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What Are They Doing? And Where?

Tracking the Traffic as One of the Instruments in an Evidence-Based Redesign of a University Library

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Abstract

During the last decade we have seen an increased focus on the future use of academic libraries, both in terms of their legitimacy and the use of the physical library space itself.

Prior to a planned, major rebuilding of the Humanities and Social Sciences Library at the University of Oslo (HumSam library), a thorough study was required to establish the current use of the library space, as well as users' wishes and needs for change.

Several different methods were used to collect this data. One was the method Tracking the Traffic (TTT), developed by Tord Høivik. This is a purely quantitative method, where the users in the library are counted several times during the opening hours. This registration takes place over a set period, for example, at fixed hours every day over a minimum time span of two weeks. The activities of the users are also registered, but without talking to the user, so one can register that one user is reading a book or using a laptop, but not what kind of book or what the laptop is being used for. Other methods used were a user survey, different kinds of interview and photo documentation.

This article aims at demonstrating how the use of the TTT method contributed when the HumSam library conducted studies to ensure an

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evidence-based renewal of the library. The experiences with this type of data collection are described, and a discussion of the methodology based on our experiences is presented. There are also examples for how this data affected the rebuilding and renewal of the HumSam library. The TTT method needs to be a part of a suite of methods to give an adequate profile of library use. Being a method based on observation, it is necessary to compliment it with other qualitative methods to fill in the picture of library users and to ensure library development soundly based on full evidence (Evidence-based Practice – EBP).

Of course, the library staff had many pre-assumptions about the library use; however, documenting use in this way may lead to more accurate knowledge.

When visiting the redesigned HumSam library today, the responses to the results of the TTT and the other studies mentioned in this article can be clearly seen. The most obvious are the number and variation of seating facilities, the number of group rooms and the reduced height and number of shelves for the physical collection. Scenes and special places for events have also been created, opening hours in exam periods have been increased and the library counters have a more inviting design than before.

Keywords: Seating sweeps; Tracking the Traffic; academic library redesign; user studies

1. Introduction

At the main campus of the University of Oslo (UiO), there is one building which is placed close to the geographical centre. The building is called Georg Sverdrups hus, named after the first director of the library at UiO. The building hosts the Humanities and Social Sciences Library (HumSam library), and opened to students and staff in 1999, after 10 years of planning. The building was new and was at the time seen as a landmark building both locally at the UiO and among academic libraries in Norway. The architect was Are Telje, and the building is already a listed building, seen as an excellent example of a "building of knowledge" from our time. When it opened, several smaller libraries at the university were co-located in this new library. The HumSam library was immediately a success and became an important arena for studying and learning for students and staff since its inauguration. The University

of Oslo is the second largest university in Norway, with about 28,000 registered students and employing about 6,000 people. The HumSam library serves half of the faculties at the university.

When the library management at the HumSam library presented its wish to refurbish and refurnish the library in 2015, one of the questions the Library management had to be prepared to answer was "Why change a success, and why invest in a nearly new building?". The HumSam library was at the time a very attractive and popular place for working and learning, as well as a meeting place for students. The management wanted this to be strengthened. The goal was to create an attractive, future-oriented and flexible library, adjusting to the common current use of the library.

As we know, both the use and contents of university libraries have changed fundamentally over the last 25 years (Anderson, 2017; Brophy, 2005). The collections have to a wide extent become digital, which among other things means less use of the physical collections in the libraries. At the time the planning of the Georg Sverdrups Hus started, the digital change was in its infancy, the library collection still consisted of physical books. Contemporary user behaviour has changed significantly since then, both in terms of the use of digital tools and on an increasing emphasis on collective forms of working as a student. These are examples of the new modes of study. At the same time, it is still very important to adapt to the student's need for varied working environments (Eigenbrodt, 2013; Fallin, 2016; Palfrey, 2015; Ward, 2003). Some libraries have taken on the role and function of a learning centre to encompass new requirements, others keep the name "Library" and choose to integrate current service needs into the framework of the library (Hines, 2003). An expected decrease in the need for working space at the university campus has been mentioned by many over the past 15 years. This is due to digital development, but at the same time many academic libraries experience an increased use of the physical library as work arena (Childs, Matthews, & Walton, 2013). One can assume that students who stay at the university campus during the day deliver better results than students who only attend lectures and do their study work off campus. The staff at the HumSam university library wanted to encourage more students to stay at campus, by ensuring that the library was an attractive place to stay and work.

The library management wanted the library to remain relevant and attractive by accommodating the current needs of students. The main emphasis

was to have more varied seating facilities, more daylight and a more visible focus on the digital collections. There was also an explicit aim to propose holding more events in the library, including presentations of research and scientific discussions. As an integral part of the library services, it was hoped to develop a centre for academic writing, and to serve the students in developing their academic writing skills. The changes were to be based on wishes and needs of the library users as well as relevant studies from other universities. The project was considered fitting with the declaration of 2016 as "the year of learning" at UiO. This focus inspired the library management to plan to reinvigorate the physical library as a learning arena, as its contribution to further develop the learning environment at the university. In the application for funding, titled: "Attractive campus: Revitalising the learning milieu in the house of Georg Sverdrup",[1] the possibilities for new ways of utilising the physical areas in the library for more extensive student and staff use was framed (UiO Universitetsbiblioteket, 2015a). It was simultaneously hoped to open up the library, to include and emphasise its function as a place for social meetings and minor events, as well as to develop the users' experience of the library (Anderson, Fagerlid, Larsen, & Straume, 2017). In the application for funding, the need to ensure an evidence based process was stressed, listing several ways to include and anchor both the planning and realization among students and staff (UiO Universitetsbiblioteket, 2015a, p. 7).

