

# An Experimental Study of a Digital TimeBank for Students Using the Asynchronous Remote Communities Method

Major Qualifying Project Proposal

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## **Executive Summary**

Timebanking is a means of using time as a currency in order to exchange services between two members of a timebanking community. The main idea of timebanking is that if you provide one hour of service (or one-time credit) you will be able to receive one hour of service from another individual. Timebanking was first discovered by socialist thinkers during the 19th century. Timebanking is intended to have multiple benefits such as extended social networks, individual and societal betterment, and inclusion of excluded groups. However, challenges of timebanking such as confusion to new users and difficulty keeping track of time credits has historically led to the failure of traditional timebanks. Although historically faced with challenges, there are currently hundreds of timebanks around the world. Many current timebanks use digital applications in order to organize time credits, sign up community members, and pair members for service exchanges. Some timebanks are even completely digitally remote. Timebanking can be a means to help many individuals but particularly unemployed people, students, and elderly as using time credits to receive services for no currency can be a way of gaining help with no financial burden. Finally, the Asynchronous Remote Communities (ARC) method can be implemented to allow timebank members to participate even when synchronous or face to face meetings are unavailable. This allows for more individuals to participate in remote communities as it lets them participate in their available time.

The main goal of this project was to provide students with a digital framework that enables them to offer and receive services in order to create a timebanking community inside a larger academic community. The group sought to measure four main objectives in order to determine if participants are willing to take part and contribute to an online community, what services and needs participants want and can offer, effective methods to implement timebanking, and finally the challenge of implementing a student digital timebank. In order to accomplish the objectives, a five-week experimental study with 13 participants was conducted. After the participants were initially recruited through a series of emails, a Facebook page was created to bring the participants together on one platform and to facilitate information and communications between participants. Participants were given an initial survey in order to gain information on the community's demographics. The following week another survey was given to participants asking their preferred needs and skills they could receive or offer. An excel sheet containing the participants and their corresponding needs and skills was then posted on the Facebook page so

participants could begin to set up others to exchange services with. In the third and fourth weeks of the study, participants were asked to exchange services (one receiving and one giving). Another survey was also issued to the participants which allowed them to register their exchanges and keep track of time credits. In the final week, a survey was given to the participants which asked them to reflect on their experience and offer recommendations to improve the timebank. Our team also formed two hypotheses in order to gain insight on the participants motives for using a timebanking community. The hypothesis suggested that participants would use timebanking almost exclusively for academic services and that time constraints will be the main reason for failure to participate. Finally, a survey was sent to the 7 participants who never finished the study in order to find out their reasons for not completing the study. The data collected in the study was then examined using an ARC analysis.

An ARC analysis was conducted to analyze the data received from the surveys that were given to participants during the study. The ARC method allowed us to gather data on the demographics of the participants, which showed that the average participants in our study were 21-year-old males that are currently undergraduate students. Pre-study expectations from participants were also collected which revealed that 62% of participants were expecting to learn new information while meeting new people. Additionally, the levels of engagement throughout the study were also analyzed in the ARC analysis which demonstrated that the engagement of participants was fairly active in the beginning of the study, but dropped by the final weeks. It was also discovered that participants were unwilling to be the first individual to post their own comments on the community page. By analyzing the participant service preferences, we were able to disprove our first hypothesis as surprisingly, the participants preferred non-academic exchanges over academic exchanges. The final week survey showed that participants had some difficulty pairing with other participants to exchange services. It was discovered that the small sample size of 13 participants and poor response rate on Facebook messenger made it somewhat difficult for participants to find others to exchange services with. After analyzing public communications between participants, it became evident that participants prefer to communicate in private messages over public community messages. The participants only communicated with each other in order to complete exchanges as there were no additional communal discussions or interactions. An interesting discovery was made in the analysis of the participants' satisfaction in their exchanges. It was discovered that most participants felt satisfied with the services they gave

and received, however many of the participants did not believe the online services they received were very useful. However, most participants described that they benefited from the timebanking experience stating benefits such as meeting new people, convenient help, and no cost. Post study opinions showed that the majority of participants would recommend timebanking to a friend, found timebanking useful, and gained a better understanding of timebanking. After the study, the non-participant survey determined the two main reasons for failure to complete participation were time constraints and miscommunication between participants. Finally, the participants were surveyed on what they believed would be improvements to the timebank. Multiple useful suggestions were received, which included having a larger participant sample size, not using Facebook at our main platform, and potentially incorporating some synchronous activities into the timebank.

In conclusion, the ARC method proved to be a sufficient method to collect data during our timebanking study. The ARC method provides data collection solutions to the difficult challenges presented by digital timebanking. Many times, in digital timebanking communities, it's not feasible to have completely synchronous communities. Our ARC analysis allowed us to analyze the data gathered from the surveys which resulted in a series of suggestions for implementing a future timebanking study at WPI. Based on our research, it is recommended to allow participants more time to complete exchanges as that will increase participation rates and result in more natural exchanges. Also, an increased sample size will give the participants more of a selection to give and receive services. Due to participant dissatisfaction with Facebook, we recommend using a new platform to facilitate timebanking activities. Finally, although asynchronous activities allow a larger participant population, it was discovered that many participants would prefer a combination of synchronous and asynchronous activities in the timebanking community.



# 1.0 Introduction

Some of you might be asking yourselves, what is timebanking? Timebanking is a framework that enables the use of time, rather than money to pay for a service. Individuals exchange an hour of their time for an hour of somebody else's (Figure 1). It does not make a difference whether that time is spent on more challenging service, such as tutoring, or a straightforward activity like giving a ride to the grocery store. The point of timebanking is that if you give one hour of your time, you will receive one hour in return.

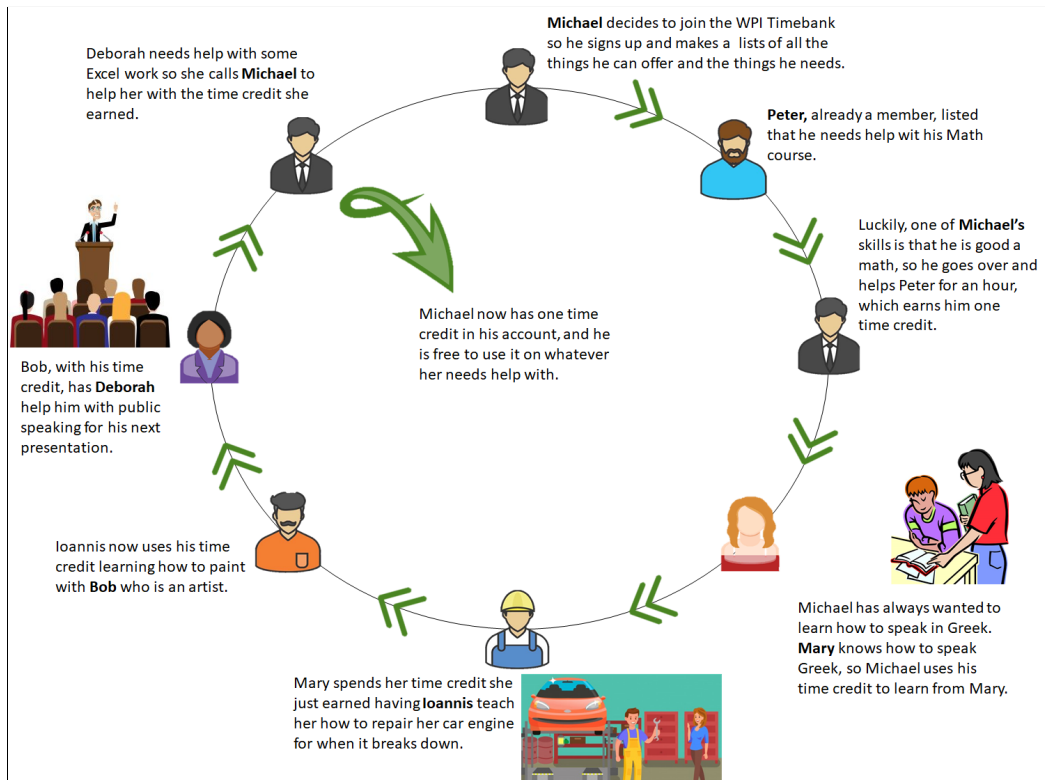


Figure 1: Cycle of timebanking.

Timebanks can provide personal benefits for individuals and students such as “feeling acknowledged, gaining self-esteem, demonstrating belongingness, expressing values, and accessing personal contact” which can greatly benefit one's personal learning and wellness (Seyfang, 2009). Now, when the topic of implementing timebanking with asynchronous remote communities (ARC) comes up, most of us will agree that online platforms have become one of the most comfortable places for college students today. During this project, the team will be examining the implementation of a timebanking community within Worcester Polytechnic

Institute to test the feasibility and effectiveness of implementing such a system. The goal of this project is to collect adequate data using ARC for timebanking between students in a local application. If it is able to be determined that timebanking is a feasible and effective method, a timebanking community can be established and students can begin to receive the benefits of using such a system.

Human-centered research methods, including interviews, focus groups, diary/elicitation studies, design workshops, and role-playing are most intended to be done in person and synchronously. Although these are great methods to use, in some cases it can be hard for the participants to actually participate in the activities due to travel restrictions, when social or political climates restrict a participant from attending, and in some cases people don't actually feel comfortable in joining (MacLeod et al., 2016). Due to these problems, ARC is a method that can help join these people to collaborate with one another and create a community of help.

During this study, a particular challenge to communal interactions has simultaneously impacted communities all over the world. The global COVID-19 pandemic has restricted human interaction and increased the difficulty of human-to-human service exchanges. COVID-19 is a perfect example of how peer to peer services or interaction may not be possible to carry out in person. In extreme cases such as a global pandemic, or much more frequent cases such as geographical distance between peers, the need for a remote learning platform arises. A remote platform that could allow people to interact and provide services to each other synchronously or asynchronously could drastically increase the possible amount of peer-to-peer service exchanges or learning opportunities inside a community.

This community involves undergraduate and graduate students, as well as faculty from Worcester Polytechnic Institute in order to exchange any type of skills or services that individuals are able to provide within their knowledge. As some studies have demonstrated, the use of Facebook groups is well known and commonly used within these communities, thus the team created a Facebook group in which we started with a 5-week experimental study with 13 participants to complete a variety of activities for our understanding of their needs and contribution within the community.

## 2.0 Background

### 2.1 What is Timebanking?

The idea of timebanking was first discussed by socialist thinkers such as Karl Marx and Robert Owen during the 19th century (Chappelow, 2020). Timebanking formulated from the idea of using labor as a currency such as labor notes or labor certificates that would prove someone earned credit for labor they did. The first timebank was created in 1973 by Teruko Mizushima in Japan. Mizushima used the idea of participants earning time credits that they could redeem any time during their life. In 1980, an American law professor/social justice activist named Edgar Cahn trademarked the name “timebanking” (Wikipedia Contributors, 2020). Timebanking can be defined as an alternate currency or bartering system that uses labor-time as the unit of account. Cahn created five core principles that must be followed in a timebanking system.

Cahn’s five principles are (Chappelow, 2020):

- We Are All Assets: Everyone has something to contribute
- Redefining Work: Rewards all work, including unpaid and care work
- Reciprocity: Helping each other build strong relationships and community trust
- Social Networks: Belonging to a social network gives our lives more meaning
- Respect: Respect is the basis for a healthy and loving community and lies at the heart of democracy

Timebanking has several benefits both for the individual but also for the society. Timebanks have shown to extend social networks and opportunities available for each person. It develops a reciprocal relationship among users. Moreover, it seems that Timebanking attracts people from excluded groups and other people who usually would not get involved in volunteering. Lastly, timebanks improve an individual’s life through increased social interactions. However, the benefits of timebanking are not always easily achievable.

Time as a currency can often be confusing to new users. New timebank members may be hesitant to ask for help in the beginning because they do not fully understand the new discourses, rules, and practices that make up timebanks. For example, new users may be hesitant to ask for help before they earn any time credits as they do not have the time credits to “pay” for help.

Unlike a normal monetary exchange, time exchanges do not require the individual to have the time credits before asking for help. Timebanks are unique systems as they allow one to “go into debt” as long as they promise to provide time and effort to the community at a later time (Ozanne, 2010). Timebanks are also unique as they view all peoples’ labor as equal, so one hour of labor equals one hour of labor no matter who performs that hour of labor. Reciprocity and trust are two major factors that define a timebanking community. Community members need to feel comfortable to ask for help while also being to help others in any way they can. They must also trust that the help they give will be returned to the community. However, the idea of timebanking must be fully understood by all community members or problems will arise. In the figure below there is an example on how a timebank community works.

Characteristics of success: In order for a timebank to be successful there are a number of things it has to incorporate. First, timebanks must keep an informal approach towards an individual. Furthermore, there must be offered opportunities which encourage personal growth, development and increase emotional intelligence. Peer supports are considered essential in order to get individuals together. Lastly, in order to be successful and attract an audience there must be a big range of incentives (Ozanne, 2010).

### **2.1.1 Current Timebanks**

Timebanks are used globally and most of them try to maintain their focus on local areas. Not all of the timebanks are the same as it all depends on the amount of participants each of them has which means they can be small or large groups which are formally or informally organized. Currently there are over 250 timebanks across the USA which bring together thousands of people from different backgrounds and ages. The way timebanks work is that they aim to create social capital and have an engaged community in order to build a network of support between the individuals involved (Seyfang & Smith, 2002). It’s a pretty simple concept to understand. Once you join a timebank, you are agreeing to be a part of a community that earns and spends “time credits”. Time credits are nothing else but just an hour of exchanged services between two or multiple individuals. You can then use or give these time credits to make other types of exchanges in the future and help a certain community (Seyfang, 2002).

