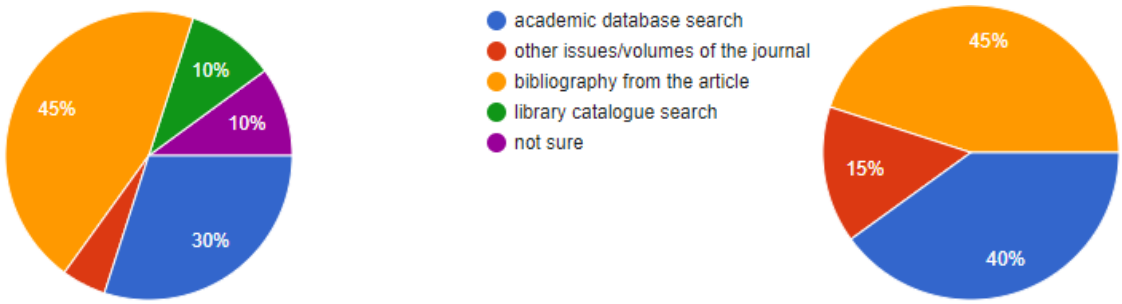
The following question asked the participants to select the correct meaning of peer reviewed papers. Before the session 45% of the participants knew the term refers to an editorial board of scholars that

critiques articles and recommends them for publication. This percentage dropped to 40% after the end of the session. On the contrary, 45% of participants in the gamification group gave the correct answer before the session, yet that percentage increased drastically after the session, 70%.

The next question, asked the students to select the most efficient place to find articles related to one they have already found. In both groups the participants seemed divided both before and after the session. As many participants selected the academic database search as the best source for finding articles relevant to one they already have read, the same percentage selected the article's bibliography. The correct answer is the article's bibliography, as it lists articles used in the research it is based upon. Thus it includes relevant scientific work and legacy knowledge in the field.



Question: What is the most efficient place to find articles related to one you have already found? (control group: before, left - after, right)



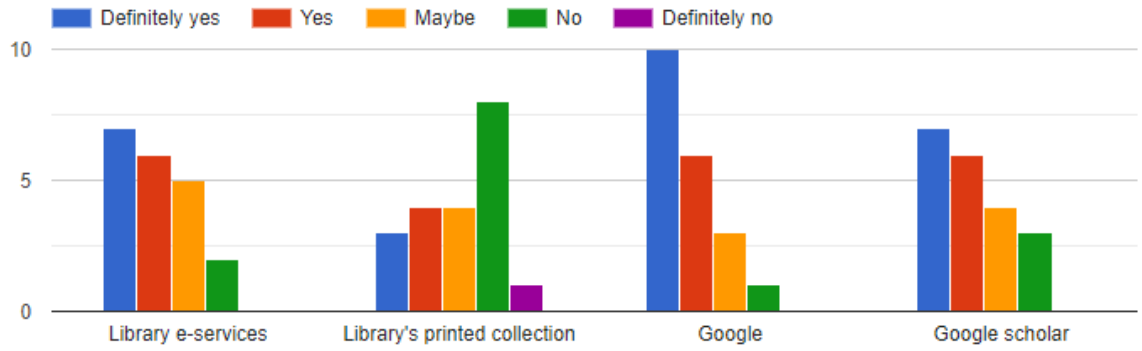
Question: What is the most efficient place to find articles related to one you have already found? (gamification group: before, left - after, right)

The last question of this portion of the questionnaires requested the participants to select the best source for newer articles relevant to a useful article they have already located. In the control group, both at the beginning and end of the session, the majority picked the correct answer with a percentage of 35%. The other answers follow closely with small variations between the participants. On the other hand, in the gamification group, we see a more decisive answer from 55% of the participants compared to a 25% of them that gave the correct answer before the session.

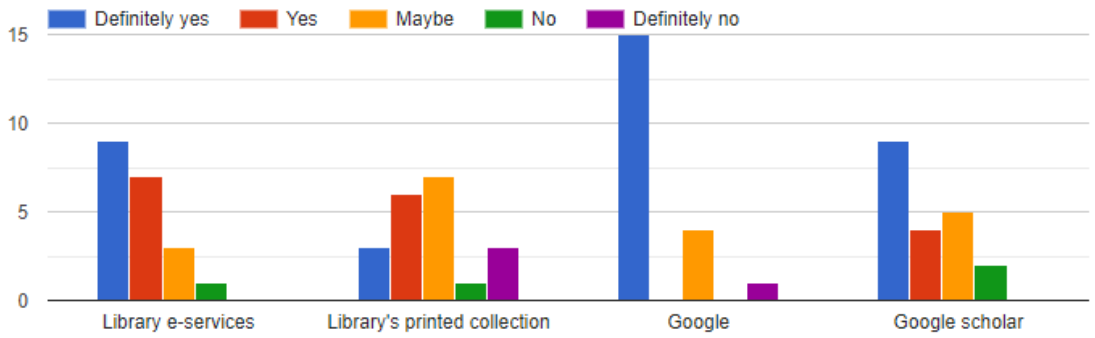
4.4. Feedback

In the following graphs we see the students' responses to questions who aim to collect feedback on the overall experience during the information retrieval session. Once again the responses of the control group and gamified group will be presented side by side. This is decided in an effort to better see a pattern or a big difference of opinions and experiences. We cannot forget that the purpose of this thesis is to examine the impact of gamification in the teaching of information retrieval.

First came the question investigating the participants' intentions on future tools for their research needs during their studies. It is evident that in both groups the majority of participants prefer and show enthusiasm to continue using Google's search engine for their research needs. At the same time, we see that a majority states they will use the library's electronic services, meaning the data bases, and Google Scholar search engine.



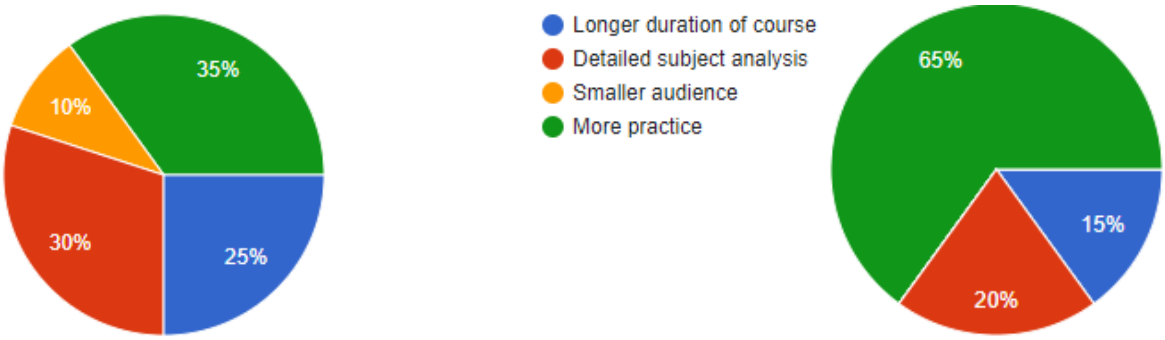
Question: How likely are you to use the following services for your future research needs? (control group)



Question: How likely are you to use the following services for your future research needs? (gamified group)

Secondly, a set of questions asked the participants to evaluate the different aspects of the course. Starting from evaluating the skills obtained, and reaching all the way to stating the level of enjoyment. Thirteen out of the twenty participants in the control group responded that they strongly believe they obtained useful skills during this session. At the same time, twelve participants claim big confidence in using the university's library e-services for their future research needs. On the other hand, nineteen out of the twenty participants in the gamified group believe they learnt useful skills for their studies and sixteen of them seem motivated to use the library's e-services more from now on. Another statistic that reveals a small, yet significant impact of the gamification on the participants' experience during the session is the question asking about the enjoyment of the session. Only nine participants from the control group enjoyed the session, while nineteen participants in the gamified group claimed to have enjoyed the session.