The focus was therefore on the primary library users; the students and staff from the Faculty of Humanities and the Faculty of Social Science. Methods to describe the current use of the library and learn more about the needs and wishes of its users were identified. Quoting Tord Høivik, "Libraries that change need to monitor the patterns of library use." (Høivik, 2014c, p. 530). This was done using different research methods during 2015 and early 2016.

The purpose of this article is two-fold. One aspect is to present how the user behavioural studies that took place during 2015 and 2016 have formed the guideline for the redesign and updating of the HumSam library. The sum of the findings from all the different data sets was a central source informing the process of reinvigorating the learning milieu in the physical rooms of the HumSam library.

The second aspect is to focus specifically on one of the methods used, Tracking the Traffic (TTT) and the findings which resulted from its use. In TTT, data of the users' activities in the library are collected through quantitative

observation. The reason for stressing the TTT method is that it was found to be a fruitful method at HumSam that added very useful knowledge to the process of evidence-based reshaping of the library space. It also appears that this method is not too well known. Therefore, it is hoped that this article can serve as an inspiration for further development and use of library user behaviour studies in general, and the TTT method in particular.

2. Literature

A landmark ethnographic study was performed at the University of Rochester (Foster & Gibbons, 2007). This study was an important inspiration for the project at the HumSam library in the early phase. Some of the ideas from Rochester were copied in the HumSam project, maybe most importantly the variety of data collected about uses and users. At HumSam numbers relating to the use of facilities were seen as important, therefore, TTT was chosen as one of the preferred methods. In most of the related studies we found, other methods had been used in addition to the observational methods. There were also examples of different aspects of the discussions about library space. In addition, Tord Høivik's bibliography (2014c) was reviewed to identify additional statistical studies.

Leckie and Hopkins (2002) conducted the very first seating sweep study in two large public libraries in Toronto and Vancouver, Canada. The study is also discussed in Given & Leckie (2003). Given and Archibald (2015) later built on this methodology integrating location data. Unfamiliar with Leckie and Hopkins' research and study, Tord Høivik started developing a similar research methodology, the TTT, on which we have based our study on (Høivik, 2014c).

Mott Linn argues in favour of this kind of methodology to assess a library's layout and operation, because it works well and has a relatively low cost in time and money (Linn, 2013). Susan Thompson has published a study about the use of different apps and other software to make the collecting of observational data easier (Thompson, 2015).

In his doctoral study, Howard Silver combines observation and interviews, aiming to find out how and why the library collaborative spaces are used (Silver, 2007). In a comprehensive study of five campuses, Francine May and

Alice Swabey find remarkably similar use patterns across different academic library types, using questionnaires and seating sweeps (May & Swabey, 2015). They point to several important factors that must be taken into consideration in the development of the library space, for example, the need for different levels of silence. The challenge of noise levels is also emphasised by Yeo Pin Pin and Rindra M. bin Ramli, in their study of how the library at the Li Ka Shing Library met user needs (Pin Pin & bin Ramli, 2008).

Rachel Applegate has followed the development at Indiana University Purdue University Indianapolis over time and found that the library space was seen as the most important working space for study purposes (Applegate, 2009). A few years ago, much focus was given to the massive change of media use, when most of the students suddenly brought their own laptops and tablets as their working tools. Judi Briden and Ann Marshall studied the consequences this had for the users' needs in the library. The crucial point to be drawn from their study is the constant need of change in the library environment, as new technologies continue to emerge (Briden & Marshall, 2010). Wendy Ellison gives another example of the same need for continuous change (Ellison, 2016).

At the university of Tampere in Finland several methods evaluating the use of space in the library, including the TTT method were presented (Lehto, Poteri, & Iivonen, 2013). At the state university of New England their seating sweeps data were handled by a Geographic information systems program (ArcGIS) to visualize the users' movements in the library (Mandel, 2016).

3. Methodology and Design

As mentioned, several methods were used to collect data in the HumSam library. Most of these were standard methods for collecting qualitative or quantitative data, such as interviews and surveys. However, the specific focus of this article is the method termed Tracking the Traffic (TTT), which is used as a way of collecting observational data about user behaviour in the library. We found it to be an effective and suitable way of identifying valuable data about the use of the library. Using TTT, it is possible to collect quite extensive amounts of information about the library users, and how they use the library space, with relatively limited use of resources.

3.1. The TTT Instrument

TTT was designed as a management method by Tord Høivik, former associate professor of Library and Information Science (LIS) education at Oslo Metropolitan University. The development of the instrument started in 2005. There are many common features with the research method called 'seating sweeps'; how the two methods relate to each other is discussed in an article from 2014 (Høivik, 2014c).

The TTT method was developed in cooperation with several public libraries over a period of several years. Its main use to date was made in public libraries in Norway, but some academic libraries have also made use of the method. Some of these conduct TTTs on a regular basis, as a way of monitoring library use over time. TTT has been used in some libraries in other countries, until now mainly as a result of the Latina summer school (Høivik, 2014c).

The instrument is thoroughly documented by Tord Høivik himself and at the recent establish website "TTT in libraries" (Høivik, 2014a, 2014b, 2014c; Olsen, 2019). We therefore limit the presentation of the method in this article to some main characteristics. The method enables local data collection of the use of the library without major investments in external expertise. It also makes it possible to collect comparable data from several libraries, to facilitate finding tendencies and trends of development.