Some examples that exist today are within the business and community development, social justice, and disaster relief areas. The business and community development area has

established a dual-currency method in which they provide individuals that want to start a small business with loan funds and they have to pay their loan processing fees with time credits. They can also pay the loan processing fees by participating in a program that matches entrepreneurs and mentors who provide professional advice for the development of a business. This creates a cycle where people within the same knowledge and area such as entrepreneurship will continue to grow because they make sure the borrowers feel accountable to their community and help (Chan & Gray, 2015).

In the social justice area, the Dane County Timebank has multiple projects that focus on tackling unmet issues such as access to wellness services, juvenile and criminal justice system harm, school to prison pipeline, transportation barriers, food access, food redistribution, building healthy economies, and more. Their main goal is to create change around the social justice area that needs more attention from the community, as well as promoting economic justice for those who will benefit from this timebank (Dane county TimeBank, 2021).

Additional to the two timebanks spoken above, they are also implemented in disaster relief. Members from the Lyttelton Time Bank helped in times of disaster when earthquakes occurred by providing aid to the emergency workers by taking small projects such as dismantling chimneys that could be safely removed or by visiting elderly residents and providing emotional labour, which would give all the emergency workers time to work and focus on issues that needed more attention and skill. Additionally, they provided services such as emotional support, food, accommodations, repairs and additional assistance. All of these may not be exchanges of services but the members that take part of this timebank earn credits for all their services and use them somewhere else within their communities (Ozanne, & Ozanne, 2013).

### **2.1.2 Applications of Timebanking**

As a result of our research on timebanking, we came across multiple timebanks created worldwide. Most of them in local communities and some completely remote. Eight case studies on timebanks were deeply analyzed. The first one was about a timebank run by the University of Georgia back in 2017, the second one was on the structure of timebanks in Spain, the third was based on the effectiveness of a timebanking smartphone application, the fourth on a pilot study conducted by the University of Bari in Italy, the fifth article by Lucian Del Moral-Espin is on digital timebanking and unpaid labor, the sixth talked about *TimeRepublik* a well-known digital

timebank, our seventh article is about *hourworld* timebanks and the implications that different motivations can bring to a timebank and lastly the eighth article by Seyfang is on growing cohesive communities and covers the topic of social exclusion and how timebanks can be incorporated within a society in order to battle such issues. These eight articles are vital in understanding how timebanks work, meaning their structure, how participants operate, and possible resemblances with similar schemes.

### **Case 1:**

This example is of a project run by the University of Georgia where two seven-week timebanks were set up during a span of two years. The project lasted for 7 weeks where students were involved in trading services (Mathew, 2020). As the authors state, timebanks are composed of five basic tenets:

- 1) **Assets:** Everyone is an asset in a timebank. We all have something to give and something we need help with.
- 2) **Redefining work:** We're changing from using money to pay for something and using time as our currency. The work that is exchanged is meaningful in every way possible to create the community we envision.
- 3) **Reciprocity:** It's all about giving back. If someone is helping you, you should help them back in something they might need. Instead of asking "How can I help you?", ask "How can we help each other?"
- 4) **Social capital:** Each individual in a timebank joins and shares a purpose to help a community creating a strong relationship. Without a strong social capital, there is no support, strength, trust or commitment.
- 5) **Respect:** Everyone deserves respect no matter at what point they are in their lives. Respect underlies our freedom of speech, freedom to believe in our own religion, and everything else we value (Cahn, 2015).

This project informed two primary objectives:

- I. Engage in and reflect upon experiential learning activities
- II. Explore community assessment techniques attune to both needs and assets.

Specific project requirements were also reviewed: inventory community members' assets and needs, conduct and summarize a pre- and post-survey on community belonging; develop a system to inventory and track exchanges, voluntarily engage in the "exchange" process, track the type and number of exchanges, and finally, prepare a collaborative summary of, as well as individual reflections on the project.

Each individual student participating in this project had to write a reflection paper through which they had to discuss the challenges and benefits of timebanking and how the project expanded their understanding and appreciation of community practice. A total of 40 students (13 during Fall 2017; 27 during Fall 2018) participated in the timebanking project. The Fall 2017 class voted to inventory and track exchanges using an Excel spreadsheet and a GroupMe app to facilitate communications, while the Fall 2018 class used an online database (hOurworld.org) for both purposes.

The majority of students in both classes (81.5% and 100%, Fall 2017 and 2018, respectively) actively engaged in voluntary timebanking exchanges during the course of the project, with the total number of transactions ranging from 15 (Fall 2017) to 33 (Spring 2018). Most common exchanges were transportation, cooking, meal sharing and companionship.

### **Case 2:**

The second article was based on Spanish timebanks. The increase in the number of timebanks in Spain is evident within the last few years. Even political parties have started including timebanks in their agendas as a way to fight the economic crisis. In this example the authors make a deep dive in the structure and how timebanks in Spain operate, as well as the differences that exist between Spain and other countries. The researchers interviewed several timebank managers and surveyed around three hundred users. Questioning timebank managers was crucial in order to understand how to build and maintain such a community toll.

For this study, they used two data collections. First, they composed a qualitative research on the time brokers and followed it by a survey of the members. Researchers also monitored their Facebook pages, joined the Spanish Association for timebanking development, and took part in two regional meetings of timebanking managers.

Survey questionnaires were forwarded to the timebank members, mostly by email, but also via time brokers, timebank Facebook pages and on the webpage of the Association for timebanking development. Contacting through email was suggested by timebank managers as it was the most frequently used for communication.

Most popular in the sample were women, the middle-aged, highly educated individuals, and members of NGOs. In the sample, 20% of all respondents had never engaged in a timebanking exchange. This percentage is lower than the figure put forward by most timebanking managers (ranging from 40% to 80% depending on the timebank). Therefore, it should be mentioned that the sample is likely to be biased towards the most active users.

Timebanks can have different structures. In this research they found out about two main philosophies of approaching a timebank. First there is the vertical timebank, where the time broker is highly involved in all stages of the transaction. Users will state their offers and demands to the time broker and he/she has the role of an intermediary by matching two offers together (a demand with an offer). More specifically, the broker contacts both parties involved in the transaction in order to give contact details of each other. The users will then contact the broker again after the transaction is done to handle credit. The other type of setup is the horizontal timebank. Here, members don't contact the broker in order to demand a service. Users receive a list or view all offers on an application. Here the broker doesn't have to match his members as they find everything they need online and contact themselves, but he has to focus more on attracting new members and maintaining its current ones while also encouraging more exchanges.

Finally, according to the principal means of communication, the researchers distinguish between dominant online and dominant offline timebanks. There are two communication flows to consider: between time brokers and users and among users. In many timebanks, time brokers send emails to the users with news about the timebanks, updated lists of the services offered and upcoming events. Other timebanks have forums. Many timebanks also have a Facebook page where all members can interact (Valor et al, 2016).



### **Case 3:**

The third article we found really useful was “It’s Time There Was an App for that too: A usability study of mobile timebanking”, published in 2015. In this study the researchers run a five-week timebanking experiment in order to evaluate the effectiveness of mobile use in the exchange of services. Thirty-two young adults took part in this study. Recruiting young participants was vital for the project as they tried to attract people with high mobile phone usage per day.

By setting up their own application, users were given the opportunity to record locations, send notifications and constantly update the pool. This was really effective for synchronous interactions. Also, users were encouraged to provide extra information such as title, description, preferred date, and time frame, estimated time to complete the task, and task location which facilitated the matching process (Han et al., 2015). Moreover, participants were able to communicate with each other by a built-in messenger but also via email. Once a task was completed, there was also a satisfaction rating to assign for the service received and possible comments.

The methodology of the study had three main steps: a pre-study survey, a five-week application use, and a post-study survey. The first survey was sent in order to get information concerning the participants smartphone usage and first ideas and attitudes towards mobile timebanking (Han et al., 2015). Participants were then put through 5 weeks where they were supposed to get involved in service exchanges. Having completed the five weeks testing period, participants were sent an online survey in order to rate their experience, general questions on the overall experience, and open-ended questions surrounding social issues.

The responses showed positive results towards the concept of timebanking and the implementation of a timebanking smartphone application. This could allow the number of participants but also the types of different services offered to increase. The use of a mobile app seems to offer great accessibility and communication for users. Three main logistical categories showed significant efficiency: transaction time reduction, location and time-sensitive timebanking activity support, and real-time coordination banking (Han et al., 2015).

#### **Case 4:**

The fourth journal that was really resourceful was “We are the time”, concerning a project run in Italy by the university of Bari on timebanking. This was a pilot study in which researchers tried to find out about expectations of timebanking implemented on university students, what kind of services would be mostly exchanged and possible positive and negative outcomes. In this study, 1956 students participated, and their answers were recorded by the research team.

The University of Bari, UNIBA, had created its own timebank back in 2009. Their aim was through this project to encourage ethical actions such as timebanking which would help people socialize, increase solidarity among citizens, further networking and promote knowledge and help everyone within the academic community. Moreover, as they stated the basic idea was the creation of a “supportive network” in order to cope with everyday life problems (Fornasari, 2019).

The team running the project, in order to record the expectations of students on timebanking, had to measure the willingness of an individual to sacrifice time for the community and also what kind of help they could offer. To do so, they came up with an anonymous questionnaire of fifteen questions which was made available to the students for a period of one and a half months approximately. In order to analyze their data, they used “Statistical Package for Social Science” (SPSS) and the questionnaires were loaded to a Ateneo ESSE3 platform for accessibility by the students (Fornasari, 2019).

With a great number of responses their team was able to draw several themes on university timebanking. First of all, most participants (roughly 70%) were within the age range of 18-24. Participants older than 25 years of age were mostly graduate degree students. Of 1956 respondents, 71.8% identifying as female, 28% as male and 0.2% were transgender. When asked if they would be willing to sacrifice an hour of their time in order to receive a service, more than 80% of participants responded positively. Slightly over three fourths of the student population were not aware of what timebank is while 14.7% had heard of it and only one in ten students

actually knew about it. When it came to services offered, most popular answers were: study/academic support (78.5%) along with language learning (49.1%), psychological support (43.1%), and support orientation (40%). Furthermore, 92.5% of students believed that participating in a timebank would strengthen social connections and other civic skills by meeting new people and making new relationships. More than 80% of the students agreed that timebanking made them feel useful towards the community and gave them a sense that they had a lot to offer and provide. Around nine out of ten students believed that a community based free exchange system such as timebanking would work, spreading solidarity and increasing social interactions within a community. When it came to skills offered, most students replied by offering cultural activities, organizing events and general assistance as the top three choices, whereas theater, cinematic and DIY sector were the less popular options. Finally, 95.6% of the participants stated that timebanking strengthens the sense of community (Fornasari, 2019).

#### **Case 5:**

Our fifth journal, “Feminization of labour, defeminization of timebanks: Digital timebanking and unpaid virtual work” revolves around the adaptation of digital timebanks and the gender differences in them and in labor. This study was done because of the sudden rise of timebanks in Europe, especially Spain, and sudden adaptation of digital timebanks (DTB). As del Moral-Espin and Pais state, there are three different types of timebanks to be discussed, territorial, combined, and digital (Moral-Espín & Pais, 2018).

- Territorial/Traditional TB: established in small territories, centralized organizational model, low technological use
- Combined TB: established territory, digital platform for communication
- Digital TB: operating globally, online communication, internet-mediated management.

For the sake of their analysis, they looked into six timebanks, three originated in Spain and three in Italy. By having three timebanks of each kind (traditional, combined, digital), in order to analyze the data received they followed a statistical analysis approach as well as implemented SNA (social network analysis). SNA is a method that allows the representation and measurement of the qualities of the relationships that link the members of a network and the

structures that they generate (Wasserman and Faust, 1994). Furthermore, they also proceeded to conduct interviews with operators of the timebanks and staff.

Findings showed that although the adaptation of digital timebanks might be on the rise, and more people are involved in digital timebanks, traditional or combined timebanks generate more activity. This being said, it is conveyed that in person activities from territorial timebanks are more likely to happen due to the close proximity of members. Moreover, another interesting point was that although traditional and combined timebanks are promoted by non-profit organizations, digital timebanks are often operated and promoted by start-ups which seek profit. It was found that combined and traditional timebanks hire operators (coordinators) when there is funding from the council for example otherwise someone offers his services voluntarily. The switch to completely digital timebanks makes the participant purely a user of the online platform and reduces one's personal involvement as far as administration is concerned.

From the first part of their statistical analysis, they went into analysis demographic data of participants related to their exchanges. It was really interesting to note that the average age of participants in digital timebanks is a lot lower than the average age in either combined or traditional timebanks. It was also noted that among digital timebanks women tended to be on the receiving side of activities more often than men and this was due to higher time pressure among women due to gender inequalities.

The second part of the research revolved around the type of exchanges among the different types of timebanks and how gender numbers might vary too. It was observed that when looking into digital timebanks, the services exchanged were more "professional". The authors stated that less in person contact might create fewer friendly bonds among members, and thus fewer personal relationships created. When looking into activities exchanged, in digital timebanks most revolved around IT support, coding and services around technology (Moral-Espín & Pais, 2018), whereas in traditional and combined timebanks the services exchanged were more personal, e.g., transportation. This difference among activities exchanged shifts away from the emotional aspect of timebanks since they become less personal and members do not initiate socialization due to the absence of in person interactions.

The last part of the study was based on the hypothesis that women are more likely to exchange services with other women rather than with men. The social network analysis was done utilizing a software named “UCINET”. It was found that among digital timebanks the participation of men seemed to increase whereas in the past, traditional and combined timebanks were dominated by female participants. The author comments also on how such findings might convey that gender differences might start to take over also in the area of timebanking.