Third comes the question requesting feedback on alterations and improvements for the information retrieval session the participants just experienced. It is evident that the participants of both groups wish for more practice in the controlled environment provided during the session. The percentages vary, from 35% for the control group and 65% from the gamified group. Next follows the answer "Detailed subject analysis" with 30% and 20% of the participants requesting a more detailed presentation of the stages, steps and processes of information retrieval. Lastly, with 25% and 15% of the participants requesting for a longer duration of the course. Finally, only at the control group we see one participants requested for a smaller set of participants per session.



Question: Which of the following can improve the effectiveness of the Information Retrieval Training? (control group, left - gamified group, right)

5. DISCUSSION

Many librarians chose this profession driven by their desire to connect individuals with information (Hernon & Altman, 2010). However, the Library Science field is in a constant change in terms of services. It is vital for the libraries to get rid of old stereotypes regarding dusty books and silent premises, and become more extroverted and attractive to the modern user. In modern times, libraries have more roles than in the past. Their purpose is not only to preserve and promote knowledge. They need to integrate and pay full attention to the new data of the idioms or societies where they belong and operate. Exploring new ways of presenting library services and attracting visitors can be a catalyst.

The results of my field experiment were not what I anticipated. In many cases, the difference of the impact in the participants' information retrieval skills between the gamified and control group proved to be minimal. That can be due to the fact that the experiment took place with a more academically diverse group than initially planned.

It would be interesting to further research the reasons and motivations behind my experiment's participants' refusal to use the physical library. A study of that sort could be crucial to the future of the Tampere University's Library and all academic libraries in Finnish campuses. By better understanding the needs and habits of their patrons, the libraries can improve their service design for the future.

The participants of both gamified and control groups were given an open end question, at the second questionnaire, where they were requested to give feedback on the session and suggestions for improvement. From their answers it became evident that they enjoyed the practical part of the session and would have liked more exercises to be added in the session. Such feedback questions can be very helpful for improving every teaching session provided from libraries. Being open to accept feedback from our patrons, can have great benefits for the customer service an organization offers.

Ideally, I would choose to run the experiment again with a closer cooperation with an academic library. Being given the possibility to run this experiment with the first year and incoming exchange students would allow me to collect a more accurate set of data for analysis. A set of data that would answer my research question better, and would allow me to understand the effects of gamification in the information retrieval teaching session.

In addition, I would be interested in researching the willingness of different academic libraries in Finland to gamify the information retrieval training and their other services. Conducting qualitative research with questionnaires would allow for a bigger number of responses, from hopefully almost all higher education institutions. Although, I understand that qualitative research with organized interviews could allow for a closer look and in depth study of the academic libraries' options in this matter. It would be interesting to examine if the funding they receive is allowing them to use resources on experimenting with their services.

6. CONCLUSION

The hypothesis for my master's thesis was that gamification can drastically improve the outcomes and experience of information retrieval teaching sessions that academic libraries offer to first year students.

I consider this research inconclusive due to the difficulty of locating only first year students to participate in the experiments. My only desired outcome was to investigate whether the use of game elements in the information retrieval teaching provided by academic libraries can positively affect the learning outcome for the first year students. Academically experienced students, during their master or PhD studies, are expected to have a better base of information search and retrieval.

I do believe that gamification can provide many opportunities for a library's users. It can improve skills' development and facilitate innovative active learning. Gamification can improve the image of libraries to the public. By improving the library services and library experience, it can change the public's opinion and idea of what a library is. Such a shift, can improve funding possibilities and expand the range of public service the library can provide for its patrons.

Designing a gamified session is not an easy affair. The facilitator must study techniques, theories, they need to plan ahead and be organized in order to successfully include game elements into their teaching and overall library experience. As Capdarest-Arest, Opuda and Keiko Stark report in their 2019 paper "Game on!" Teaching gamification principles for library instruction to health sciences information professionals using interactive, low-tech activities and design-thinking modalities. Participating in a hands-on workshop can be a game changer. An interactive workshop can give the confidence and facilitates learning the tools to prototype games for different patron audiences.

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8. APPENDIX

8.1. Questionnaires' drafts

Questionnaire before the course:

Demographic

- Age
drop down with age groups

- Gender
male , female, other

- Degree level
bachelor, masters, phd

- Student status in Finland
degree, international degree , exchange students,

- Study field
Business (marketing, finances, hr, etc)
Engineering (architecture, urban planning, robotics, etc)
Humanities (art, languages, history, etc)
IT
Science (physics, environmental science, etc)

Background

- Have you followed information literacy training before?
yes , no , not sure

- In a typical month, how many hours do you spend conducting research in a library, in person?
none , 1- 4 hours , 5-10 hours , 11-20 hours , more than 20 hours

- In a typical month, how many hours do you spend conducting digital research in the library databases?
none , 1- 4 hours , 5-10 hours , 11-20 hours , more than 20 hours

- When working on an assignment do you normally use (1-5)
library e-services?
library's printed collection

Google
Google scholar

- All of the following are Boolean Operators: AND, OR, NOT.
true false

- Using the operator AND to combine concept terms is a good way to increase the number of records retrieved in a search.
true false

- The following search statement will exclude any records that contain the term “poodle”:
(dogs OR canines) NOT cats.
true false

- What is the name of the link found in databases that may lead you to the full text of an article?
Cite Text, Full Text, Get Text, RefText, Not sure

- The word count can be used to filter the search.
true false

- The abstract can be used to filter the search.
true false

- The year of publication can be used to filter the search.
true false

- A reviewer’s name can be used to filter the search.
true false

- What is a periodical?
a journal, magazine or newspaper – a magazine that comes in microfilm – a book series – online full text of an article.

- You’re considering the following article citation, what does 64(20) represent?
Kors, A. C. (1998). Morality on today's college campuses: The assault upon liberty and dignity. *Vital Speeches of the Day, 64*(20), 633-637.
The volume and number of pages in the article, volume and issue number of the article, year and issue of the article , the volume and starting page number of article, not sure

- In an online database which combination of keywords below would retrieve the greatest number of records?
cognition and emotion, cognition or emotion , cognition not emotion , cognition and emotion not feelings, not sure

- Select the correct meaning of peer reviewed.
articles are sent to the author’s friends and colleagues for critical review, the author shows evidence that the article was read by colleagues when submitting it for publication, an editorial board of scholars critiques articles and recommends them for publication

- If you find a very good article on your topic, what is the most efficient source for finding related articles?
academic database search , bibliography from the article, library catalogue search, other issues/volumes of the journal , not sure

- If you find a very good article on your topic, what is the most efficient source for finding newer related articles?
Google scholar search, bibliography from the article, list of who cites this article, other issues/volumes of the journal , not sure

Questionnaire after the course:

Skill assessment

- How likely are you to use the following services for your future research needs? (1-5)
    library e-services?
    library's printed collection
    Google
    Google scholar

- All of the following are Boolean Operators: AND, OR, NOT.
true false

- Using the operator AND to combine concept terms is a good way to increase the number of records retrieved in a search.
true false

- The following search statement will exclude any records that contain the term "poodle": (dogs OR canines) NOT cats.
true false

- What is the name of the link found in databases that may lead you to the full text of an article?
Cite Text, Full Text, Get Text, RefText, Not sure

- The word count can be used to filter the search.
true false

- The abstract can be used to filter the search.
true false

- The year of publication can be used to filter the search.
true false

- A reviewer's name can be used to filter the search.
true false

- What is a periodical?
a journal, magazine or newspaper – a magazine that comes in microfilm – a book series – online full text of an article.