TTT is basically a quantitative method, where the purpose is to register the users' activities while they are in the library. To conduct a TTT, you need a floor plan of the library divided into zones, a time plan for the observation tours, and a list of activities. The registrations are done by having regular "tours of observation" along predefined routes through the library counting the users' activities. The activities are distributed into 16 predefined categories, describing media use and activities, and whether the activity is done alone or in a group. An example: The activity 'Alone with PC' (ALPC) describes a user using a stationary PC alone, while 'Group with PC' (GRPC) describes a user using the same medium as a part of a group. If the person is using his or her own laptop, the activity is changed to 'Alone with Laptop' (ALLAP). A full list of the activities can be found at the TTT website.[2]

The division of the library floor plan into zones is one of the main factors for which one can extract findings from the TTT analysing the data. For example:

the registration of "user queuing" will give different information if the librarians counter and the printer room are in the same zone, or separate. If the zones are separate, one can easily find out whether there usually is a queue for getting help from the librarian and if so at what time of day there are queues. Whereas, if they are in the same zone, you cannot know if the only element causing a queue is the printer.

The observation tours are conducted according to a fixed time schedule. Høivik recommends that the tours are distributed throughout opening hours every day of the week. He also recommends counting in two full weeks as a minimum to achieve a full picture of the use of the library space. The collected data is registered in a spreadsheet, as a basis for further calculations.

TTT is well customised for users new to this kind of quantitative methods. On the website "TTT in libraries", which is open access with a non-commercial CC-licence, both the ideas, the specific method and practical tips can be found (Olsen, 2019). Both Høivik and several libraries have made their collected data available for reuse and comparison purposes.

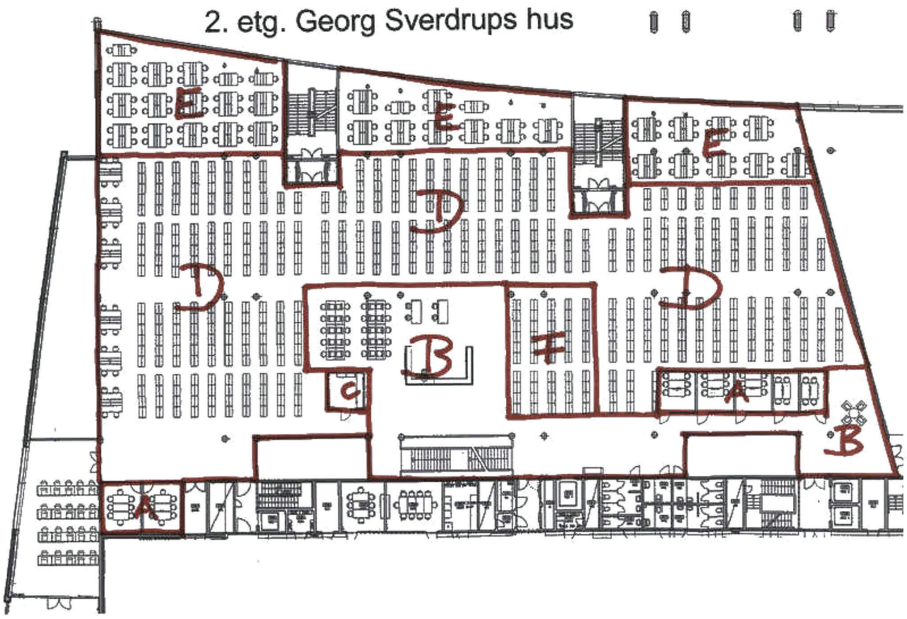
3.2. TTT Implementation at HumSam

The TTT study at the HumSam Library was planned and supervised by a six-person project group. The author of this article was an external member of the project group, the other members included librarians, academic librarians and two section managers.

The library was divided into 39 zones, distributed throughout the four floors and two open library stacks. Several factors were considered for the final division of zones, mostly based on two conditions: function and type of seating facility (Figure 1).

The HumSam Library has six floors, covering 29,000 square meters in total. Four floors are completely open to the public, two have limited access. At the time of the TTT study, the floors that where open to the public hosted a large collection of printed documents, with sections of individual reading desks on each floor. There were a few group tables on most floors, and some group study rooms available on four of the five floors. In total, the library had

Fig. 1: Map with zones, 1. Floor HumSam library.



498 reading desk spaces and 22 group study rooms. The reading desk areas were divided into two areas: one silent reading area, where laptops and other sound sources were not allowed, and the other regular reading areas, which could best be described as 'quiet' reading areas.

To keep the cost of the study down, it was agreed that the regular library staff would conduct the data collection. All participants in the data collection were given two hours of training, which showed to be an important factor for a successful implementation. The project group developed instructional material for the training, containing a thorough description of the activity codes and the zones. Initially there were some sceptical voices among the library staff, related to the expected additional workload and a lack of self-confidence to conduct the tasks. Most of these objections disappeared early in the project implementation. In fact, the project had a very positive effect on the workplace atmosphere.

Before starting the registrations, the project group conducted a series of test rounds. The findings from these led to some minor changes in the description, for example the need for a priority list when several kinds of media were in use by the same user. The TTT method is originally based on registration of one activity per user. In the HumSam priority list, using a laptop or a tablet was defined as the most important one. There were two main reasons for this, connected to the planned rebuilding of the library: the need for charging when using electronic media, and the need for lockers to store the media for short periods, e.g. when leaving for lunch.

Three full weeks of counting were conducted over three separate weeks during the spring of 2015, one week in February, one in March and the last one in May. Each week, regular tracking rounds were performed during all open hours. The distribution of the counting time schedule followed Høivik's advice, roughly every second hour for a large library such as this one. In total, 132 observation rounds (44 per week) registered 39,127 activities across a total of 18 days.