#### **Case 6:**

Our sixth journal, “Collaborative Economy and the Digitalization of Timebanking: Opportunities and Challenges” suggests how digital timebanking creates many opportunities to promote, create, expand, and interconnect territorial and digital timebanks (Del Moral & País, 2015). The article focused on one current digital timebank: *TimeRepublik* and compares this digital timebank with traditional timebanks. The comparison between *TimeRepublik* and traditional timebanks provides a clear understanding of the new opportunities and also challenges that digital timebanks can potentially offer.

The article discussed how digital timebanking immediately connected to social media, such as Facebook, as social media platforms have become a go to place for exchanges between individuals and a place to create communities. Digital timebanks have also greatly simplified the registration of exchanges. In the first timebanks, registrations of exchanges were complicated and difficult to keep track of which can be considered a main reason people stopped using traditional timebanks. Digital timebanks have allowed for easy, single step registrations that automatically transfer time credits for the exchanged services.

Multiple distinguishing statistics were discovered between traditional timebanks and digital timebanks. One interesting discovery from this study was the age difference of traditional timebank users compared to digital timebank users. In traditional timebanks, most of the users consisted of retired individuals and people in need of financial resources. This study determined that 67% of members of *TimeRepublik* were under the age of 34 years old. Another interesting discovery was that the rate of men and women in *TimeRepublik* was completely opposed to traditional timebanks. In traditional timebanks, there were usually far more women than men but this article found that in the digital timebanks, 63% of the participants were male (Del Moral &

País, 2015). With a more even ratio of men and women, it was discovered that homophily per gender was smaller in digital timebanking than in traditional timebanking. The digital timebank *TimeRepublik* made more men interested in timebanking which evened the male to female ratio and resulted in more men and women exchanging with each other.

A final opportunity to note is that it was found the types of services and time of exchanges differed between traditional and digital timebanks. It was observed that most of the exchanges on TimeRepublik were more professional or working-life oriented. Traditional timebanks had several more socializing exchanges taking place. This had a drastic impact on the time spent on exchanges. In the digital timebank, 38% of exchanges were less than an hour and 16% were 15 minutes or less. In many traditional timebanks, it was not possible to spend less than an hour or even 30 minutes. Oftentimes meeting someone face to face is not easily done for less than 30 minutes (Del Moral & País, 2015).

We can conclude from this article that it will be crucial to make the registration of exchanges simple. If the registration process is complicated, it will decrease timebanking member participation. Implementing a digital timebanking community will also facilitate exchanges of services between a gender diverse population. The average time for exchanges in a digital timebank is usually far less than an hour. We must make it possible for participants to exchange shorter time credits in order to need this digital timebanking trend. Finally, as we move forward with timebanking at WPI we should be aware of the economic direction our timebank is going to prevent against individuals using timebanking as only a means of personal capital gain. The potential economic challenges of timebanking are a concept that is not discussed in the other articles we reviewed; however, we believe it will be an important aspect to keep in mind as we continue with our study.

#### **Case 7:**

Our seventh article is “Unequal Time for Unequal Value: Implications of Differing Motivations for Participation in Timebanking”. This report analyzes service exchange records from the three largest hOurworld timebanks and implemented a survey study that was distributed to approximately 10,000 members in over 120 timebanks in the United States. 50 formal interviews were also conducted with founders, organizers, volunteers, and members of

hOurworld (Shih, et al., 2015). The researchers looked into trends in member practices that are only traceable using such a large data set. Finally, the report analyzed how self-serving and prosocial motives affect member participation.

After the data was analyzed, the report described some interesting findings on timebank member motivation and participation. The first interesting trend discovered was that most services were seen as luxury/in essential services. This created problems with participation as members who were looking for more pragmatic needs were unable to find the services they desired. Another reason for lack of participation was that timebank service exchanges would sometimes fall through because the member offering the services prioritized other obligations over timebanking. This was especially true if the member was able to make money doing the same service outside of timebanking. One reason for this is that members can use money currency to pay expenses such as rent, where time credits can only be spent on services they might have no current need for. Finally, the study determined that service receivers are motivated by instrumental rewards, while service providers have more ideological and altruistic motives. Members who frequently use the timebanks are more drawn to social experiences while members who use timebanks infrequently are not. The difference in motives and expected rewards can leave some timebank members feeling like exchanging time credits is not equal in value for both participants (Shih, et al., 2015).

#### **Case 8:**

The research paper “Tackling social exclusion with community currencies: Learning from LETS to Time banks” by Gill Seyfang discusses how growing cohesive communities covers the topic of social exclusion and how timebanks can be incorporated within a society in order to battle such issues. It is really interesting to point out how timebanks can affect marginalized social groups, and this is done by analyzing the case of timebanks in Britain. As stated by Seyfang, timebanks in Britain have been on the rise, even BBC has covered the topic, but in general timebanks have been under research. The first British timebank was in Gloucestershire, run by a charity called “Fair Shares” in 1999. By 2002 there were more than thirty timebanks operating within the United Kingdom with an average size of sixty-one members with around thirty hours of exchanging services per week. It was calculated that there are slightly more than

two thousand members across the whole country with more than sixty three thousand hours exchanged in total (Seyfang, 2002).

The research methodology approach by Seyfang was really interesting since it was based on ways to measure the success of a timebank. Thus, in order to evaluate if a timebank is running well, they took several factors under consideration from which the main two consisted of, jobs created, and money saved. Then a general discussion of the signs of economic, social and political benefits had to be done in order to evaluate the effect of timebanks amongst a social group. They proceeded in site visits, surveyed members, interviewed several timebank coordinators and a focus group consisting of twelve people (Seyfang, 2003).

An interesting point by Seyfang was that a high percentage of people participating in Rushey Green's timebank (one of British timebanks analyzed in the case) were introduced to the topic of timebanking by their general practitioner. Such people had several underlying physical and mental issues and being included in activities within the timebank was their first recovery step and re-engaging with society.

Seyfang's final argument revolves around the scale of timebanks. She commented that unfortunately at the current state timebanks are small in scale. Because of that it is directly related to insufficient funding. Having the right infrastructure and legal framework is vital for timebanks to survive and expand in the future. Such a support will aid timebanks to evolve, expand and reach new standards. Making timebanks "mainstream" (Seyfang, 2003) will allow for large-scale adoption and will emerge in new sectors such as education, training, regeneration, health and social care (Seyfang, 2003). They will need to be supported both from the private and public sector in order to secure the survivability of such timebanking projects.

All eight examples presented above are crucial in order to understand the structure of a timebank, how to include and treat participants, how to maintain a timebank alive and how to approach difficulties. Also having seen all these previous examples of past timebanks we validate the possibility of social benefits both on an individual level but also for a collective community. Moreover, information about their methodology and approach was crucial in order to set up our pilot study. Especially when it comes to data collection, data management, analysis and drawing final conclusions.



### **2.1.3 Participants**

Different timebanks can provide services for many different types of participants, however there are a few main groups of people that can benefit greatly from timebanks. Unemployed persons are encouraged to participate in timebanks because service exchanges will allow them to receive help without having to spend any money (Seyfang, 2002). Similarly, youth and students can also benefit from timebanking without spending any money in order to gain developmental assets (Shih, et al., 2015). Students and youth are usually not fully employed and therefore do not have excess spending money. A good way for students to get help is by exchanging services with another in a timebank as it allows the student to give and receive services using only time credits. This makes timebanks a perfect platform for students who are on a tight financial budget. Finally, elderly people can benefit greatly from participating in a timebanking community. Many physical tasks such as dog walking or lawn mowing may be too physically demanding for elderly individuals to do themselves. Also, as elderly people lose the ability to do things on their own, they may have a difficult time paying for assistance such as a personal caregiver. Timebanking has proved to be a viable means of decreasing healthcare costs for the elderly by providing non-skilled healthcare support free of any monetary payment (Sajani, 2018). Timebanking will allow elderly people to exchange knowledge or skills such as tutoring and knitting for physical activities or care giving that they cannot do themselves or afford to pay for. Although these examples all benefit greatly from timebanking, timebanking can be beneficial for any individual regardless of wealth, physical ability, age, or occupation.

### **2.1.4 Benefits of Traditional Timebanking**

Timebanks are often highly beneficial for participants and their communities. Timebanks can help participants extend their social networks and friendships by developing reciprocal relationships between users. It has been found that timebanks are effective in attracting socially excluded groups and individuals who usually do not participate in traditional volunteering (Ozanne, 2010). Participation was also found to improve individuals lives by increasing social interaction. Community engagement in a timebank can also provide personal benefits for individuals such as “feeling acknowledged, gaining self-esteem, demonstrating belongingness, expressing values, and accessing personal contact” (Seyfang, 2009). Timebanks also provide a

platform for participants to get help for themselves which can support them in achieving their objectives.

Most common benefits of timebanks include creating a feeling of connection to the community by attracting all kinds of people to engage in creating reciprocal relationships. This has also helped people of more marginalized social groups to be part of their local communities (Collom et al., 2016; G. Seyfang, 2002, 2009; Valor & Papaoikonomou, 2016; Whitham & Clarke, 2016). Moreover, timebanking exchanges create a feeling of belonging and trust among individuals while also helping overcome several psychological barriers and stereotypes that previously existed (Fornasari, 2019). Timebanks have also been observed to boost participants' confidence and willingness to offer their services to receive help from other individuals. As far as vertical and horizontal timebanks are concerned, it was found that vertical timebanks and the use of a broker, made it easier to find a better fit for each exchange as well as made it easier since the participants avoided the discomfort of negotiating with strangers. Horizontal timebanks on the other hand were faster and much more efficient since everything was done within an online platform and within the members of the timebank (Valor et al., 2016). In general it seems that timebanking offers several benefits to both the individuals, and the community by motivating everybody to become more active and caring citizens. Tackling social exclusion would have unlimited benefits on civic participation, social capital, community building, cost-saving and active citizenship (Seyfang, 2003).

### **2.1.5 Benefits of Online Timebanking**

Online timebanking shares many benefits with traditional timebanking. Traditional and online timebanks have many of the same benefits as they both provide service exchanges and social interactions between participants. Therefore, participants and communities using online timebanks will receive the same social and service benefits as if they were participating in a traditional timebank. However, online provides some unique benefits that are not present in traditional timebanks.

Additionally, Hooper, et.al., (2015) states that online timebanks have multiple additional benefits when compared to physical timebanks. Such benefits consist of the following:

- Requiring less commitment and demand from participants is better to keep them interested and not burdened with requirements.
- Having a purely online platform allows for a much wider range of participants since it is not done on a local scale.
- Social rules and restrictions are less strict, which benefits individuals who have a hard time socializing face-to-face with others.
- Online platforms make it easier to invite others whom you believe could be beneficial or benefit from a timebank.
- Most commonly, it does not require participants to gather in a physical location, which eliminates any type of transportation cost or difficult logistics.

### **2.1.6 Challenges of Traditional Timebanking**

Timebanking can be challenging at times as it has a number of obstacles to maintain in order to be successful. First, there is little clarity between timebanking and volunteering as people often get confused. Timebanks are a new concept for many people who are used to only using monetary currency for exchanges so the idea of time credits as currency can be confusing. Also, some people state that giving help makes them happy, but they find it hard to ask for help in return. Another example showed that people weren't spending their time credit because of a skill gap. Lastly, individuals tend to gradually disengage from the activities of the timebank causing the timebank to fail (Ozanne, 2010).

Historically, timebanking has been largely unsuccessful. Maintaining a timebanking system is quite complex and has relied on the trust of the participants. Cahn's five principles have historically been difficult to enforce in timebanking communities leading to most timebanks being short lived. However, modern technologies, such as smartphone apps, are giving new hope for timebanking opportunities. Modern technologies allow timebank operators to better organize and facilitate the transfer of time units. Online platforms also allow timebank participants to connect with others that could use or provide services. Although timebanking has not been successful in the past, modern technologies that will help organize timebanks and connect members may allow timebanking to become a useful method of exchanging services (Ozanne, 2010).

Additional to these challenges, it was found in a classroom-based study that timebanking can be seen as a way of shifting responsibility from the state to individuals for the absence of certain services. Moreover, it was mentioned that more challenges can stem from individuals finding it hard to move on from the concept of using money instead of time to pay for something, as well as individuals tending to give services but are reluctant to receive them because they find it hard to ask for help in return. The two most common challenges found were the lack of time and the lack of skills. Students didn't have enough time on their hands to coordinate meetings due to work, internships, or family responsibilities. On the other hand, some participants just felt as if their skills weren't desired or needed by the other community members which made them feel as if they lacked the right skills because they couldn't find someone to match with (Mathew, 2020).

### **2.1.7 Challenges of Online Timebanking**

Having an online timebank brings many new challenges. If a timebank is purely online, you need to try to transfer the human networks and interactions because it is an important aspect that individuals consider when being a part of a timebank. As a member you will be concerned about identity and trust due to the nature of exchanging services with strangers. A study found that people see trust as one of the most pressing concerns because in most cases you are told to never meet up with a person who you have only met online (Hooper et al., 2015).

Other challenges that should be taken into account when implementing an online timebank is to make sure your audience is well aware of the meaning of timebanking as well as maintaining them involved and true to the goal. Hooper et al. (2015) found that individuals thought that a good way of explaining timebanking simply was through cartoons or short videos, as well as providing examples of good practice, badges, and the ability to unlock achievements.

Additionally, to the human focused side, the current designs of spaces and technologies are not tailored for older generations. New technologies or platforms require a degree of online knowledge and in the field of product development, despite the growth of an ageing or disabled population, the industry is tailored primarily for humans that have a general understanding of it, which tends to segregate those who don't (Hooper et al., 2015). There is also the challenge of not being in complete control of your timebank. Due to it being purely online, it is hard to drive

conversations and make sure all your participants are active. This difficulty is an important one because in some cases the success of timebanks depends on the control of the moderators.