- You're considering the following article citation, what does 64(20) represent?
Kors, A. C. (1998). Morality on today's college campuses: The assault upon liberty and dignity. *Vital Speeches of the Day, 64*(20), 633-637.
The volume and number of pages in the article, volume and issue number of the article, year and issue of the article , the volume and starting page number of article, not sure

- In an online database which combination of keywords below would retrieve the greatest number of records?
cognition and emotion, cognition or emotion , cognition not emotion , cognition and emotion not feelings, not sure

- Select the correct meaning of peer reviewed.
articles are sent to the author's friends and colleagues for critical review, the author shows evidence that the article was read by colleagues when submitting it for publication, an editorial board of scholars critiques articles and recommends them for publication

- If you find a very good article on your topic, what is the most efficient source for finding related articles?
academic database search , bibliography from the article, library catalogue search, other issues/volumes of the journal , not sure

- If you find a very good article on your topic, what is the most efficient source for finding newer related articles?
Google scholar search, bibliography from the article, list of who cites this article, other issues/volumes of the journal , not sure

Feedback

- I am satisfied from the information retrieval course
Strongly agree, agree, neutral, disagree, strongly disagree

- I enjoyed the information retrieval course.
Strongly agree, agree, neutral, disagree, strongly disagree

- I feel motivated to use library's data bases more.
Strongly agree, agree, neutral, disagree, strongly disagree

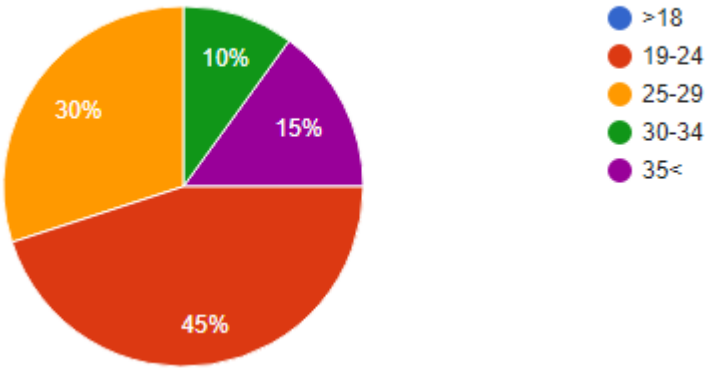
- The teaching techniques & aids used during the course were efficient.
Strongly agree, agree, neutral, disagree, strongly disagree
theory, exercises, classroom, computers, projector, rewards system

- Which of the following do you believe that it could improve the effectiveness of the Information Literacy Training?
Longer duration of course, Detailed subject analysis, Smaller audience, More practice, Other

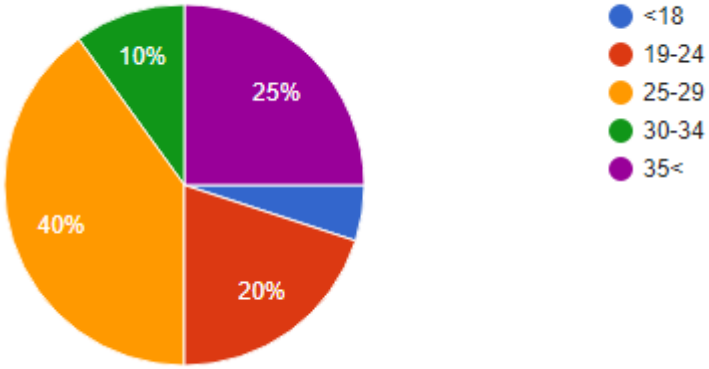
- Please write any other comments or suggestions you have regarding the design of this Information Literacy course.
open text

8.2. Graphs

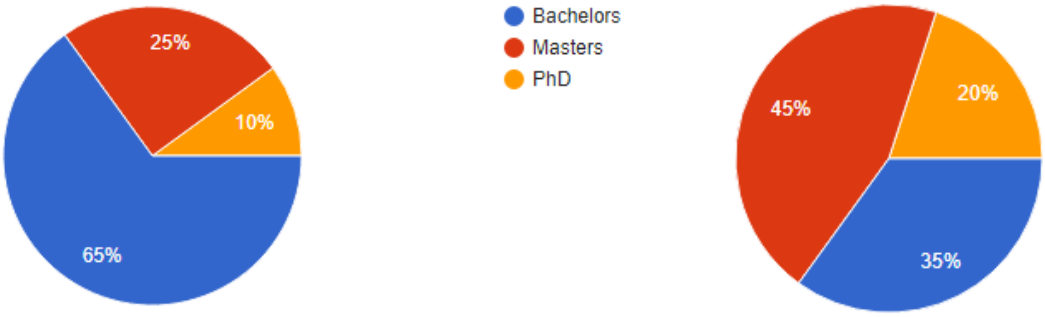
Participants' demographic



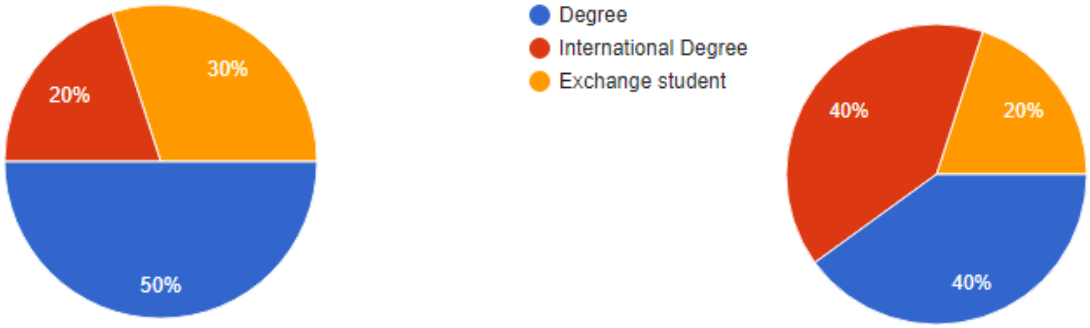
Question: Age (control group)