It is important to inform the library users when an observational study is conducted. This was done using several channels of information, from using the information screens in the library to counting staff wearing yellow vests to indicate that they were conducting a special mission while they walked through the library and noted the activities of the library users.

The project group found it essential to maintain the activity categories as close to Høivik's description as possible, to make the findings suitable for comparison with other libraries. 'Talking on a mobile' was one of the very few categories where there was a need to diverge from the TTT description. Visitors talking on mobile phones were seen as a nuisance in the library, both by staff and patrons. To find numbers for this activity and have the chance to map where it took place, the category MOB was added.

TTT is a universal and open methodology, where the participating libraries are asked to share their collected data. The HumSam library decided to contribute by making the collected data openly available online,[3] as well as being open for contact regarding use of the data for comparisons and research.[4] The activity manuals are open and available as well, for others to use and for further development. This was seen as our contribution to a common knowledge

base of user's activities in the library space. It is hoped that the findings can contribute to future comparison and discussion towards the further development of academic libraries. A comprehensive report was published describing the TTT study at the HumSam Library, written by Unni Knutsen (UiO Universitetsbiblioteket, 2015b, in Norwegian).

3.3. Methodological Issues

One of the obvious challenges regarding this kind of survey is that it is only possible to investigate the use of the library rooms as they are set out and organised now – with the existing distribution of rooms and furnishings. As mentioned, the main parts of the HumSam library were equipped with individual reading places, so the findings would naturally show a high degree of individual use owing to the set-up of these places. Thus, additional data collection tools had to be employed to avoid this distortion. However, even then, one cannot fully know how the users would really use the library rooms if furnished or equipped differently.

Another obvious disadvantage using this kind of observational method is the fact that even if one registers what kind of medium the user is using, this implies no knowledge of what it is used for – work, studies or entertainment. The user of a laptop could be writing an exam essay, following a Netflix series or using TED-talks to better understand a complicated part of the curriculum. To get more detailed information, qualitative research methods such as interviews must be used.

The current TTT methodology does not describe how to register the use of different media types at the same time. It showed to be more the rule than the exception that the library user had several media at hand at the same time – both laptop, mobile, book, and maybe a tablet and a notebook. It is seldom obvious which media is in use, but it was obvious that the users wished to have the possibility of accessing them all. The result of this is that each user needs more table space than previously. The need to register several media types in use could be solved at different levels of complexity, which is discussed at the TTT web site. It can be stated that one should be careful changing the TTT principal of one activity equals one user, because valuable data would be lost. Methods to solve this problem need to be further developed.

In the TTT method, belongings occupying a reading desk are not registered, only actual people being in the library. If belongings were registered, it would cause the rate of perceived occupied spaces to be higher, but such data would need a separate category and must obviously be excluded from the analysis of activities. At the HumSam library such belongings were not registered.

May and Swabey point to another methodological limitation, namely that the method "overemphasizes activities that take longer to accomplish" (May & Swabey, 2015, p. 774). Since the activities are counted in a snapshot of time, it is more likely that 'reading a book' is recorded than entering the library to collect a book from the reservation shelf.

These examples of the shortcomings of the TTT method illustrate the necessity of substantiating this user behaviour study with other methods.

3.4. Additional Research at HumSam

At the HumSam library several research methods were adopted. The first was a survey conducted in 2014, with 1,100 responses. The main findings from this were that students were satisfied with the library but wanted more group rooms and flexible zones. Different kinds of interviews were conducted later; one was using a web based, short questionnaire: the staff asked users leaving the library a few questions. This data collection went on for one week and gave information about 50 random user's main errand in the library for this visit and the duration of their stay. During the same period another interview series took place, when two library employees conducted a series of in-depth interviews of 17 students using the library (Anderson, 2017; Fagerlid, 2017).

Photos were also used to document library use. Photographs of the different rooms in the library were taken to document use at selected hours. In addition, an Instagram competition called "My favourite place" was launched. The competition lasted 12 days, inviting the users to share their favourite places in the library. A total of 86 pictures were shared. And finally, a mini survey was conducted to register the use of the group rooms in the library.

4. Findings

In the following section, the focus is on the findings from the TTT observations. The numbers are based on the three one-week observation periods. In total, 39,127 observations were made, where each observation relates to a person using the library space. In the week in February there were 10,685 observations and in March 11,809. May is a busy month in the library due to exams; this is reflected by the total of 16,633 observations during the observation week.

The time use profile was almost identical in the three periods, even though the total numbers of users varied greatly. The average visitor spent 94.7 minutes in the library.[5] From this figure, one needs also to be aware that multiple visits of one user would inflate the number of visitors registered in the gate count. Supposing some of the users leave their working place one or several times during the working day to have lunch or take a break, it can be assumed that the amount of time spent in the library per person during one day might be significantly higher.

There are differences in the time spent on different weekdays: on Saturdays the students stayed longer (102 min.), while the average on Fridays was 82.3 minutes. In comparison, the Norwegian public library in Bekkestua (a large public library close to Oslo) measured an average visiting time of 24 minutes in 2010 using the TTT method.[6] The University library in Stavanger conducted a TTT in 2010 and found the average visit lasted 44 minutes.

Taking a closer look at the data according to the time of day, it is possible to locate where in the library users preferred to sit. The reading desks on the first floor were shown to be the most popular. One can assume that the workspace with lots of daylight through the big windows could be one of the reasons. In addition, this is a somewhat quieter area than the ground floor, which is the entrance floor. In analysing the TTT data, the photos of the reading areas gave useful additional data to expand on the most preferred work areas.