Del Moral & País, (2015) discussed the potential threat of commercialization of digital timebanking. They discussed how businesses or individuals may use timebanking simply for personal benefit and will begin to disregard other members well-being and community cohesion. Digital timebanking could potentially be abused in the name of capitalism which could result in real wage stigmatization, job destruction, and destruction of basic structures of welfare, meaning that it will be disruptive for local economies and create imbalances in supply and demand, as well as affect the purchasing power of several social groups.

Lastly, implementing a digital timebank seems to create some initially unforeseen challenges. The challenge of different motivations for participations between members will be important for us to acknowledge and analyze as we conduct our own study. The types of exchanges that our participants partake in can be analyzed to determine motives for participation by analyzing trends in the types of services offered and received. It will also be important for us to determine if there is a monetary motivation for participation in our study. Shih, et al., (2015) discussed how services exchanged for money are often seen as a better value for participants. It will be interesting to evaluate if this trend continues inside the WPI community timebank or will the WPI members have more prosocial motives.

As mentioned before, the main principles of timebanking include seeing people as assets, redefining work, creating reciprocal relationships, and building the social infrastructure of social capital and social networks through reciprocity. Many timebanks have formed in multiple locations but not many have been implemented online because they possess a new set of challenges. Timebanks are beneficial in many ways, but some of its difficulties include investment in set-up; risk management; strong community and technological support; and the need for local adaptation. However, we feel that the most important challenge is to maintain the social network whether it be a traditional or online timebank.

## **2.2 What are Asynchronous Remote Communities (ARC)?**

Asynchronous Remote Communities are a set of methodologies and adapted methodologies from human centered design. ARC takes more traditional methods such as focus groups or surveys and transform them so the participation in these methods is more flexible. This

allows activities to be done asynchronously, meaning not at the same time, as well as remote meaning not face-to-face. The first time ARC was introduced was in a study conducted by MacLeod et al. which took into consideration individuals that were geographically distributed (Dunbar, et al. 2017). This allows more flexibility for participants and has the advantage that it can be done over a longer period of time. If a more traditional method is used like a focus group, you only have one or two sessions at most and they take a lot more time to bring everyone together in one place. When compared to ARC, you can spread out the information being provided across a longer period of time through online platforms. The goal of this method is to increase engagement and participation within the community.

How ARC works is by recruiting a community that the team is trying to recruit to help understand and engage in a design process. An online platform such as Facebook private groups could be useful to bring these people together and have the activities that happen over a period of time. It has been found that Facebook groups are a great platform to use because it has more of a real connection when creating an ARC as you can see pictures of people and you can chat with them as well. In past studies, ARC has been used within stigmatized or distributed communities to help individuals who have turned to the internet in hopes of coping and looking for answers about the stigma in their lives. Using these platforms has allowed individuals to form meaningful relationships that otherwise would not have occurred if online communities did not exist. People who have suffered through rare diseases, discrimination, prejudice, and deterioration of physical and psychological health have sought their communities which have provided them with means to discuss personal information with individuals that are going through similar situations and give a sense of comfort and social support without being judged by others (Maestre et al., 2018).

ARC has also become increasingly relevant during the COVID-19 pandemic. As most businesses and schools have moved to online platforms, a whole new array of difficulties regarding in person meetings has arisen. Many individuals find it difficult to connect with other community members if they are not allowed to meet in person. The formation of remote communities as a way for people to connect and interact has become increasingly popular during the COVID-19 pandemic. In these remote communities, it is often impossible to conduct traditional research such as interviews and focus groups. This is also true during a pandemic as social distancing guidelines and travel restrictions prevent individuals from conducting research in person. ARC provides researchers with methods to conduct human centered research remotely

and asynchronously. This pandemic may expose more people to the benefits of ARC which could promote the use of future ARC. COVID-19 is an atypical motivation for ARC as there are many more everyday reasons to use this method. For example, it may be difficult to interview a participant as the participant may work long hours and is unavailable during most of the day. Allowing the interview to be done remotely and asynchronously will allow the participant to do the interview in a time that works for them which might make individuals more likely to participate. This will also allow the researcher to interview a wider range of participants as the flexible ARC methods will allow more people to participate, who may not have been able to participate otherwise.

### **2.2.1 Application of Asynchronous Remote Communities**

The use of ARC can be so diverse and implemented within any community out there, it just depends on who is more receptive and for who does it work better. It all started with MacLeod et al, (2016)'s study where they researched distributed populations mostly focused on participants with rare diseases. They wanted to shift away from synchronous and face-to-face studies in order to reach individuals that were not able to become part of the community otherwise. During this research they provided valuable information such as lessons learned along the way that would help others build on it when implementing their own ARC study. These lessons would provide the reader bits of information on what to do and what not to do when recruiting people, giving consent about the study and implementing different types of activities that can potentially do harm to participants depending on the group being studied.

A second study made by Prabhakar et al. was focused on studying the suitability of ARC for pregnant and new mothers. They decided to use MacLeod et al., (2016) study and modify it for their specific population target. The main reason they chose pregnant and new mothers was because they have time, mobility or availability constraints that limit them from participating in these types of studies and ARC would replace and make it easier for them. During their study they suggested new lessons learned from their study and added more activities to clarify confusions which would help triangulate participants' responses better (Prabhakar et al., 2017).

Thirdly, another ARC method was implemented in a study conducted by Dunbar et al., 2017 which was mainly an extension of MacLeod et al., (2016)'s and Prabhakar et al. (2017)'s,

studies but also had their own experiences which were focused on individuals living with HIV. During this research they concluded that this target population was a very receptive one as compared to other synchronous methods used because it is easier to recruit individuals online due to the fact that it can be more private if it's a stigmatized group. They also added lessons learned from the study which covered from purpose of activities, to balancing usefulness and effort as well as activity triangulation.

Lastly, study “ARC: Moving the method forward” is vital in order to understand how asynchronous remote communities organize themselves and operate. As stated, the ARC approach divides huge time-consuming methods into shorter tasks. This is done by eliminating the need of co-location and thus achieving a wider range of participants. By doing so, people from more marginalized social groups can be included. An interesting point was the reference to people with disabilities or members of the LGBTQ community, where due to privacy and issues with identification, ARC seemed to be a great solution as limited private information would be asked and public exposure was minimal. Moreover, as far as the structure of ARC is concerned, usually it is built within an existing social media platform (e.g., Facebook, discord). This is great as the infrastructure is already there and people just have to either create their own online communities or get invited to one. Researchers seem to largely benefit from ARC studies since they are getting a wider variety of data, meaning that possible minority group's data could be missing in the case of in person study. The only issue that remains is the ethical manipulation of data received although it is not just the researcher's responsibility but also the platforms' in use (Walker et al., 2019).

### **2.2.2 Benefits of Asynchronous Remote Communities**

ARC has created many unique benefits that can allow human centered research in ways it would not otherwise be possible. The main benefit created by ARC is its ability to “overcome barriers that make it difficult to conduct face-to-face (F2F) studies with certain populations”. One example of this could be a research study involving participants who work over 40 hours a week. As the participants have a busy schedule and would usually not be able to meet in person, ARC allows the participants to complete the study in a time that works best for them. ARC is also a valuable tool if there are physical barriers such as geographic location that prevent face-to-face research. If ARC was not available to these participants, they would not be able to



participate in the study. ARC also allows researchers to modify their methods to best fit their target populations which allows it to become ideal for many research projects. The use of multiple activities in this method allows researchers to verify the data they collect through multiple sources allowing for a more complete picture of participant data (Dunbar, et al. 2017).

## **3.0 Methodology**

The goal of this project was to provide students with a system or framework that enables them to offer services as well as receive them in order to create a community between an academic community, for example between students at Worcester Polytechnic Institute (WPI).

The group's measurable objectives were:

- Determine if participants are willing to take part of this community and contribute to it.
- Determine what participants can offer others and what types of needs they might have.
- Determine the most effective ways to implement timebanking.
- Determine the challenges of creating digital timebanking between students.

To achieve the goal and objectives, the group developed a methodology to gain information through ARC, using Facebook groups and surveys. In the following sections, we described in detail the methods we used to achieve each objective, why we selected these methods, and how we analyzed our data.

### **3.1 Experimental Study**

In our initial approach to understand how the ARC method is useful within timebanking communities we decided to come up with a 5-week experimental study consisting of 13 participants. The reason this initial study was done was because it gave us information on what are some typical skills individuals can exchange, as well as feedback on participants' experiences which we used to improve upon our initial ideas. Additionally, as technology was being widely used during the COVID-19 pandemic, this also helped us understand how effective the ARC method was as opposed to face-to-face gatherings.

As a way to achieve this we created a private Facebook group where all the interactions took place and participants shared their experiences. It's been mentioned that private Facebook groups are a great way for communities to come together and share information relevant to them. In past investigations the groups have demonstrated to be a valuable supplement to traditional face-to-face support groups. It also serves as a place where individuals can both seek and provide support to one another (Gaysynsky et al., 2014).

### **3.1.1 Methods of Recruitment**

During our recruitment process, we started by reaching out to students from Worcester Polytechnic Institute. As a way to achieve this, we used two different methods: sending email advertisements and word of mouth recruiting. Multiple emails were sent to numerous clubs and academic departments within the campus to gauge interest. Along with this, in order to make the study more attractive and get participation, we mentioned that each participant would receive a \$20 gift card for participating in the study. If an individual was interested, we made sure that they were qualified to participate by sending them a consent form, shown in Appendix I, which would ensure that they were able to enroll in the study.

### **3.1.2 Week 1: Introduction of Participants**

Once we had our participants, during our first week in the experimental study we had our participants do three different things. We started off by having them fill out a quick survey on their gender, age, major, university and expectations of the study which can be found in Appendix II. The purpose of this survey was to give us more insight in the diversity of our participants which could be later used in the analysis. Secondly, we had them introduce themselves in the Facebook page so that people would feel more comfortable with each other and have a more familiarized environment. The introduction phase was crucial because we wanted our participants to feel comfortable enough to share information about themselves and be able to start a safe community for others to join and not feel judged. Additionally, it was used as a way to help make a smooth transition into the exchanges where people would know a little bit about the other person. Thirdly, we provided our participants with an overview of what timebanking is and what the purpose of it was. In order to do so, we created three different videos, linked in Appendix III, about what timebanking was, the benefits of timebanking and some examples of exchanges. The purpose of this was to make sure our participants knew exactly what they were getting into and how everything was going to work. Additionally, we wanted them to fully understand what timebanking is and have an in-depth explanation on what it truly is about and what is trying to be accomplished with this study.

### **3.1.3 Week 2: Sharing Skills and Needs**

In our second week of the study we wanted the participants to start thinking about what they could offer others, as well as what they needed help with. As a way to help everyone, we posted on the Facebook page some examples that we came up with, shown in Appendix IV, which the participants could use as reference if they got stuck and didn't know what kind of services they could offer or receive. We also had them fill out a survey, also shown in Appendix IV, in which once they knew what to put down, they could enter their skills and needs which could later be seen in a spreadsheet accessed by everyone. The purpose of the spreadsheet was to give them liberty to edit their skill and needs as necessary, as well as giving them time to start finding matches with other participants. Finally, we included a short video, found in Appendix IV, on how to fill out the survey and how to access the spreadsheet and edit their skills or needs. The purpose of this video was to explain that if there was a mistake in the information entered in the survey, they could go into the spreadsheet and edit it so others know what skills and needs they possess without any mistakes.

### **3.1.4 Week 3 & 4: Exchange Process and Data Recording**

During our third and fourth week of the study we encouraged students to partake in the exchange of services as it was the main event of the experiment. We gave this part of the study two weeks because we were not sure how busy participants' schedules were and wanted to make sure everyone got the opportunity to provide or receive any type of help from others. This part of the study was also one of the most important ones because it gave us insight on how things could potentially work on a bigger scale and improve upon it if we saw any inconveniences. At minimum, each person had to exchange services 2 times (1 receiving and 1 offering). In this case, each participant received/offered help from at least two students at WPI. The exchange should most commonly be for every hour of service you get one time credit, but it was possible for partial time exchange (30 minutes of services) and on top tipping for good work (+ 30 minutes as tip).

Each participant was granted 4 time-credits from the beginning just to make sure the exchanges could begin and run smoothly without difficulties. Once the participants confirmed and completed the exchange, we had a time credit tracker survey shown in Appendix V, in which

one person out of the two entered information on the amount of time credits exchanged, with whom it was, and what was the service provided; all of which was recorded in a spreadsheet. The purpose of this spreadsheet was to keep transparency with all participants and if someone entered the wrong information, the other participant could report it to us to correct it.

### **3.1.5 Week 5: Feedback on Study**

In our final and fifth week of the experimental study we asked the participants to fill out a survey, shown in Appendix VI, asking them for information regarding their experience during the 5-week study. Additionally, we asked them to tell us how we could improve and facilitate the process in the future. All of this information ended up helping us refine our system and making sure it's a community that runs effectively and efficiently for participants to enjoy and for others to implement within their own universities.

### **3.1.6 Post Study Survey - Non Participation**

As a way to gather more information, we created a survey, shown in Appendix VII, tailored for the participants that didn't complete the study. We wanted to understand some of the difficulties participants dealt with in order for us to come up with better adjustments for the timebank. In this survey, our main question was why they didn't complete the study? We gave them five different options (time constraints; loss of interest; unclear instructions; lack of participants; other) to choose from and depending on what they chose, we would ask them specific questions about their situation. The purpose of this survey was to understand better on how we can adjust timebanks to a broader population and since it was a college environment, this type of information would aid us to get the perspective of busy individuals, especially at WPI.