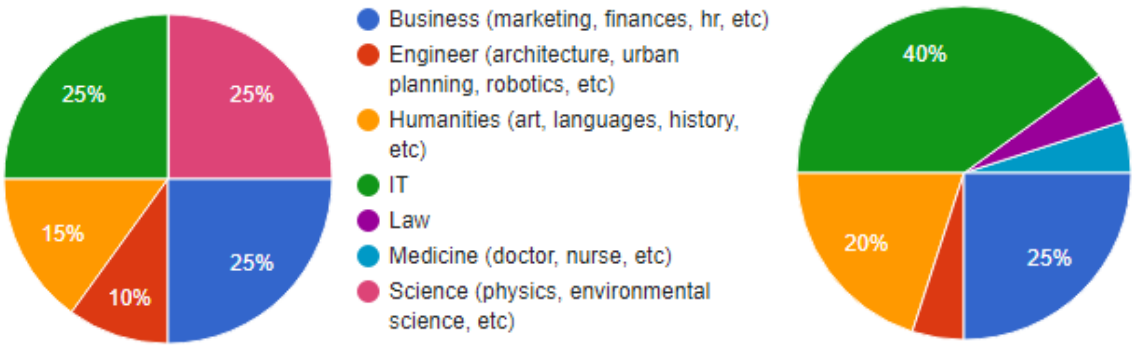
Question: Age (gamified)



Question: Degree level (control, left - gamified, right)



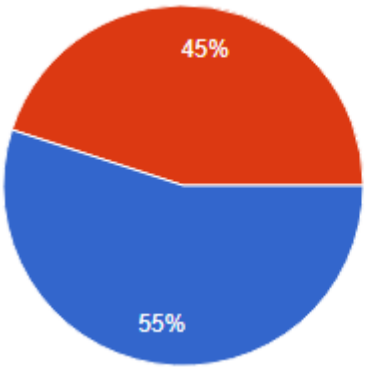
Question: Student status in Finland (control, left - gamified, right)

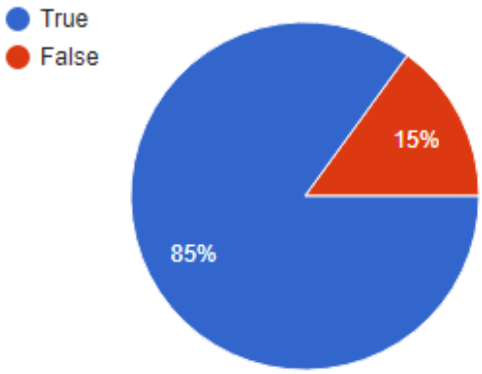


Question: Study field (control, left - gamified, right)

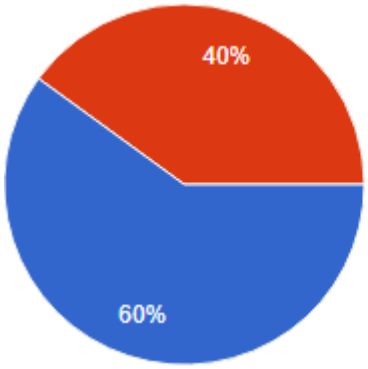
Information search & retrieval skills

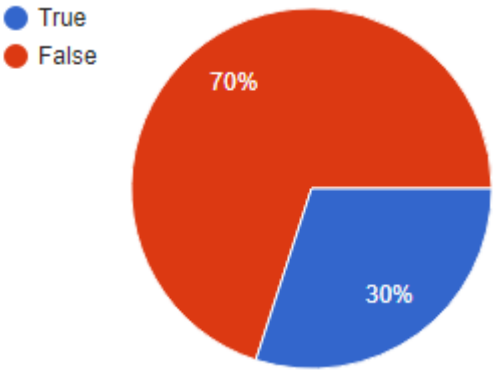
Control group:



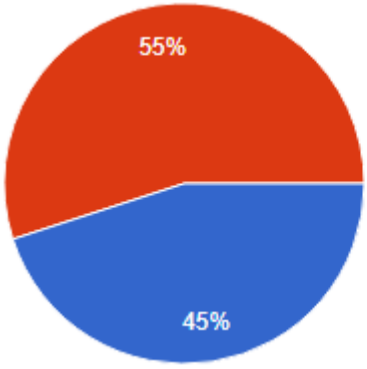


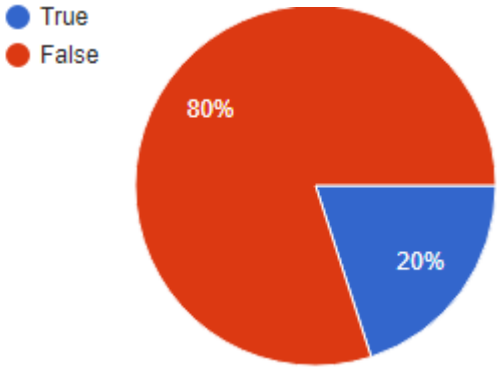
Question: Are the following boolean operators: AND, OR, NOT? (control group: before, left - after, right)



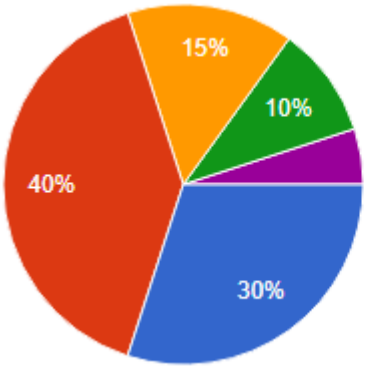


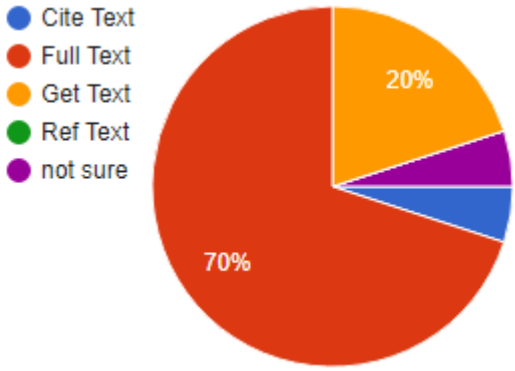
Question: Using the operator AND can increase the number of results? (control group: before, left - after, right)



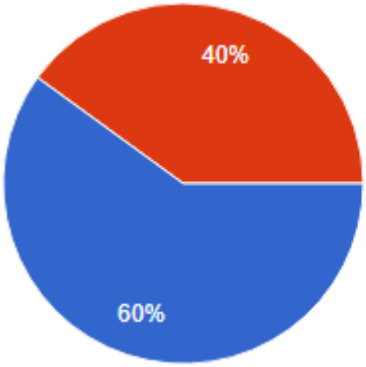


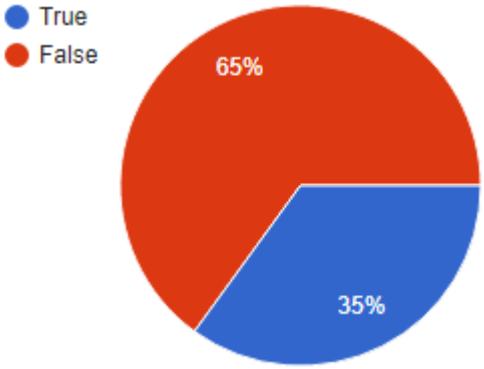
Question: The following query excludes the term “poodle”: (dogs OR canines) NOT cats? (before, left - after, right)