Most of the observed users were working alone, either with a laptop or with books, pen and paper. This was like the findings from a 2010 micro TTT study.[7] The most frequently observed activity was working with a laptop,

alone or in groups, making up 53 % of the total observations. We defined this category as a user having a laptop – or a tablet – switched on.

Interestingly, the figure for this activity went from 47.8 % in the February study, to 55.9 % in the May study, indicating the importance of computer access near the term final exams. 28.6 % of the patrons were observed working with physical media, books or journals, alone or in groups. An additional 8 % of the patrons used one of the stationary computers. Adding up these figures, we noted that 89.8 % of the observed users were actively using some kind of media at the time of observation. The remaining 10.2 % of the observations showed users performing other activities, such as browsing the shelves, walking, eating or talking.

One of many interesting findings was related to how many, and which, of the reading desks were taken at our two busiest times of the day – at 12:30 and at 14:30. There were 52 silent reading desks and 446 regular reading desks in the library. Approximately 10 % more regular desks were in use, when compared with the silent reading areas. This tendency could be due to the no-laptop rule in the silent reading areas, even though this rule is not actively enforced by the library staff.

One advantage of conducting a thorough tracking process is its possibility to check reality against general perception. An example of this was registering the queuing as an activity. In the tracking register, queues were almost non-existent, whether waiting for help at the counters, using the printers or the toilets. On the other hand, an established perception was confirmed: less than 0.5 % of the registered users were in contact with the staff during the observations.

The same low figures were found for those using the reference collection. As in many libraries, there was an ongoing discussion amongst the library staff as to whether it is important to keep a physical reference collection in the main library space. The number of users observed at the reference literature shelves was very low. However, there could be use, which is difficult to pick up with the traffic register process.

One of the requisites was to count mobile phone use in the library. In the library as it was at the outset, sound tended to reverberate, and a loud cell

phone conversation could cause a disturbance for many other users. A total of 110 cell phone conversations were noted during the observation schedule. A clear pattern noted, which showed that these conversations mainly took place in the library's open areas, near the reference desks and stairs. These areas were most likely chosen because of their distance from the reading desks. However, these areas are where sound amplifies most.

The library staff experienced becoming co-researchers, and most of them were surprised by how interesting it was to have a deeper look into the library users' activities in the library. This enthusiasm became a positive side effect of the TTT project.

4.1. Findings from Other User Studies at the HumSam Library

As mentioned earlier, several different kinds of studies took place prior to the rebuilding of the HumSam library. In this section only a few of these findings are presented.

The social anthropologists Cicilie Fagerlid and Astrid Anderson conducted several observation and interview studies at the library. Findings from these studies can be found as articles in the book 'Open Library' (Åpne bibliotek) (Anderson, 2017; Fagerlid, 2017). In her article about the university library as a place, Anderson describes a great diversity regarding the relation to and the use of the library among the respondents. Spaciousness, silence, fellowship and discipline are qualities that are valued and appreciated. The physical library containing analogue books and comfortable furniture for work is important as well as reflective of the academic community which it serves. She does not find evidence of worry about the irrelevance of the physical library in the digital reality among her respondents (Anderson, 2017, p. 167). Fagerlid in turn looks deeper into how the library space can work as an arena suited for concentrated academic study with great discipline.

A minor study, conducted by a student during her internship period in 2015, focused on the use of different artefacts in more detail. She did not ask what mediums were used for but registered all the types of media that were used. Summing up, 64 % of the users had a laptop, 41 % of them were using the

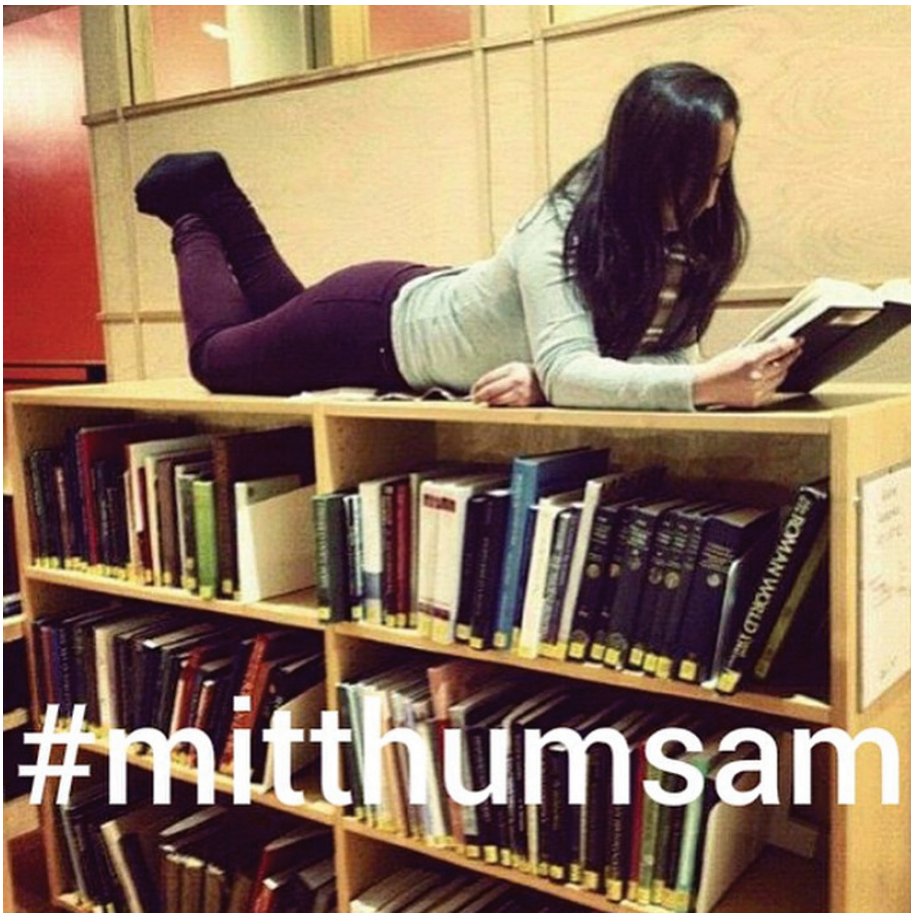
laptop at the time of registration. 65 % had one or more books, 25 % of them were using them. Very few had or used a notepad. She also registered the user's gender and concluded that there was almost no difference regarding the use of the different media between the genders. Counting the number of media in use at the same time, it was found that 89 % used one artefact, 10 % two, and the invisible 1 % had more than two artefacts in use.