## **3.2 Determine if participants are willing to take part of the study and contribute**

To have a successful study we had to include the right participants in it. Thus, participants had to make themselves available certain hours per week in order to exchange services, otherwise data would have been insufficient. Our aim was to get as many service exchanges as possible so that we could draw clear conclusions. Students with loaded schedules

were more likely to be avoided as timebanking can be a time-consuming activity. Previous research on timebanks implemented on students have indicated that lack of free time was the most challenging part for the participants (Mathew, 2020). Also, participants must be at least eighteen years old and a member of the WPI community. To ensure students qualified to enroll in our research we provided them with a consent form which would confirm this information.

### **3.2.1 Consent to participate in study**

As noted previously, in order to have consent of participation a form was sent to each participant via email, shown in Appendix I, which consisted of a full explanation of the study, a list of all the information being gathered, and extra information needed for them to understand the terms of the study. These forms had to be signed by the participants and sent back to us in order to verify that they agreed with terms and that they could take part in the study.

### **3.3 Determine Skills and Needs from Participants**

The first part of this project was to determine what our participants were capable of offering within their knowledge and what types of needs they might have for others to help. This information was helpful by letting us see where the participants could contribute and for the team to create the matches between participants. For this study there were many types of skills participants could provide. A basic example of a valuable skill was academic tutoring if a participant was skilled in a particular subject such as mathematics. In this case, as shown in the figure below, let's say participant *A* could provide mathematics as a skill and offer to exchange tutoring services to other timebank members. Alternatively, if participant *B* had a particularly difficult time with mathematics, participant *B* could list math tutoring as one of their needs. Then participant *A* could provide his or her math skills to participant *B* to help satisfy participant *B*'s need for math tutoring. This example could apply to a variety of skills and services participants can provide. More examples of services can include cooking lessons, foreign language lessons, computer help, ride sharing, workout sessions, and any other skills or services that could satisfy the needs of other community members.

### **3.3.1 Participants**

An ideal number of participants was between 15-20 as this number would provide enough data, without providing an overwhelming amount (Dunbar, et al. 2017). We invited the WPI community, mainly students, to participate in this study. As the participants were college aged and above, this study focused on individuals above the age of 18. Furthermore, a diverse selection of participants was desired to experiment with to see how different groups of people viewed and used the timebanking services. Preferably, participants didn't have relations with other participants as this experiment was interested in how strangers exchange services between each other and wanted to prevent the bias of participants only wanting to exchange with the participants they know. Also, as this study was conducted over Facebook, only participants who previously had a Facebook account were allowed to participate. This was to ensure that we weren't creating any privacy risks by asking participants to share their information on Facebook if they hadn't already done so.

## **3.4 Determine the most effective ways to implement timebanking**

The last part of the study was to determine which ways were most effective when setting up a timebanking community. This was the most challenging aspect of the study as we took into consideration all the difficulties as well as the benefits experienced by the participants in order to draw conclusions. We also commented on the structure of the timebank. For example, if we observed that these online exchanges ran smoothly, we could have discussed implementing completely online timebanks based on ARC. Another example was by observing an increase in a certain group of services and thus we could have commented on such fluctuations. All these questions were answered at the end of the study after the participants finished exchanging services and provided us with feedback.

### **3.4.1 Feedback from Participants**

In order to get feedback from our research subjects we sent a survey to all the participants at the end of the study. In the surveys we aimed at getting a clear view of the experience of each individual. We sought for possible difficulties faced by participants, comments on services offered and needed, possible ideas on improvements and any other sort of information that might

have been helpful in structuring our timebank more effectively and efficiently. Survey questions can be seen in Appendix VI. Monitoring the Facebook page was also a big source of feedback as we could track all exchanges and see who was more active as well as what services were most popular. All data collected was used and analyzed in order to draw conclusions for our pilot study.

### **3.4.2 Increase Online Participation**

Completely online timebanking poses the challenge of engaging participants and promoting participation. When participants are completely online, it can be difficult to get them to follow through. Particularly for this study, it can be difficult to remember to check the Facebook page for updates if the information is posted irregularly. In order to keep participants engaged it will be important to encourage discussion that will prompt responses from the participants. This will help keep participants active in the discussion and will keep them engaged in the study. Also, for this study the greatest concern to participation is the short and forced time for exchanges. In an established timebank, exchanges will occur more naturally over a longer period of time as participants realize needs or services they can exchange. However, this study requires multiple exchanges in a two-week period which may result in participants forcing exchanges when they have no current need for services. Having no real need for a service may discourage participants from actively searching for exchanges.

### **3.5 Data Collection**

Qualitative data will be collected through the use of surveys in weeks 1, 2, and 5. These surveys will be presented to participants in the form of a Google Form that will automatically transfer the collected data to a corresponding Google Sheet. The first week survey will collect participant data for name, gender, age, major, university attendance, student status, and expectations. This data helped us determine the diversity of participants. It also helped us determine if there were unique trends within the university. The second week survey collected a list of needs and skills from participants to determine what services they will be interested in exchanging. This data was used to determine which types of services (academic or non-academic) the participants will be most interested in exchanging. This can be used to prove the first hypothesis that the participants will be more likely to use timebanking to exchange



academic services. In week five of the study, a final survey was given to the participants to gain insight on the participant's experience exchanging services. This final survey included 14 questions asking about the participants' experience in terms of ease of exchanging services, interactions with other participants, motives for participating in timebanking, and overall timebanking experience.

Also, data on the service exchanges were also collected during weeks 3 and 4. Participants also filled out a Google Form that collected data on who provided the service, who received the service, what was the service, and the amount of time credits exchanged. Data from this Google Form was also automatically transferred and collected on a corresponding Google Sheet. This data was analyzed to see if there were trends between participant interactions and the types of services that were actually exchanged.

### **3.5.1 Analysis of Data**

Our team conducted an experimental study on digital timebanking for students running an ARC method. In order to analyze our data we used charts from our Google Slide surveys, charts from Excel files, and a free, open source tool for coding textual qualitative data called Taguette. This source helped us transform data from surveys into useful qualitative data we could analyze. There was a wide range of data used to form conclusions and lessons learned throughout the study. The data used consisted of all the surveys collected throughout the study; Facebook posts, comments and likes; and the types of skill and needs (academic or non-academic) each person provided. In our first analysis, information from the first survey was uploaded into Taguette and exported into a single spreadsheet in order for us to understand the expectations from our participants in a simpler manner. We separated the answers into three categories such as learn new things/experiences, learn about timebanking, and no expectations. The way all the information was analyzed was by looking for trends based on different categories such as positive or negative feedback on the use of online platforms for timebanking, demographics, engagement levels throughout the study, type of skills and needs provided, benefits from study, pros and cons of digital timebanks, as well as a general analysis from all the participants. What we did in order to analyze all these different types of categories was by using all the answers and extra comments in surveys, as well as observation from the Facebook group and found trends/lessons learned for future use. The purpose of this was to give us more insight if

asynchronous remote communities and timebanks made a good combination. As we move on to the next section, we provide explanations as to what the participants thought of the study and if it would be a good application for a college community or on a global scale.

### **3.5.2 Hypotheses to be Tested**

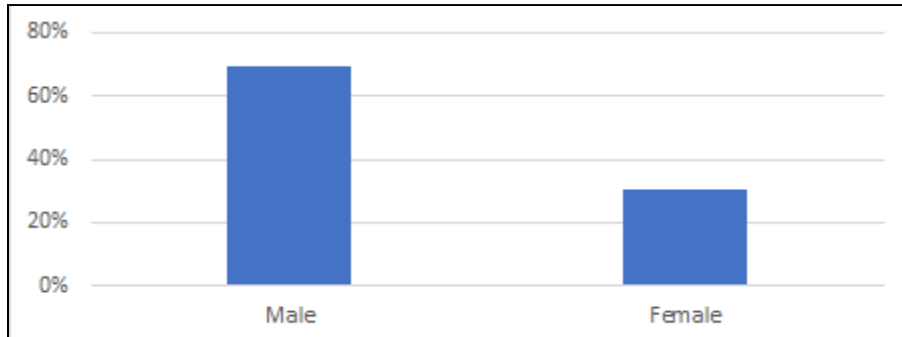
For this study we created two hypotheses to be tested in order to gain insight on the participants motives for using a timebanking community. The first hypothesis we tested was that timebanking participants will be more likely to use timebanking to give and receive academic services such as tutoring over everyday services. We believe that most participants in the study will choose to exchange academic services as our participants are mostly students or professors and have academic knowledge to share or will be in need of academic help. This hypothesis can show how useful timebanking is in an academic environment, such as WPI, by determining the amount of interest in using timebanking for academic services. Timebanking can provide a unique and effective way for students to receive and give tutoring. Showing that university participants will choose to use timebanking for academic purposes will show how students are interested in using and earning time credits to enhance their educational learning experience. We also believe students would find it easier and more convenient to get quick help from a peer in a community timebank rather than scheduling or attending a traditional extra help session which would increase the amount of academic exchanges.

The second hypothesis we tested was that time constraints were the main reason participants did not end up participating and they were more likely to participate if given a longer period of time to conduct exchanges. Given the short time period to conduct exchanges (two weeks), we believe that some participants will not be able to make time to finish exchanges. Participants may become busy with other academic and social requirements which will be prioritized over participating in our study. If the participants are given a long period of time they will have more opportunities to find time to participate. Also, in a short time period it is less likely that participants will have a particular need or want. If given a longer time period to conduct exchanges, participants will have more needs arise which they can satisfy through timebanking exchanges.

## 4.0 ARC Analysis

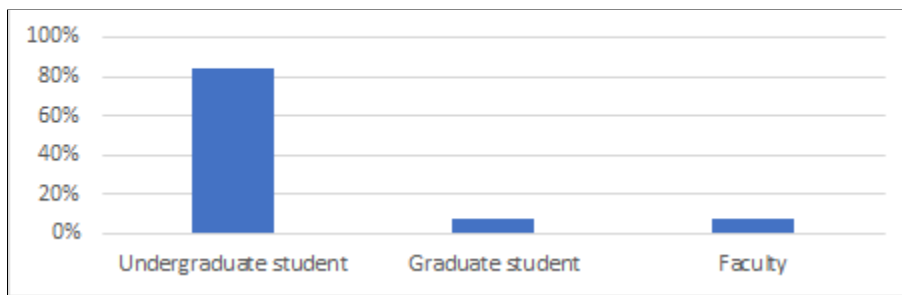
### 4.1 Demographics

Based on the research we conducted it was evident that most of the time females are more willing to participate in a timebank. In our case though, it was surprising to discover that 69% of total participants were male and 31% female, as shown in Figure 1.



*Figure 2: Participant genders.*

The majority of participants were undergraduate students with an average age of 24 and a median of 21, more specifically representing 85% of the total population of our study. This can be explained as more than 70% of WPI's students are undergraduates. However, our team reached out to faculty and graduate students for our recruitment, but we only got a response from one participant for each category respectively, out of the 13 participants in the study. This difference could represent fluctuations of interest due to age or the absence of free time. This is also shown in Figure 2 below.



*Figure 3: Type of participants.*

Our participants' majors were quite surprising. Based on our research, one would expect that people who would be more interested in such a study would be students pursuing a liberal

arts degree or social science, but it appeared that the majority of our participants were mechanical engineering majors. This could be the case due to the study being conducted within a polytechnic school where the majority of students attending are engineering majors. The second and third most popular majors were Computer Science and Bioinformatics and Computational Biology. These two majors combined represented 34% of the total population. It was interesting to note that across all eight different kinds of majors that participated in the study, none of them were from the social sciences, humanities and arts departments. All majors and their representing population can be shown in Figure 3 below.

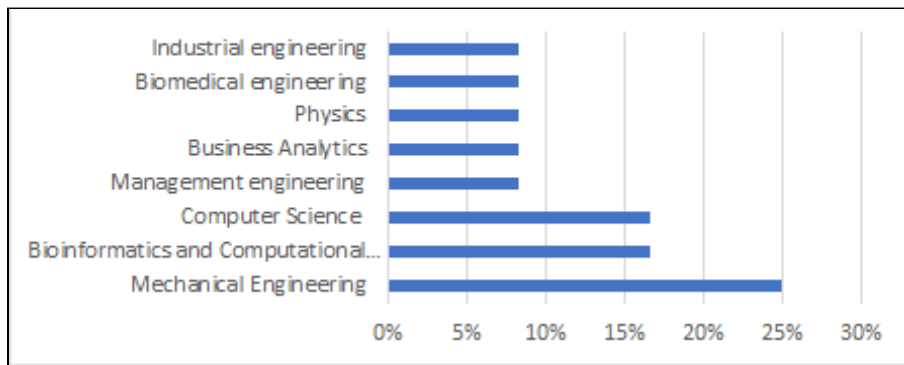


Figure 4: Participants' majors.

## 4.2 Pre-Study Expectations

Before the period of exchanging services had begun, we asked our participants for their expectations on our study. The most popular response we got was the expectation to learn new things from new people and share skills with other people. This represented 62% of their responses. 23% of participants responded that they joined the study in order to learn more about the concept of timebanking and whether they would be able to incorporate it in their everyday lives. Lastly, 15% of the population entered the study having no expectations. Figure 4 below, is representative of their responses.

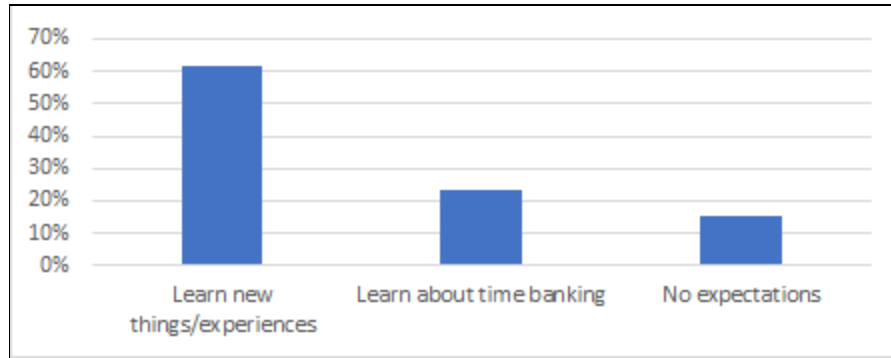


Figure 5: Participant expectations.