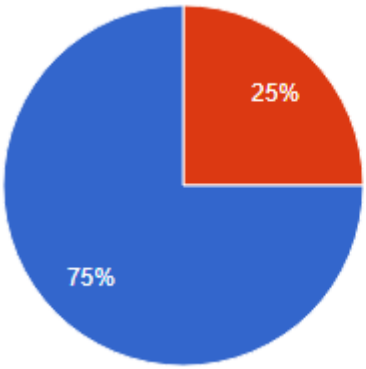


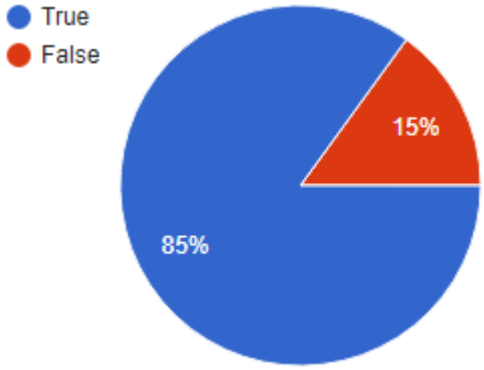
Question: Which term gives you the whole article? (control group: before, left - after, right)



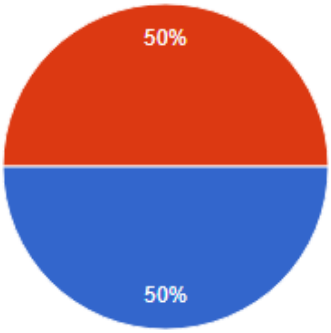


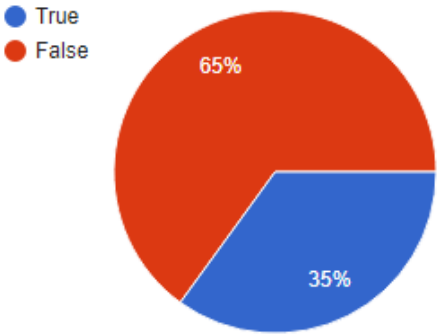
Question: The word count can be used to filter the search? (before, left - after, right)



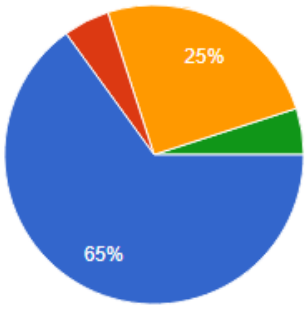


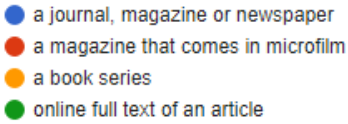
Question: The year of publication can be used to filter the search? (before, left - after, right)

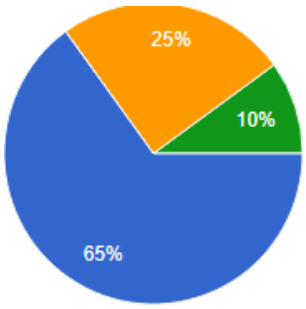




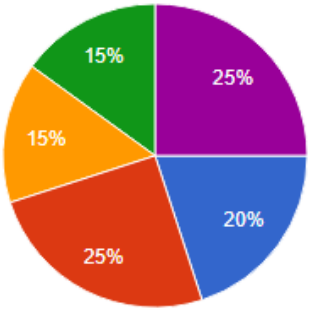
Question: The reviewer’s name can be used to filter the search? (before, left - after, right)

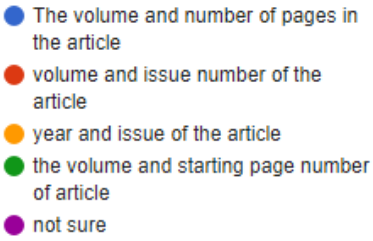


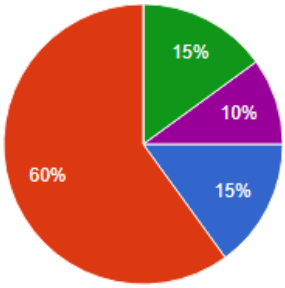




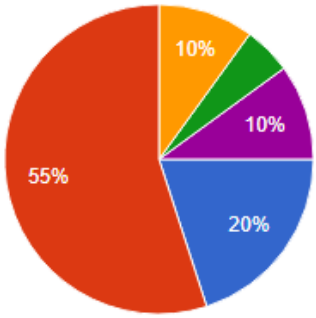
Question: What is a periodical? (before, left - after, right)

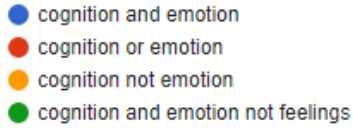


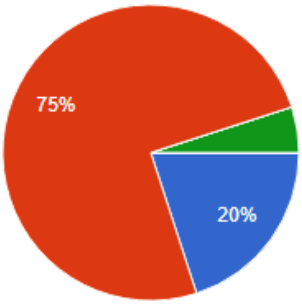




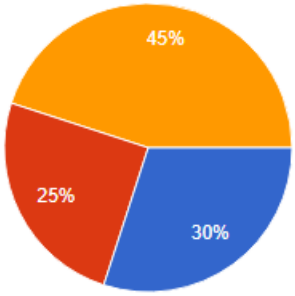
Question:What does 64(20) represent? Kors, A. C. (1998). Morality on today's college campuses: The assault upon liberty and dignity. Vital Speeches of the Day, 64(20), 633-637. (before, left - after, right)

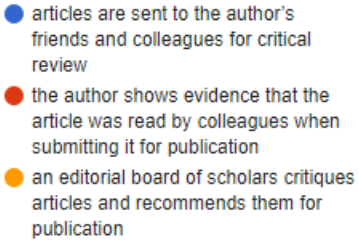


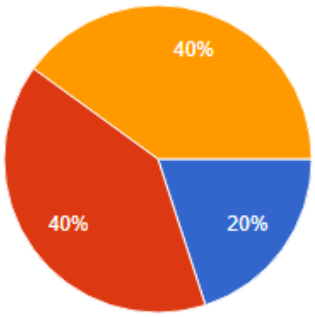




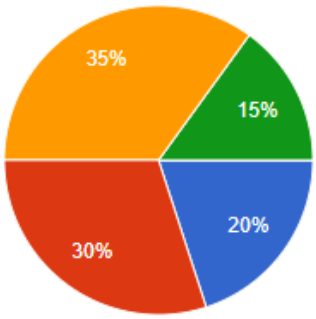
Question: Which combination of keywords below brings the biggest number of records? (before, left - after, right)

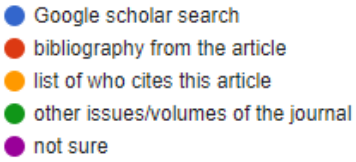


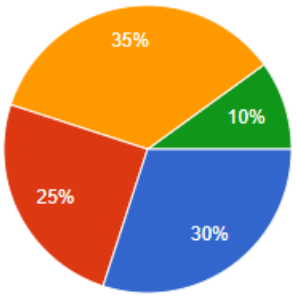




Question: Select the correct meaning of peer reviewed. (before, left - after, right)