During the spring 2015, a survey using short interviews was conducted at the library entrance. This aimed to document what the library meant for the user and whether they had some thoughts about desirable changes for improvement. 52 informants were interviewed, selected on a chance basis as they left the library. Most of the respondents reported that they were very satisfied with the library space, in particular the comfortable chairs and the good light conditions. Still, some of them would prefer more shields around the reading tables, and more seats.

A separate use count of the library's individual group study rooms was also conducted. This had two main purposes; to compare the group sizes with available seats and to document the use of the 22 group study rooms. The tracking was performed 9 times during one week of April 2015. At the time, these rooms were available on a first-come, first-serve basis, with no reservation or booking system available. They were found to be very popular, with very few observations of empty rooms during the count period. The most common group size was pairs, followed by groups of three. This proved the group study rooms to be unnecessarily large for these small teams. The need for more small-group study areas in the library became a key point in the redesign process.

An Instagram competition, where the aim was to get a better understanding of how the patrons perceive their library, used the label #mitthumsam (in English: #myhumsam). Patrons submitted 86 contributions. Some of them were very concrete and easy to use in the future planning. For example, they showed their frustration with the lack of lockers for storing valuables. Most contributions showed patrons' own favourite places in the library and were in that sense not too easy to translate into contribution for rebuilding the library (Figure 2). Most of the contributions were from patrons obviously satisfied with their library. Several commented on the good natural light, as well as on the importance of the quiet zones. Different kinds of seating

Fig. 2: The winning photo in the Instagram competition.



possibilities proved to be important, as well as the company of fellow students in the reading rooms.

It is important to add that many more initiatives were taken to secure an evidence-based rebuilding, refurbishing and refurnishing of the library. A number of representatives from the students, library staff and university management were involved in contributing in the process, sharing their expertise and knowledge in securing an evidence-based process.

5. Redesigning the Library Based on the Collected Data

5.1. Discussion

The findings from the different study methods in the HumSam library and findings reported in published books and articles from other university libraries have been studied. This has been integrated with the many ways that were established to involve the staff and users. These sources of information have formed the base of evidence redesign of the physical library at HumSam. However, this article has focused on the TTT process in particular. Of course, it is not possible to track the separate findings from only one of the used research methods in the redesigned library.

One can easily find traces of the responses to the user behaviour studies conducted in the HumSam library when you visit today. One of the main guiding principles for the redesigned library was sound; further stressing the already existing division of the library regarding noise level. The furnishing and seating facilities of the lower ground and ground floor are inviting for group activities, cooperation and minor events. The higher levels were quieter and therefore, more conducive to individual study.

The first phase of redesigning was carried out during 2016/2017, when the ground floor was the object of a major restructuring, refurbishing and refurnishing process. This phase included the transformation of 1,900 m^2 of mainly high shelves and individual working places on the ground floor into a myriad of different seating furniture and modern group rooms, set in a room filled with daylight. The number of seats at this floor increased by about 50 %. The shelves' height was reduced from 210 cm to 140 cm, and the number of shelves reduced from 3,000 to 1,150 (Figure 3). A stage for events, presentations and discussions was placed in the entrance area, which has become very popular as a new arena on campus.

At the reopening of the first floor, Rector Ole Petter Ottersen stressed the importance of good physical learning environments as a strategic tool for UiO, to secure a high quality education and support the well-being of the students (Ottersen, 2017). The result is clearly visible in the illustration below, the height of the shelves is halved, and several new working places have been established (Figures 4 and 5).

Fig. 3: The ground floor before the refurbishment, with high shelves.