### 4.3 Level of Engagement

We observed that there was a mix in the levels of engagement throughout the study. As you can see in the figure below (Figure 5), participants started off really slow but there was a burst of activity in the second week when participants started introducing themselves in posts. After that, participants kept a steady level for about one or two weeks and then lost most of it by the end. The reason for the loss of engagement levels could have been because of final weeks at WPI and the fact that the study continued into winter break. We also noticed that none of the participants shared their experiences in the Facebook group even though it was mentioned to do so. This could have been because participants were not paying full attention to the Facebook posts or they simply forgot about it. Something we observed during the introduction period was that participants would not post unless one had previously done so. This is also one of the reasons we believe that no participant posted about their exchanges.

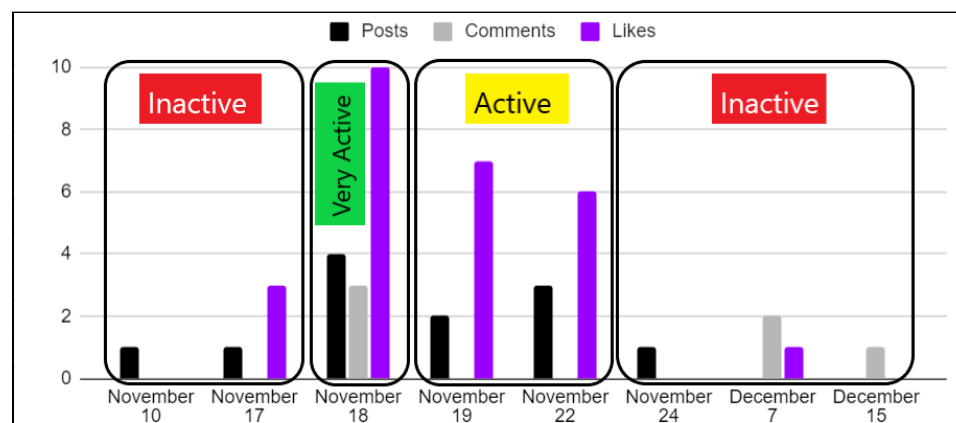


Figure 6: Engagement levels.

By the 5th week we asked our participants how likely it would be for them to keep participating in timebanks (Figure 6). Out of the seven who responded, four said it was an average chance while the other three said they were likely to do so. Additional to their responses, some left extra comments such as “The entire concept of timebanking requires students to help each other. The matter of fact is busy college students will not help random strangers unless they are paid or they are friends or they are required to, or they get something in return from the same person, most of the time.” and “It was a cool experience, but I wouldn't do it if there wasn't a platform for it”. These two comments helped us understand better that there might be the chance in future studies that not all participants are going to be willing to do this or be highly engaged simply because they are too busy with work. Some participants might not choose to pursue future timebanking opportunities as they don't owe the other people anything and it might not feel like they are getting something in return. Having a solid platform would also be important as it would allow everything to run smoothly and prevent participants from having to use different types of platforms or software in order to participate.

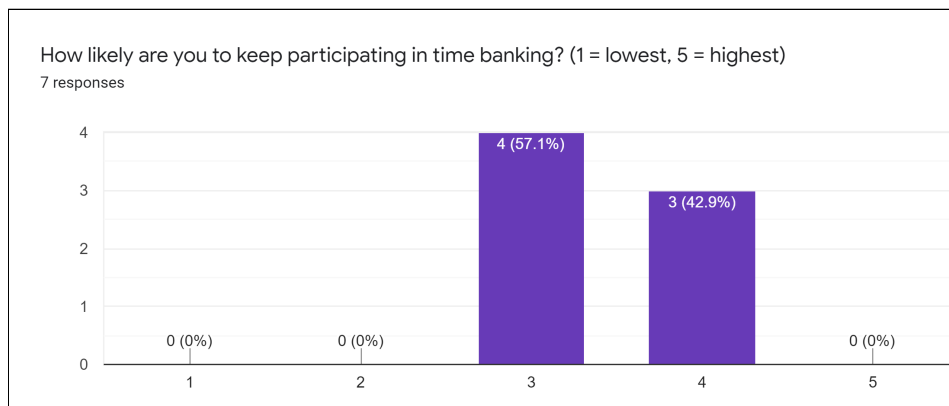


Figure 7: Likelihood of future timebanking participation.

#### 4.4 Participant Service Preference

The data we collected using the ARC method was used to disprove our first hypothesis, which stated that timebanking participants will be more likely to use timebanking to give and receive academic services such as tutoring over everyday services. The skills and needs survey that was issued to participants in the second week was used to determine what types of services participants wished to exchange. We initially believed that participants, composed of mostly students, would largely use timebanking for giving and receiving academic services such as tutoring. Our skills and needs survey collected 49 skills and 45 needs preferences from our

thirteen participants. We categorized these needs and skills based on if they were academic or non-academic. Academic skills and needs were considered any activity that would be offered or included by an academic institution such as WPI. Examples of academic skills and needs include activities such as tutoring, language skills, proofreading, and job searching/resume critiquing. We considered all other activities that are not offered by academic institutions and that are considered individual interests as non-academic skills and needs. Non-academic skills and needs consist of activities such as guitar lessons, investment ideas, chess knowledge, home workouts, and artistic abilities. Contrary to our hypothesis, it was determined that the majority of the participants' skills and needs were non-academic. It was discovered that only 36.7% of desired skills were academic and only 33.3% of desired needs were academic (refer to Figures 7 & 8) .

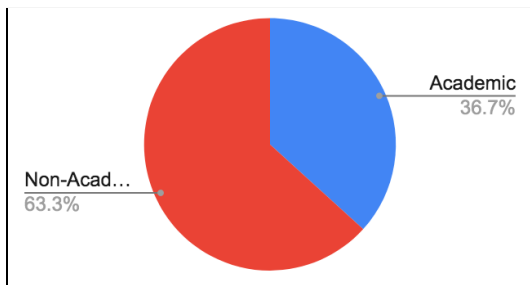


Figure 8: Participant skills.

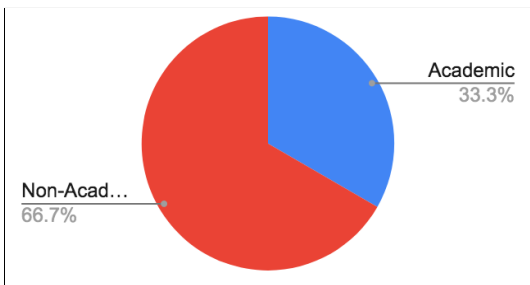


Figure 9: Participant needs.

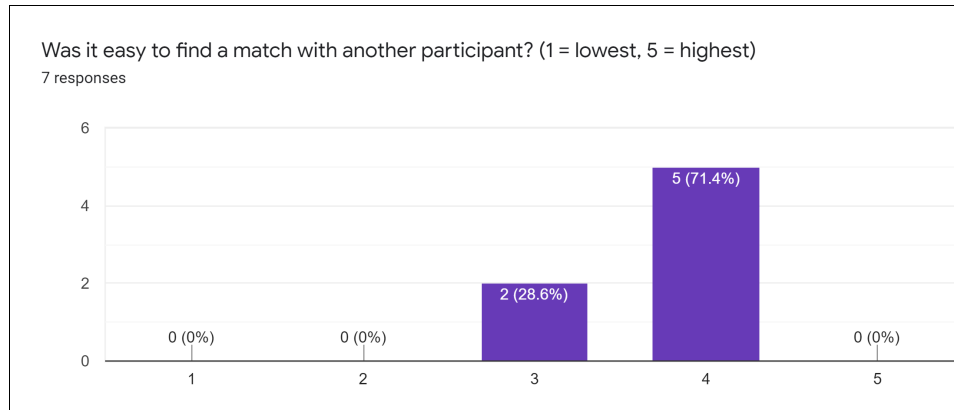
The data clearly shows how participants were more interested in exchanging services based on their individual, non-academic preferences, which can be seen in Appendix VIII. However, a few trends in academic skills and needs were identified. Language skills such as foreign language tutoring was the far most offered skill with 33.3% of academic skills consisting of such. Job search and resume critique skills were the most desired need making up 40% of the desired academic needs. These findings suggest that digital timebanking may be a productive tool for language tutoring and job search help in the future at WPI. Another interesting takeaway from this data is that although non-academic activities made up approximately two thirds of participants' interests, there was no single skill or need that was dominantly desired. This shows that the types of non-academic needs and skills are very uniquely based on the individual participants. Therefore, it will likely be difficult to determine the types of non-academic services that participants will prefer to exchange.

## 4.5 Participant Pairing

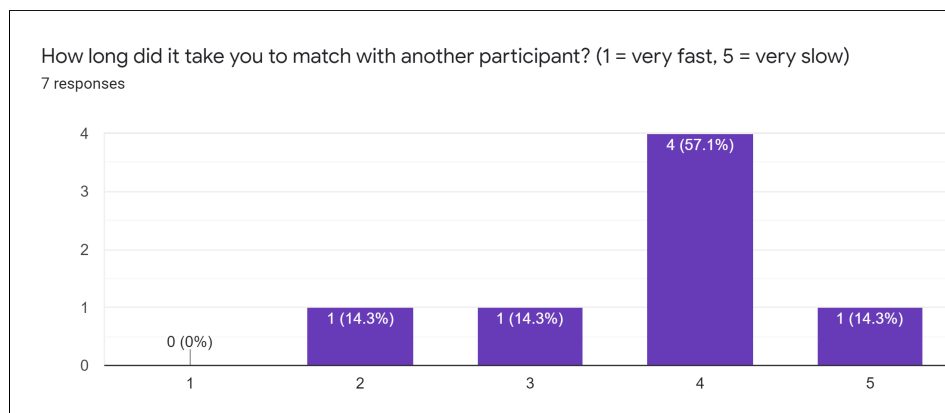
During our final survey we collected data in order to understand the participants' experiences throughout the duration of the study. We asked a total of 14 questions and out of 13 participants, only 7 responded. In our first question (Figure 9) we asked the participants if they found it easy to match with other participants to perform the service exchanges. The results clearly show that two participants thought it was of medium ease and three said it was mostly easy. What we learned from this was that although it was not completely easy to find someone, it was relatively easy to match with someone whom you can perform an exchange with. Some participants left comments and mentioned it was not fully easy to find someone because of the small pool of people in the study and it was hard to match their skill and needs. Others mentioned it was tough to keep up with Facebook posts and Messenger as well as it was hard to coordinate times because the study was during finals week at the university. The study was also extended throughout winter break which caused conflicts as students became distracted by their non-academic lives over the break. As discussed, the first question already gave us useful information to improve our initial process. Having a bigger group of participants and conducting the study during periods of low stress time would have definitely helped to make a more efficient matching process.

Even though the participants said that it was relatively easy to find a match, some say that it was a slow process to actually perform the exchanges (Figure 10). In our second question we asked them if the matching process was a slow or fast one. For the most part it was fast enough to find a participant to match with. Five participants said it was fast while one said it was medium and one said relatively slow. This was due to the fact that many participants felt like others weren't paying attention to their Facebook messages and didn't respond for a week while others felt like they didn't have time because of upcoming final exams. During the study, we saw that no exchanges were logged for a full week and we determined it was because of these reasons. This helped us acknowledge that for the future, matches should be done ahead of the exchange period so when the week of exchanges starts, the participants already know who they will be trading skills or needs.





*Figure 10: Ease of participant matching.*



*Figure 11: Time required to find a match.*

## 4.6 Relationships Between Participants

Participant communication was very low on the Timebank WPI Facebook discussion board. Members of the Facebook group chose to interact with each other privately through the Messenger feature. The admins were the main contributors to the group discussion board and the participants had very few posts on the discussion board. Other than the introductory posts, there were only four interactions between participants on the discussion board; all four were questions for the admins. The participants didn't publicly advertise their own skills on the Facebook page and all chose to connect to others in the private Messenger which resulted in less of a communal feel during the study. There was little interaction between participants other than the required amount for service exchanges. Even the required amount did not guarantee interaction between

participants, as previously noted not all participants were proficient in answering their Messenger inbox.

#### 4.7 Satisfaction of Exchanges

Diving into the satisfaction of the participants within the exchanges was quite interesting. There were some ups and downs to being an asynchronous remote community (ARC). In our survey we included questions regarding participants' overall satisfaction with the services they received (Figure 11) and if they felt as if they helped others while being an online timebanking community (Figure 12 and 13). We wanted to understand if the ARC method was going to be useful for a timebank within a college community. In our third and fourth questions (Figure 11 and 12) the participants said that they were satisfied with the services they received, and they felt as if their skills helped others. Although, one individual mentioned that is a bit hard because they did not really know the person. This tells us that even though participants felt like the services were good, having to talk to a stranger felt difficult at times especially if you have never seen their face in person or know much about them. As a remote community, this can be helped by having more interactive activities through Facebook or having online, synchronous calls where the participants can get better acquainted with each other. In a college community you want everyone to feel included and that is a main goal of timebanking. By creating these interactive activities, individuals who are shy might feel more comfortable in forming social relationships instead of just having a one-time experience with another person.