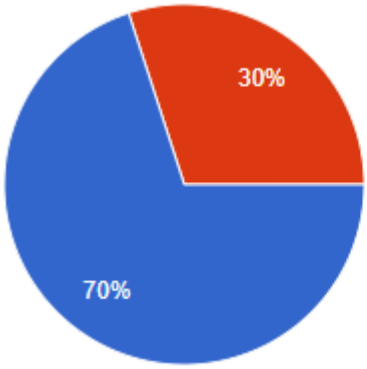


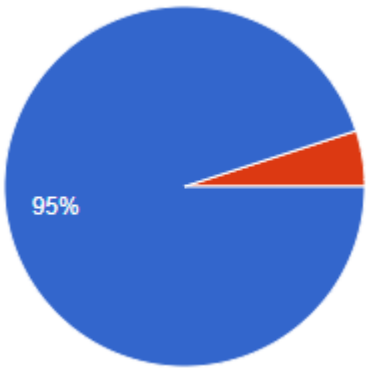




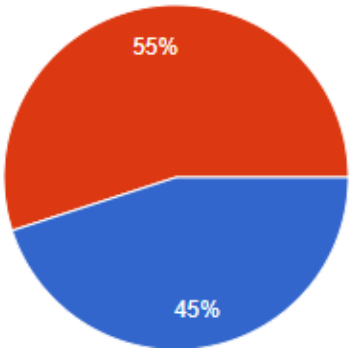
Question: What is the most efficient place to find articles related to one you have already found? (before, left - after, right)

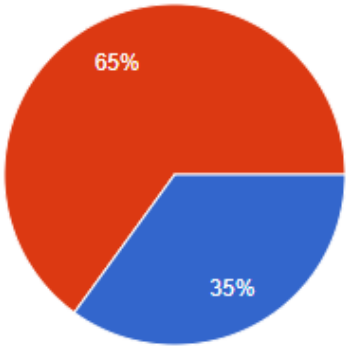
Gamified group:



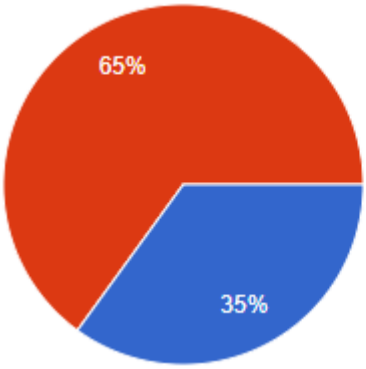


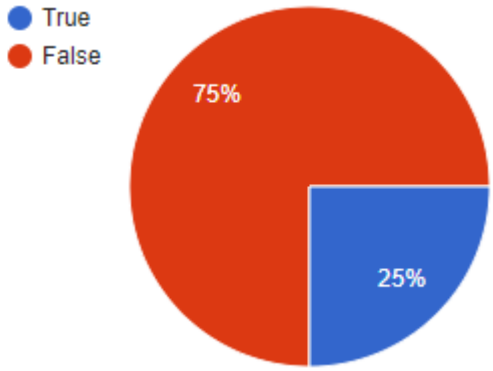
Question: Are the following boolean operators: AND, OR, NOT? (before, left - after, right)



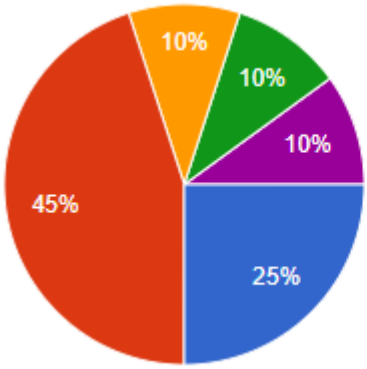


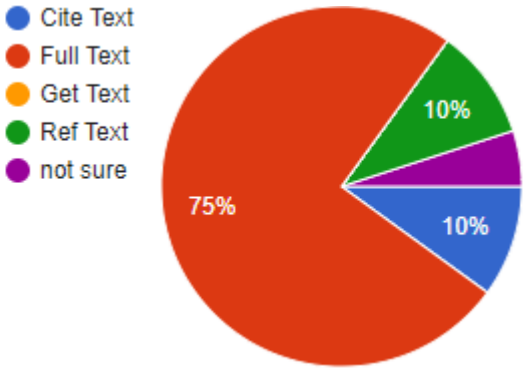
Question: Using the operator AND can increase the number of results? (before, left - after, right)



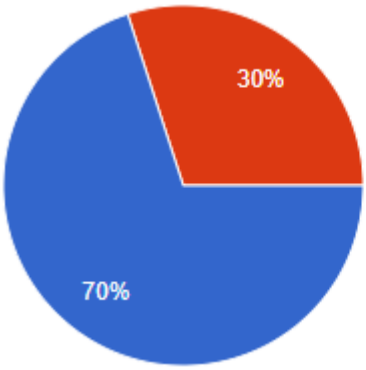


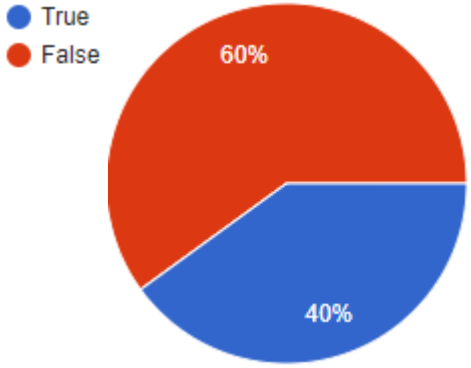
Question: The following query excludes the term “poodle”: (dogs OR canines) NOT cats? (before, left - after, right)



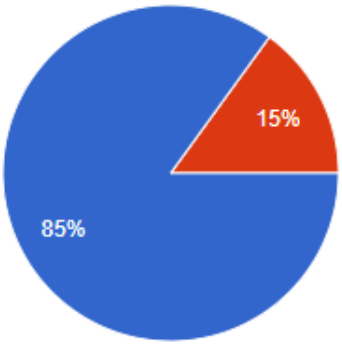


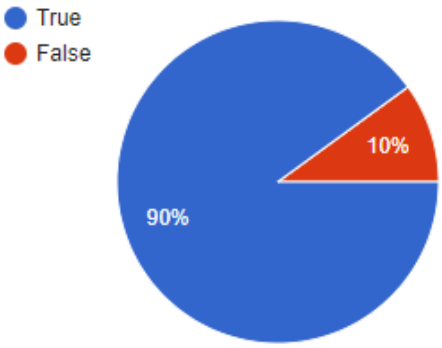
Question: Which term gives you the whole article? (before, left - after, right)



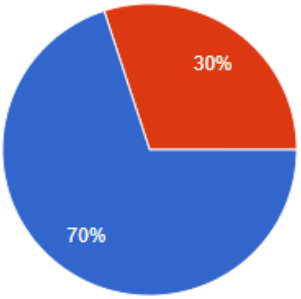


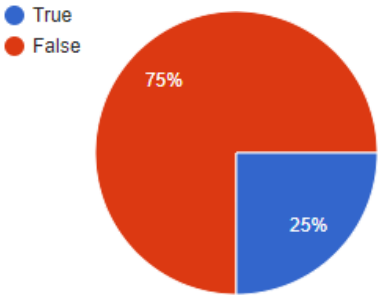
Question: The word count can be used to filter the search? (before, left - after, right)



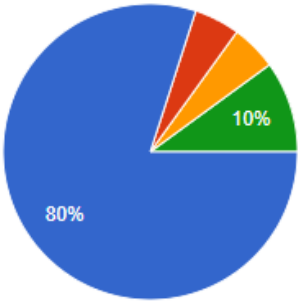


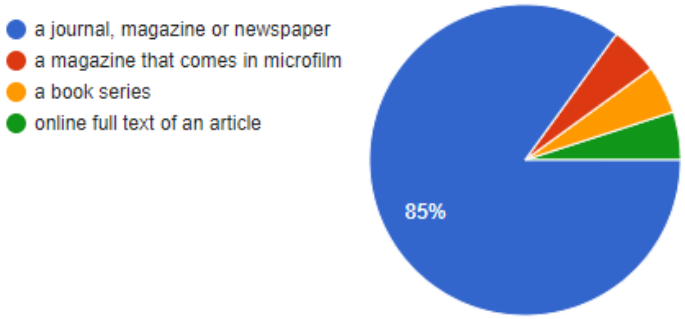
Question: The year of publication can be used to filter the search? (before, left - after, right)