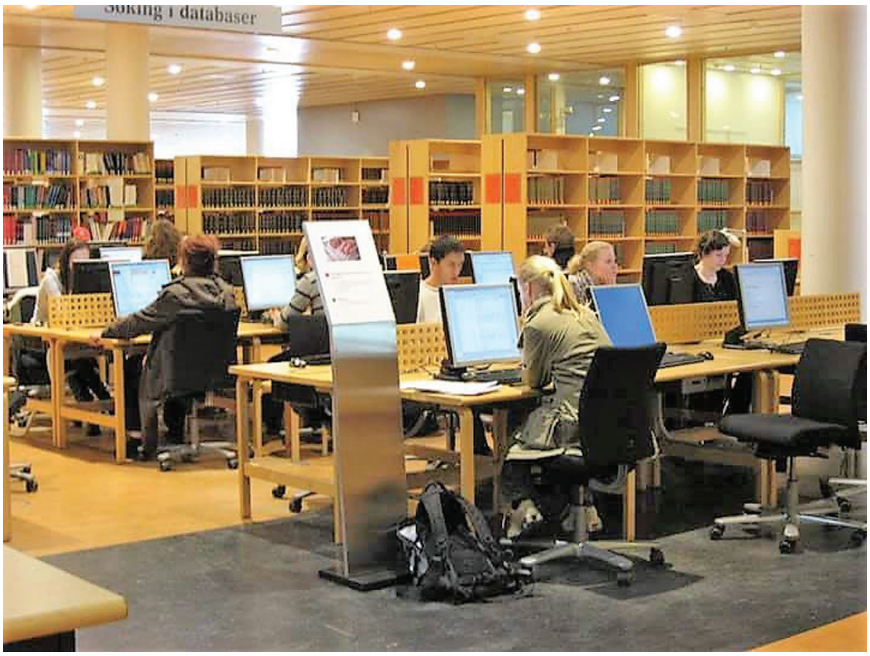


Fig. 4: The ground floor with new shelves for printed journals.

Fig. 5: More light and lower shelves in the refurbished library.

The second phase included similar fundamental changes, reshaping the lower ground floor, which opened in the Spring of 2018. The changes on this floor were even more fundamental. There used to be very few group rooms, some reading desks, but the main area was filled with high shelves mainly used for storage of volumes of printed journals. A major weeding process was conducted, a lot of the volumes were transferred to the national library for safe storage. A compact shelving system was mounted to store the remaining journal volumes. A new arena for exposure of fiction literature was established, as well as 13 group rooms with glass walls and different kinds of seating facilities. The fundamental changes at this floor made it possible to increase the number of seats from 25 to 150 (Figure 6). There is also a small stage for minor events.

The number of reading desks and seats for the library users has increased by 140 % in total, and the number of visitors has increased by almost 50 %, from 700,000 in 2015 to 1,049,636 in 2018. New TTT studies are planned, to follow up and review the development of use in more detail.

The new working places on the ground floor and lower ground floor are set up with varying furniture. One of the findings from the TTT was that the social working tables were the most popular, therefore it was seen as important to

Fig. 6: Different kind of group seating, from closed rooms in the back, open group tables and high-backed sofas.

Fig. 7: New group rooms at the ground floor.

prioritise this kind of working spaces in the redesigning (Figure 7). At the same time, it was very important to keep as many individual reading tables in a quiet area as possible, because these were also much in use. In the new

layout, different kinds of furniture are used to signal different kinds of use, ranging from café-style tables, to group worktables, sofas and individual working spaces (Figure 8).

Many of the sofas chosen are high-backed, which also contributes as a noise moderator in the large room (Figure 9). The new design intends to signal different levels of sound, from the café-style tables at the entrance to the individual desks located in the interior part of the library next to the window (Figure 10). The zones are also marked using different colours on the flooring. This corresponded to several of the findings reported by other studies, where the issue of sound level was quite important to users, both those who want to talk and those who want a quiet working environment. The students themselves maintain the quiet study environment with a strong sense of self-regulation that does not tolerate too much noise. This is a well-documented effect reported by many library users, and was one of the key findings when the social anthropologist Cicilie Fagerlid investigated the HumSam library as

Fig. 8: New designed individual reading desks.

Fig. 9: Sofa groups with high backs.

Fig. 10: Cafe style sofa groups by the window.

a defined room for the students' concentrated studying (Fagerlid, 2017). Her informants report that the library environment and atmosphere is an important inspiration for concentrating on the study work.

University libraries have traditionally needed large physical spaces to store their collections of printed material. As times have changed into the digital age, journal articles as well as books are found electronically rather than physically in the library. Studying the results from the TTT, only a few users were observed looking for books during the 132 rounds of observation. This is of course not a comprehensive truth, since the data analysed were collected every second hour, but it does give an indication of the amount of daily use. On this aspect, the findings correspond with the impression of the library staff. In the redesigned library at HumSam, this has led to a vast reduction of shelves in the main library room. Parts of the book collection have been weeded; major parts of the remaining books are now stored in open storage. This provided another opportunity for meeting the users' needs. By lowering the height of the shelves on the ground floor, more daylight was let into the room. In addition, the group rooms that had previously covered half of the big windows were rebuilt in the middle of the room on the ground floor, serving both as working places for groups as well as shelters for noise. A web-based reservation system for the group rooms was installed.

The current issues of printed journals still on subscription, have been located more centrally on the ground floor, in a "Journal centre", and have in this way become much more visible and accessible to the users.

The evolution of the library collections has implications for the library's new role, as a learning space and community in the academic space. Physical space previously occupied by printed material can now become available to the students for their studies (Fallin, 2016). This is obvious in the restructuring of the HumSam Library. From having hosted mostly collections, one can now say that the ground floor has been given back to the library users. At the same time the change to digital collections requires initiatives to accommodate accessing this material. A focus on dissemination of the digital collection has resulted in more active and professionally designed use of the information-screens in the library.

The TTT showed a major increase in the number of users during the exam periods; this has led to extended opening hours during these periods, including the library being open on Sundays.

At Chichester University, a study showed a need for "a review of desk space and furniture to cope better with mobile devices and aid multi-tasking"

(Ellison, 2016, p. 302). The findings at the HumSam library produced similar findings, as expected. The multimedia use, with several media being accessible simultaneously, indicated an increased need for table space. However, in the current furnishing at HumSam library, the reading tables were not replaced by bigger tables, mainly because this was not emphasised by the students.