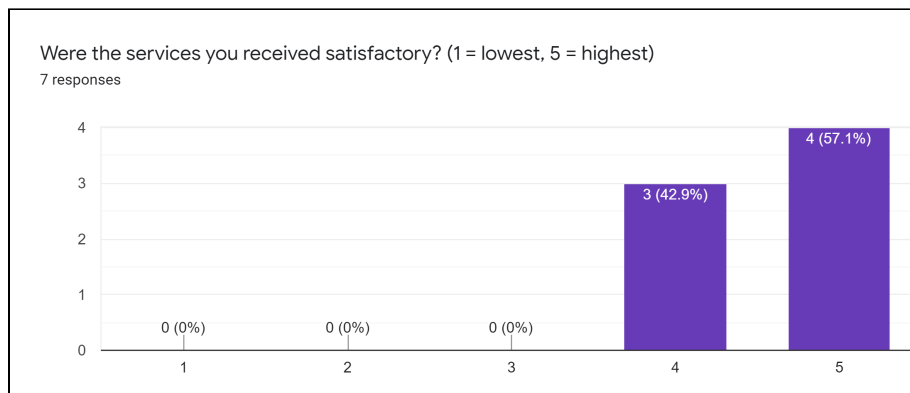


Figure 12: Satisfaction of services.

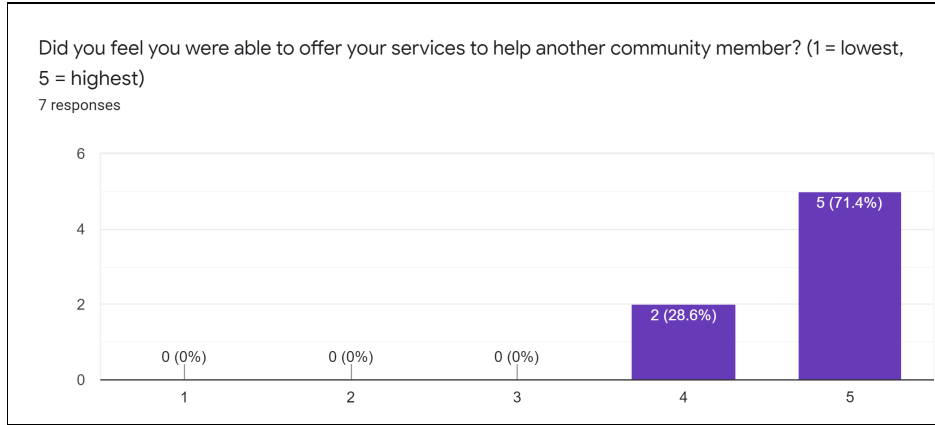


Figure 13: *Quality of offered services.*

Now, the downside of the ARC method is the online services. Most of the participants, except one, did not find the online services to be so useful or found it to be of medium usefulness (Figure 13). Some mentioned that online activities made it difficult because it was easy to ignore others if you wanted; some activities like drawing classes were particularly difficult; and others mentioned that they were a hand-on learner. All of these reasons were deemed valid which shows that ARC has its limitations.

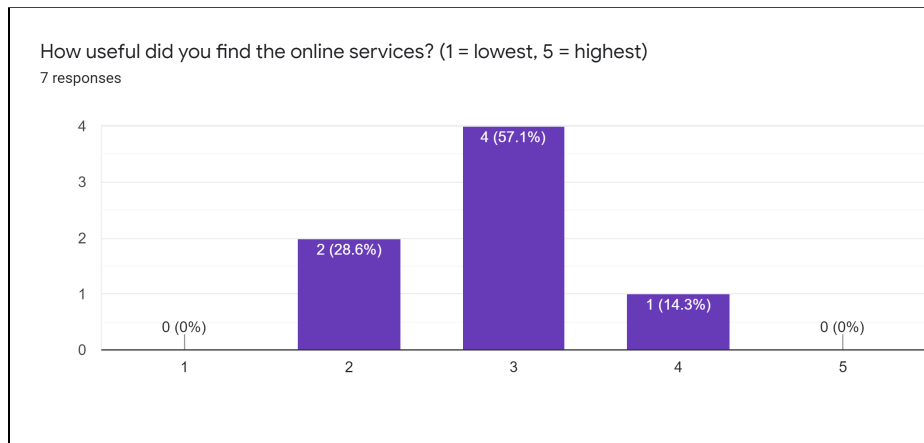


Figure 14: *Usefulness of services.*

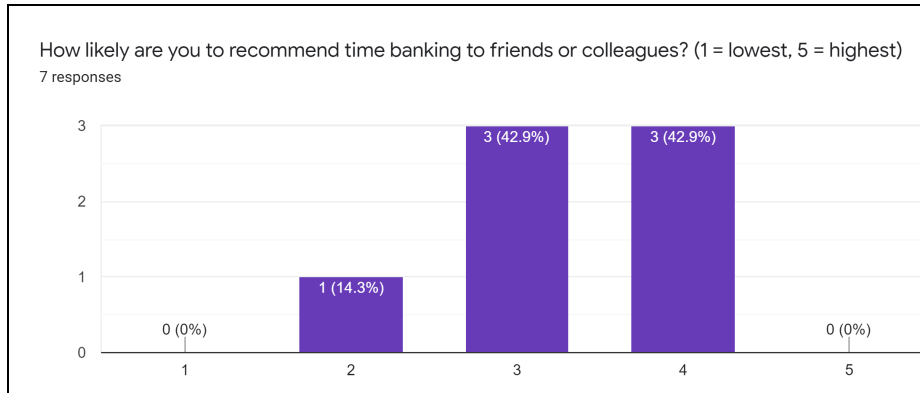
## 4.8 Benefits from Study

Participants were asked if they experienced any benefits while participating in this study. It was interesting to note that all participants who filled out the final survey reported experiencing at least one benefit with four of the seven participants reporting at least two or more benefits. Benefits described by participants include learning new skills, improving current skills,

meeting new people, gaining insight, convenient help, help from someone the same age, casual and effective services, human network expansion, no cost, practicing individual skills, and motivation to try new activities. Meeting new people and learning new information were the two most occurring benefits. Participants found digital timebanking an effective way to meet new people and expand their social networks which they could benefit from later on in their life. A large majority of the participants believe that they benefited from learning new information. One participant described the benefit of “convenient help from people my age” which allowed them to casually and comfortably learn new information. Digital timebanking also was able to motivate participants to try new activities and therefore expand their knowledge. Another participant discussed how they had wanted to try a new activity and finally decided to try that activity because help was offered to them through our timebank. Finally, one participant described their experience as “learning new skills without having to empty your pockets” which shows that cost can be a barrier to learning new skills and no cost digital timebanking allows users to overcome cost barriers. Overall, digital timebanking was a beneficial way for participants to give and receive services.

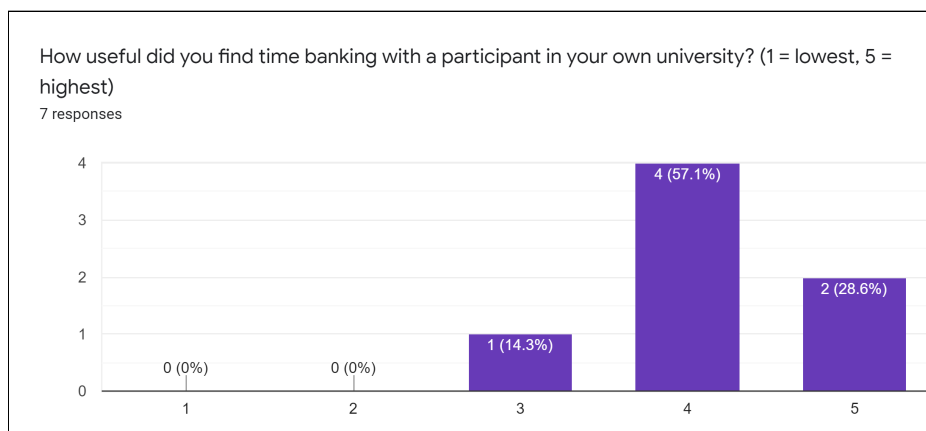
#### **4.9 Post-Study Opinions**

Since we asked our participants during the first week of their study about their expectations and what they thought they could get out of this project, their final feedback would be essential for comparing and understanding their progress. When asked if they would recommend timebanking to fellow classmates or friends, most of them answered positively. This can also be shown in Figure 14. It appeared that a small percentage of participants would not recommend timebanking to their colleagues. Not recommending timebanking could be due to participants having difficulty devoting time to exchanges in their busy schedules and during their exam period.



*Figure 15: Likelihood of recommending timebanking.*

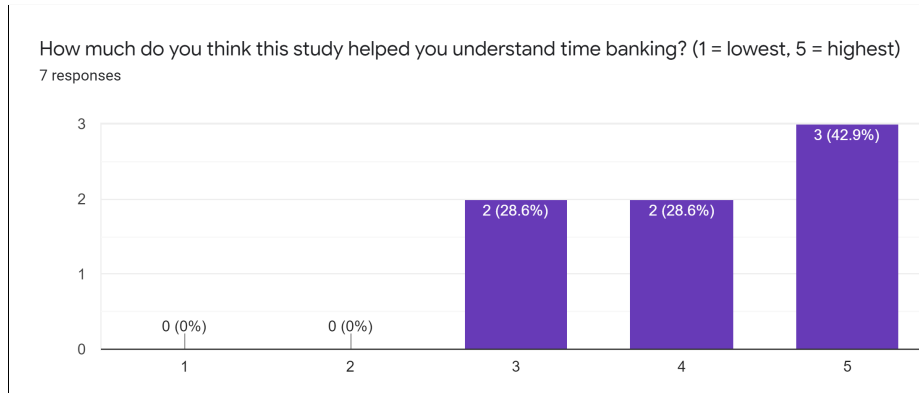
Due to the Covid-19 pandemic and the feasibility of advertising to and connecting students, the study consisted solely of students at the same university (WPI). This obviously had an impact on the diversity of the participants but also proposed a social difference compared to existing community timebanks. Although the study lacked diversity (meaning people of different ages, social groups, employment), participants did not seem to dislike the fact that it was run only throughout their own university. Most of them, when asked if they found it useful that the study was internally within their university, responded positively. This is also portrayed in Figure 15. This could be due to the fact of having similarities with other WPI students and thus have fewer social barriers to prevent asking for help from a stranger. As found in previous timebanking studies, many cases indicated a hesitation between participants to get to know each other or make new social connections.



*Figure 16: Usefulness of timebanking.*

The most popular statements by participants in the beginning of the study was that they wanted to learn more about timebanking and how it could be included in their everyday lives. In

order to draw our conclusions, participants were asked at the end of the study how much they have learned about timebanking after participating in our timebanking study. The survey gave participants a chance to rate their understanding of the concept of timebanking. most of the participants (42.9%) answered that they now have complete understanding of what timebanking is. This is also shown in Figure 16 below.



*Figure 17: Participant understanding of timebanking.*

Furthermore, as students were initially interested in how they could incorporate timebanking in their everyday life, we asked for their opinion on whether they would use timebanking as a means of saving money in exchange for receiving a service. Most students responded positively as shown in Figure 17 where 42.9% of respondents strongly agreed that they would use timebanking as an alternative to save money and receive help. This could be due to the fact that students usually live on a tight financial budget. This is because most students don't have a full-time job with stable pay and thus seek for alternatives in order to decrease expenses. Also, the reciprocal nature of timebanking could seem attractive to certain individuals who are looking to expand their social circles inside and outside their university.

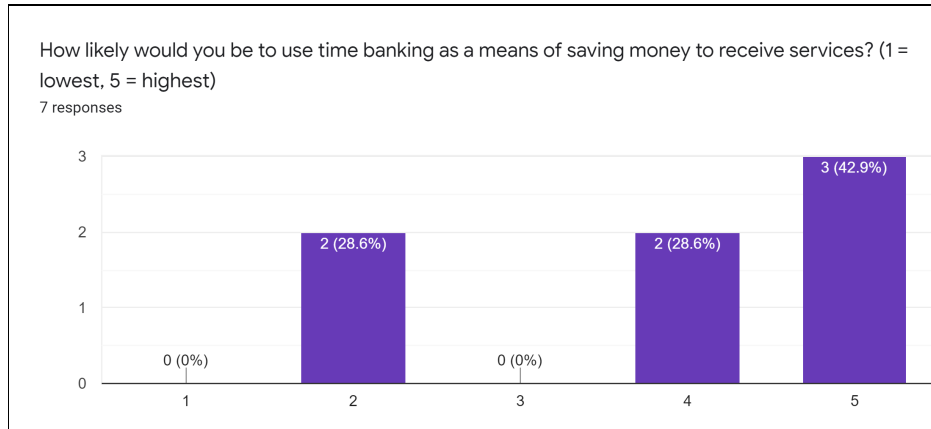


Figure 18: Use of timebanking for saving money.

#### 4.10 Non-Participants Feedback

A significant part of our study population was unable to achieve the requirements to complete the study. Requirements included exchanging at least two services with other members, meaning that they had to receive and provide at least one service. We then reached out to the six participants that failed to complete the study in order to determine the reasons they were unable to or chose not to complete the study. The main reasons participants said that they were not able to complete the study were time constraints (66%), and miscommunication with other members of the study (33%). This can also be viewed in Figure 18 below.