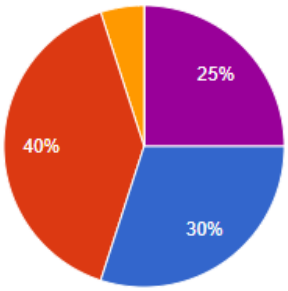


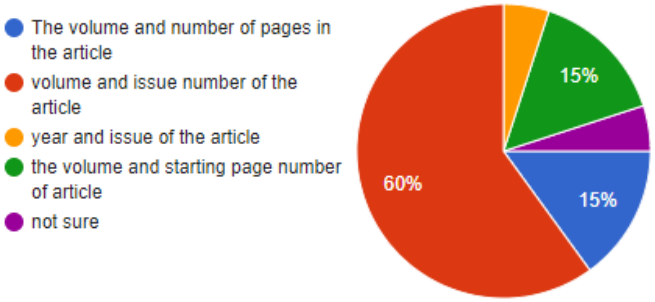
Question: The reviewer's name can be used to filter the search? (before, left - after, right)



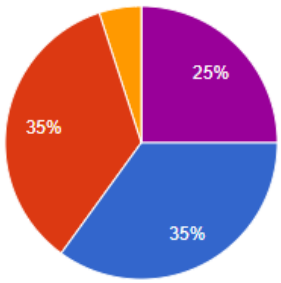


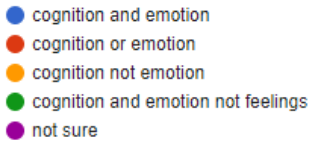
Question: What is a periodical? (before, left - after, right)

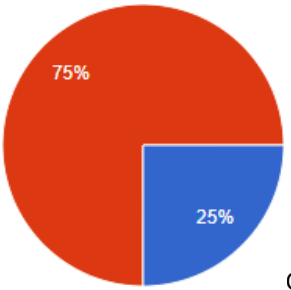




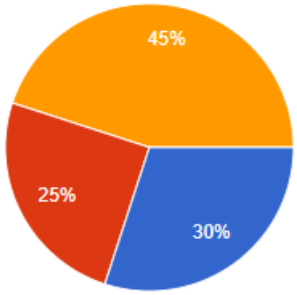
Question:What does 64(20) represent? Kors, A. C. (1998). Morality on today's college campuses: The assault upon liberty and dignity. Vital Speeches of the Day, 64(20), 633-637. (before, left - after, right)

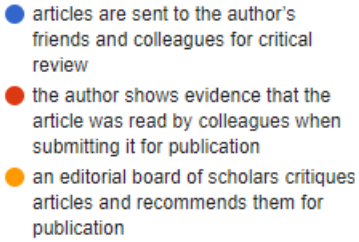


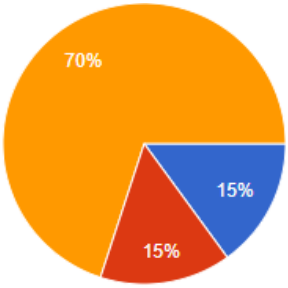




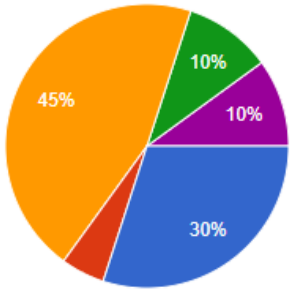
Question: Which combination of keywords below brings the biggest number of records? (before, left - after, right)

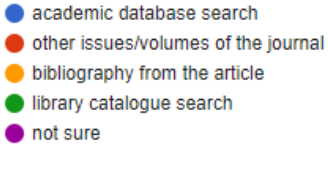


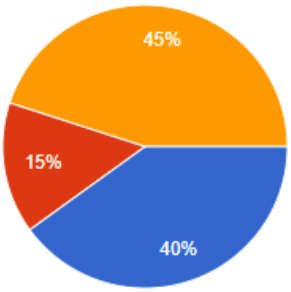




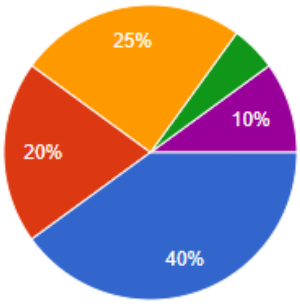
Question: Select the correct meaning of peer reviewed. (before, left - after, right)

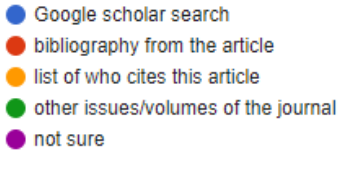


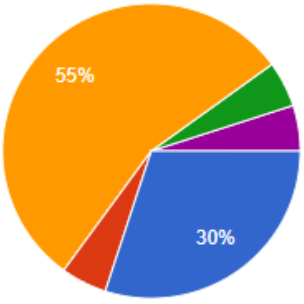




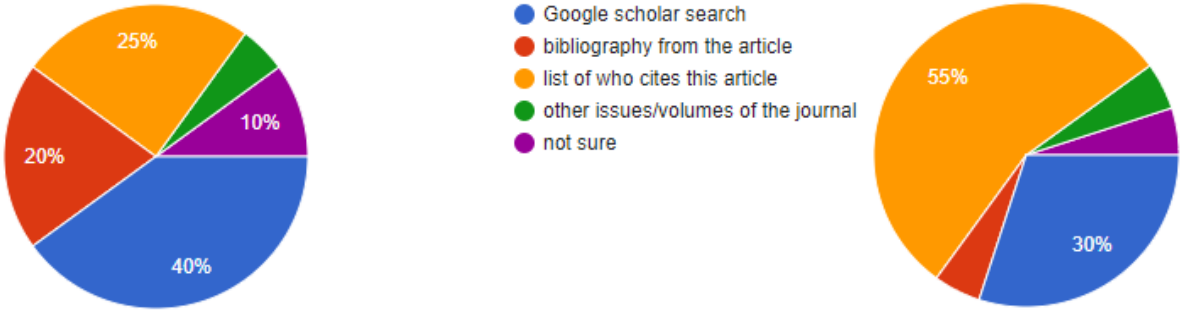
Question: What is the most efficient place to find articles related to one you have already found? (before, left - after, right)