Some findings from the TTT data resulted in very concrete solutions. A good example is the construction of mobile phone booths on all floors. This solved the problem of talking on a mobile as a disturbing factor. Nearly all phone conversations registered during the TTT took place in the same area of the library, therefore the boxes found their natural place there (Figure 11).

The finding of extensive use of electronic devices at the HumSam Library was of course not a real surprise. Anyway this presented a need for charging

Fig. 11: Telephone booths.

facilities "everywhere". In a response to this, plugs are included in all new furniture, sofas, working tables and group rooms.

In the TTT study, as in all studies of current libraries, there is a massive use of different kinds of digital devices. Libraries can help the students to take care of these by offering safe places to store them while taking a lunch break etc., for example by installing lockers with charging facilities. This has been discussed at the HumSam library but has not been introduced to date, mainly due to security issues.

Based on the results of the TTT studies, it can be stated that queues are not a problem in this library, neither for the printers, nor for the library counters. The library counters were not much used and were not very expedient or flexible for guiding the users. In the redesigned library a completely new solution for library counters was developed by the staff in cooperation with the interior designer (Figure 12). The previous library counter is used to host the ICT-support. This meets a long-awaited need bringing this service

Fig. 12: The new library counter at the ground floor.

closer to the users. The new journal shelves are also a result of the fruitful innovation of library staff and the interior designer/architect working together.

Since findings from the TTT showed a quite limited contact between the users and the library staff, the library management saw the need to introduce new ways of being visible and accessible in the library environment. The new counters were one important part of this, another is a new service of "walking librarians", being available in the library space.

There does not seem to be a clear consensus on what kind of reading desks or reading areas students prefer in other studies. Observational and ethnographic studies report different results. At the Florida International University (FIU), a seating study showed that the students preferred quiet zones in the library, as opposed to zones allowing whispering or quiet conversations (Dominguez, 2016). In another observation study conducted at the University of Chichester, Ellison (2016) could not find a clear student preference, although Ellison states that the silent study zones, "were always in use during observations" (Ellison, 2016, p. 301). The TTT study indicates that in the HumSam library the most popular reading places were in the quiet, not silent parts, that is the areas where users can talk quietly without making too much noise. These findings were confirmed by the informants from the studies of Anderson and Fagerlid.

The TTT study showed that the patrons at the HumSam library were most active between 12 am and 3 pm. This is a very different pattern from some of the universities in other countries; like the University of Rochester in the U.K, and it is probably due to differences in national study habits (Foster & Gibbons, 2007). This difference shows the importance of collecting parts of the data locally; it is not sufficient to presume ways of use based on other libraries' data.

The users do not necessarily adhere to the librarian's vision of how their library is to be used. At Florida International University, patrons preferred to work on their own even in areas intended for group use (Dominguez, 2016). At another university library they found that patrons were bringing laptops even to areas without electric outlets or WIFI connection (Given & Archibald, 2015). Applegate found the study rooms to be the most popular work space, with a "soft chair" area coming second (Applegate, 2009). At

Florida International University in North Miami, they performed a series of observational studies, including several seating sweeps (Dominguez, 2016). The study showed a demand for "flexible seating options and lounge-like furniture", which the library followed up by plans to upgrade the seating options as well as increasing access to power outlets. This is very similar to how the ground floor at HumSam is furnished after the reform. It will be very interesting to follow-up and observe how the users respond to their redesigned library.

6. Conclusion

By Spring 2018, the planned remodelling and refurbishing of the HumSam library was completed. The lower ground floor and ground floor were totally transformed, containing many more seating facilities of varied kinds; two stages and many more group rooms. Large amounts of the printed library collection that used to occupy these floors were moved to the library stores or transferred to the National Library. Some minor changes were made at the second and third floors, like smaller library counters, some more comfortable chairs, more digital information screens and phone booths. To ensure that the transformation was based on sound and up-to-date evidence, required for evidence-based research, different kinds of user behavioural studies were crucial.

In this article, observational data collection has been emphasised as very well suited for the task of assessing activities of library users. By conducting the TTT-studies one can collect comprehensive data about the activities of library users with relatively little effort. If an TTT-app fashioned for the registration of data were developed, conducting this kind of study would have been even easier.

The management at the HumSam library plans to conduct TTT studies on a regular basis in the years to come, as one of several ways of maintaining an awareness of the users' activities in the library space. There is no sign of the technological development slowing down, and it is crucial for libraries to keep up with users' needs. Only a few years ago, the fundamental change occurred where everyone brings along his laptop or tablet as a study tool – what is next...?

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The photographs in the article are by employees at the HumSam library or the author.

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Notes

[1] The author's translation of the Norwegian title: Attraktivt campus: Revitalisering av læringsmiljøet i Georg Sverdrups hus.

[2] https://sites.google.com/view/ttt-in-libraries/home.

[3] HumSam data: February 2015: https://docs.google.com/spreadsheets/d/1tkKLOW6jhN3oFswM0-fTRjXm3gCVADrZyqE-Ppbhx08/edit?usp=sharing, May 2015: https://docs.google.com/spreadsheets/d/1VOdGhDK4XDiD7HL91wB8kaZVgDhgPjQhkr5BKjaj2Fo/edit?usp=sharing.

[4] Interested readers may contact the HumSam library at humsam-biblioteket@ub.uio.no.

[5] The time spent in the library is calculated by a formula defined in the TTT-method, combining data from TTT and the gate count at the entrance. Further description: https://sites.google.com/view/ttt-in-libraries/calculations/staying-period.

[6] https://samstat.wordpress.com/ttt-eksempler/b%c3%a6rum-samlet/bekkestua-2010/.

[7] This minor study was conducted by a LIS student in her internship period.