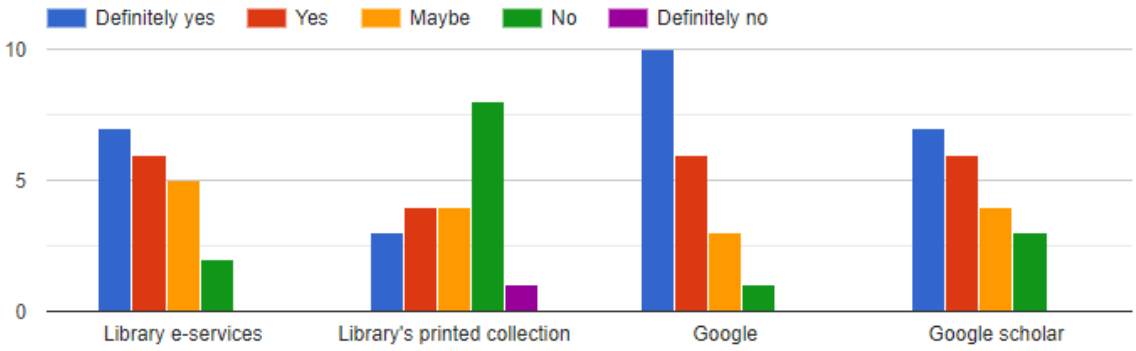


Question: What is the most efficient place to find articles related to one you have already found? (before, left - after, right)

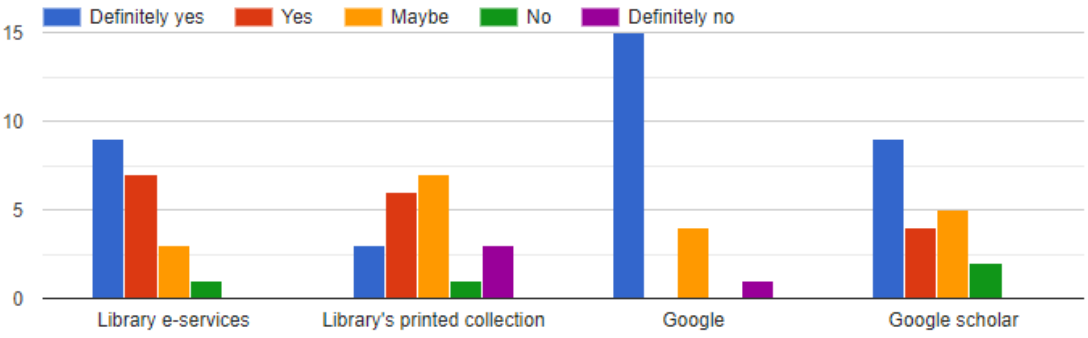


Question: What is the most efficient place to find articles related to one you have already found? (before, left - after, right)

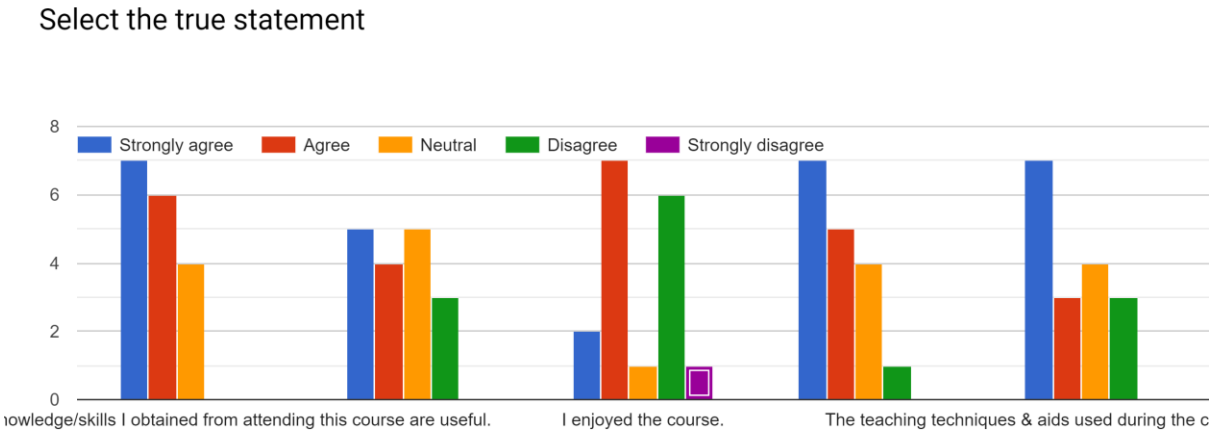
Feedback



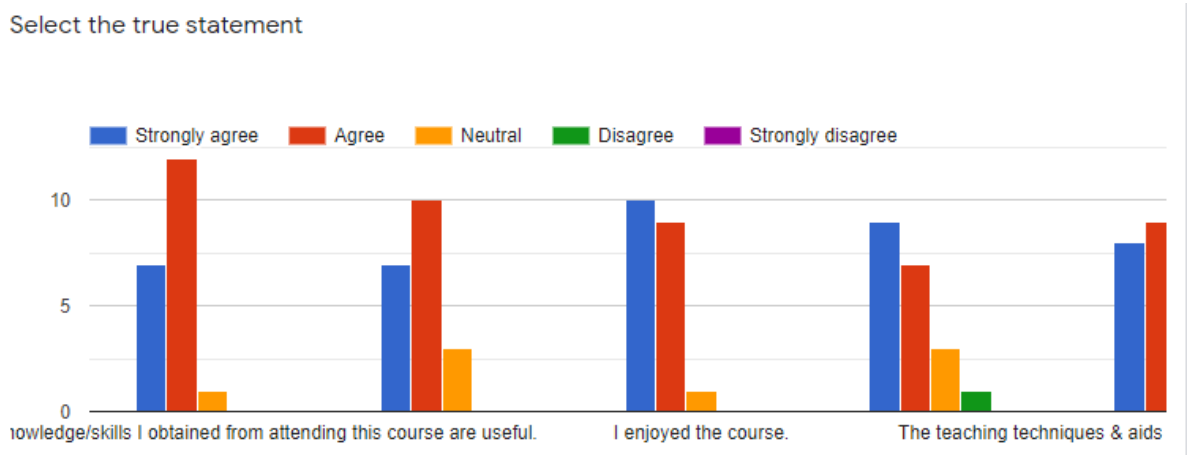
Question: How likely are you to use the following services for your future research needs? (control group)



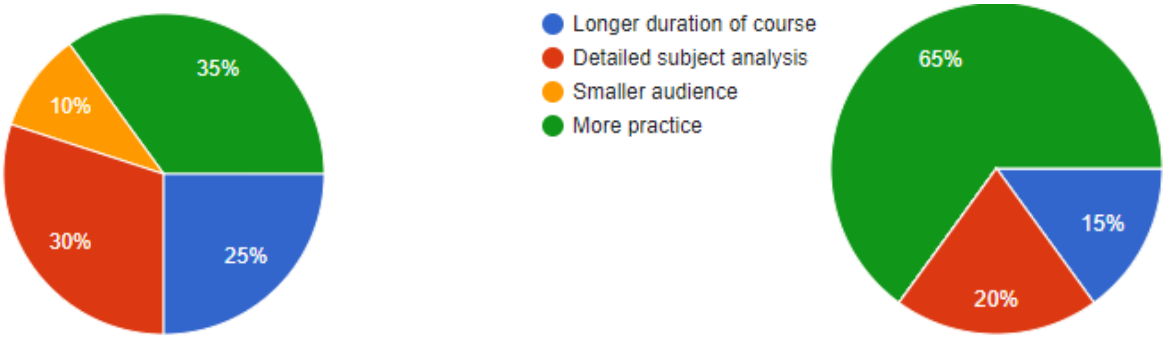
Question: How likely are you to use the following services for your future research needs? (gamified group)



Question: Select the true statement (control group)



Question: Select the true statement (gamified group)



Question: Which of the following can improve the effectiveness of the Information Retrieval Training? (control group, left - gamified group, right)