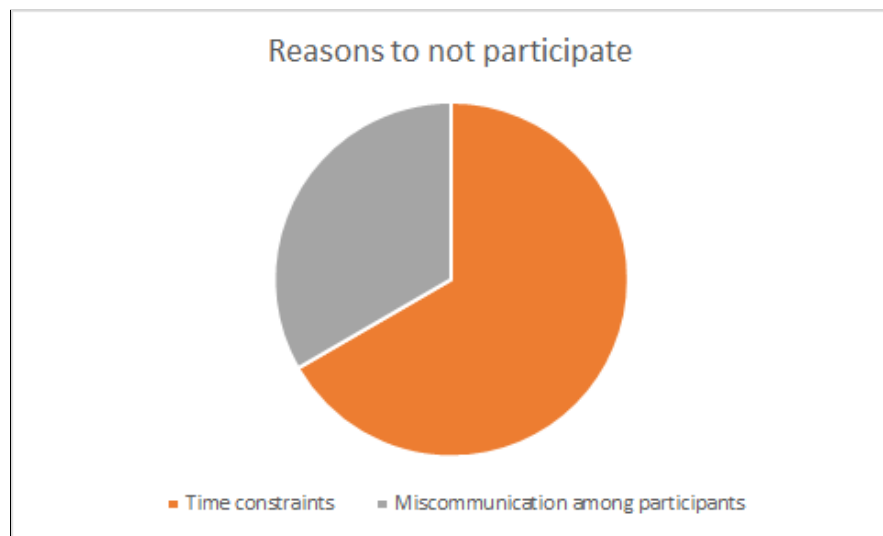


Figure 19: Motives for participation failure.

66% of the participants who were not able to complete the study said time constraints were the main reason, which supports our second hypothesis that time constraints will be the main reason participants fail to complete the study. This hypothesis was formed with the assumption that students will be more likely to prioritize their academic work over their timebanking activities.

In order to deepen our analysis of members that did not actively participate in the completion of the study, we followed up with a series of categorized questions based on the main reason they were not able to complete the study. It appeared that students mostly failed to find enough time to devote for the study since it took place close to their exams period. Although we extended the timeframe for students to complete the requirements after the term was over, it was difficult to accomplish due to the fact that they were back home for Christmas holidays and were less likely to be online. Most participants stated that if they were given more time, they would have completed the study, but when asked if they thought the time requirements for individual exchanges were too long they disagreed. Their last two statements, although contradict one another, seem to justify their initial answer that they struggled to find the time due to their other obligations. One participant described his miscommunication challenges in the study. The participant actively engaged in trying to set up exchanges with other participants, however he was unable to get a response from the participants he reached out to and therefore was unable to complete the study. This participant also received help setting up exchanges through the admins however the admins were also unable to get any responses from the non-participants. This aligns with timebanking communication challenges that were discovered during the background research for this project.

#### **4.11 Pros and Cons of Digital Timebanks**

Current time banks have their own benefits and challenges but when we talk about digital timebanks, we are changing how people benefit from them and the new challenges they have to face. We consider digital timebanks to be used on a global scale or fully online. All exchanges are via online platforms (i.e., video chat and online messaging) and can be done between individuals from different parts of the world. For the purpose of this study, we focused on implementing a digital timebank using ARC within the WPI community. Digital timebanking and ARC were crucial to use as current COVID-19 restrictions prevent all face-to-face meetings. Some of the benefits we found from our study was that you have the ability to meet new people



from around the world or within your own community as the internet is becoming more accessible to the general public. Additionally, there is no need for travel to meet somewhere as the timebank is asynchronous. As long as the information is posted on the platform, each individual has the liberty of accessing it whenever they have time and from the comfort of their own home.

On the other hand, digital timebanks lack the sense of community and togetherness that is present in traditional timebanks. Timebanks are mainly kept within a community, but if expanded into a global scale the feeling of togetherness and comfort with the people around you can be lost. It can also happen within a community, as our results demonstrated. Participants felt it was hard talking to strangers they've never met which digital timebanking makes harder because you will never get to meet that individual in person. Additionally, some exchanges are better off kept as in-person rather than digital as it can become hard to explain things (i.e., art class) via online platforms. We believe digital timebanks are a great addition to traditional timebanks around the world but with more innovative ideas to tackle the challenges, it can be an incredible system used around the globe.

#### **4.12 Future Directions - Recommendations**

Although the participants described a mostly positive experience, they did provide some suggestions on how to improve the timebank. One suggestion we received was to give a longer timer period to conduct exchanges. Multiple participants discussed the challenges of trying to complete their exchanges as they had busy schedules on the third and fourth weeks of our study. In a long-term timebank this will not be as much of an issue as participants can exchange services at times that work best for them. However, if another study was to be conducted, we recommend giving a larger time period (more than two weeks) for participants to complete exchanges. Another suggestion we received from participants was to have a larger sample size which would give them more opportunities to receive and give the services they desire. In order to accomplish this, we recommend starting advertising timebanking far in advance of any future study. We began recruiting three weeks before our study began and were only able to have thirteen people agree to participate. We found the best recruitment method was word of mouth, closely following Covid-19 safety regulations, as people seemed more willing to participate if they were able to have a conversation with an admin about the study. It was also recommended

by participants to look into using a platform other than Facebook. One participant discussed his troubles with communicating over Facebook and wrote “people keep forgetting to check Facebook”. This suggests that many college students do not regularly check Facebook and checking Messenger notifications can therefore be easily forgotten. It’s therefore recommended to use a platform that is more commonly used by college students to create a digital timebanking community. Using a platform that students use more often will also help decrease the problem of inattentive participants by making it easier for participants to see notifications. A final improvement suggested by the participants would be to include some type of synchronous meetings as well. One participant described how he thought small, introductory group sessions held synchronously would allow new participants to get acquainted with each other. It will then be easier for participants to interact in the timebank if they have already been even briefly introduced. This can remove some of the awkwardness associated with exchanging with a complete stranger. The synchronous introduction meetings could also be recorded and posted on the platform allowing other participants to asynchronously view the videos and learn more about fellow participants.

## **5.0 Conclusion**

### **5.1 The ARC Method in Digital Timebanking**

The Asynchronous Remote Community (ARC) method proved to be a sufficient and valuable method to research digital timebanking. Digital timebanking creates a unique set of challenges due to its online basis. It can be quite difficult to collect data in an online community such as a digital timebank as it's often impossible to have face to face interactions between community members. Holding synchronous meetings between community members is also a great challenge for many communities as individuals usually have other time commitments that leave finding a common time between members extremely challenging. Synchronous meetings can also deter members as they likely do not have the time commitment and will be less likely to participate. In this study, having asynchronous activities was crucial to the successful trial of digital timebanking. Participants in our study described how time restraints were the main reason for lack of participation. Therefore, having many of the digital timebanking activities asynchronous, such survey completion, were crucial in promoting participant involvement. Using the ARC method allowed us to gather data from four separate surveys which allowed us to analyze trends in participant demographics, preferences, and motivations.

### **5.2 Final Recommendations**

Through our ARC analysis of the WPI digital timebanking study, we were able to identify a few recommendations to improve future timebanking studies at WPI. The first recommendation is to allow for a longer time period for participants to conduct exchanges. It was shown that participants felt rushed to complete their exchanges in the two-week period they were given, so a longer time period will allow participants more time to complete the exchanges. The second recommendation we suggest is to increase the sample size. Although we attempted to recruit a larger sample size, our participant group was relatively small. Having a larger sample group would allow for more variety of services and would make it easier for participants to find another to exchange with. The third recommendation we suggest is to use a platform other than Facebook that students use more frequently. It was discovered that on average, WPI students do not frequently use Facebook and therefore would be more likely to respond on another platform

they use more regularly. The fourth and final recommendation we suggest is to include both asynchronous and synchronous activities. Some participants showed a desire to have optional synchronous meetings as an icebreaker activity in order to get to know and talk to other participants before conducting exchanges. We hope these recommendations can be used to further improve future digital timebanking studies at WPI.

### **5.3 Digital App Creation Recommendations**

Based on our findings in this pilot study, we formulated several recommendations based on the feedback we received from participants on how to create an online application for timebanking. First of all, our feedback on the use of Facebook was rather negative and since other similar platforms have similar limitations, we would recommend the creation of a timebanking specific platform. Creating a new application will give the researchers the opportunity to alter certain options and specifications in order to better accommodate the members. Within the platform, users should be able to create their own digital profile, consisting of pictures, skills, interests, certifications, and ratings. By creating such profiles, the program will be able to and should match members based on matching needs and skills. The application should also have a search function so when a user is in need for a certain skill, the application can scan through other members profiles and suggest members that will be able to provide the needed skill. Then users could initiate a conversation with the suggested member profiles in order to set up exchanges. The ability to rate each member after receiving a service is vital for the protection of the community as well as for reassurance of the quality of service received. Users can have different ratings for different services they might offer based on the quality of the service they provide. For example, an individual could have their cooking services rated five stars due to their excellent cooking ability. However, that same user could have their coding services rated only two stars due to their inexperience teaching coding. Users will also have an overall total rating to ensure they are safe and friendly towards the community. Similarly, to other digital timebanks, the application could have a global platform but also the ability to divide the users into smaller, local communities. Making local ARC communities could also help connect the local communities and would be a good way for people new to the area to expand their social circles. For exchanges that can be done remotely, having a globally available application could greatly increase the number of timebank members and the variety of services

available. Since these exchanges will be done remotely online, the application could also provide users with their own video call service in order to internalize all processes within the application. Lastly, having a timebanking specific platform provides users with one inclusive location to stay up to date on all timebanking information and all communications with other members. Having a timebanking specific platform will be essential in the successful implementation of an ARC digital timebank inside of a university.

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# **Appendix I: Consent Form**

## **Informed Consent Agreement for Participation in a Research Study**

**Investigators:** Michael Connor, Ioannis Alexandros Maillis, Peter Way

### **Contact Information:**

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IRB Manager - Ruth McKeogh, Tel. 508 831- 6699, Email: irb@wpi.edu

Human Protection Administrator - Gabriel Johnson, Tel. 508-831-4989, Email: gjohnson@wpi.edu

**Title of Research Study:** Experimental pilot study for Timebanking for students.

### **Introduction:**

Some of you might be asking yourselves, what is timebanking? Timebanking is a framework that enables the use of time, rather than money to pay for a service. Individuals basically exchange an hour of their time for an hour of somebody else's. It does not make a difference whether that time is spent on more challenging service, such as tutoring, or a straightforward activity like giving a ride to the grocery store. The point of timebanking is that if you give one hour of your time, you will receive one hour in return. Now, when the topic of implementing timebanking with asynchronous remote communities (ARC) comes up, most of us will agree that online platforms have become one of the most comfortable places for college students today. During this project, the team will be examining timebanking within Worcester Polytechnic Institute to check whether it is possible and effective to implement such a system. The goal of this project is to be able to collect the adequate data from our study in order to determine if the combination of ARC and timebanking is suitable for a local and global application between universities.

You are being asked to participate in a research study. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.



**Purpose of the study:** The purpose of this study is to understand if implementing timebanking within WPI is doable. We want to conduct this study in order to get students' feedback about their experience and with that be able to progress with the project.

**Procedures to be followed:** Procedures might include interviews and surveys among people in the experiment, in order to analyze the usage of timebanking in the communities.

**Risks to study participants:** No risk greater than experienced in everyday life.

**Benefits to research participants and others:** Subjects may receive benefits such as positive social interactions, learning opportunities, and the opportunity to connect and communicate with peers from their university and potentially another university.

**Record keeping and confidentiality:** Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

Record keeping procedures will only be accessed by the students and professors that are conducting the study. The information will be kept confidential within our own devices and the information collected will consist of the following:

1. Name
2. Gender
3. Age
4. Skills they possess to offer others (e.g., tutoring)
5. Needs they possess for others to offer (e.g., car ride)
6. Expectations of the study
7. Feedback on the study

**Compensation or treatment in the event of injury:** The study does not involve more than a minimal risk of injury or harm. You do not give up any of your legal rights by signing this statement.

**Cost/Payment:** Participants in the timebanking experiment will be granted a 20-dollar gift card and there will be no cost to participate.

**For more information about this research or about the rights of research participants, or in case of research-related injury, contact:** Any of the investigators listed above, IRB Manager (Ruth McKeogh, Tel. 508 831- 6699, Email: [irb@wpi.edu](mailto:irb@wpi.edu) ) and the Human Protection Administrator (Gabriel Johnson, Tel. 508-831-4989, Email: [gjohnson@wpi.edu](mailto:gjohnson@wpi.edu)).

**Your participation in this research is voluntary.** Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

**By signing below,** you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that your questions are answered to your satisfaction before signing. You are entitled to retain a copy of this consent agreement.

\_\_\_\_\_  
Study Participant Signature

\_\_\_\_\_  
Study Participant Name (Please print)

\_\_\_\_\_  
Signature of Person who explained this study

Date: \_\_\_\_\_

**Additional clauses to add to Consent Agreements, as appropriate:** Additional costs to the subject that may result from participation in this research include: (list).

- \$20 participation gift card which will be given after completion of all the tasks of the study.

Significant new findings or information, developed during the course of the research, may alter the subject's willingness to participate in the study. Any such findings will be promptly communicated to all research participants.

Should a participant wish to withdraw from the study after it has begun, the following procedures should be followed: (list). The consequences for early withdrawal for the subject and the research are: ().

**Special Exceptions:** Under certain circumstances, an IRB may approve a consent procedure which differs from some of the elements of informed consent set forth above. Before doing so, however, the IRB must make findings regarding the research justification for different procedures (i.e., a waiver of some of the informed consent requirements must be necessary for

the research is to be “practicably carried out.”) The IRB must also find that the research involves “no more than minimal risk to the subjects.” Other requirements are found at 45 C.F.R. §46.116.

## **Appendix II: Initial Survey**

### Week 1 survey questions

1. WPI email
2. Full Name
3. Gender
4. Age
5. Major
6. What best describes you at the moment? Undergraduate student, graduate student, Alumnus, or Faculty.
7. What are your expectations from this study?

## **Appendix III: Informational Videos**

Video 1: What is timebanking?

[https://drive.google.com/file/d/11wdwPo\\_72cD\\_ysCyuYT2dwaKqgVk82Iz/view?usp=sharing](https://drive.google.com/file/d/11wdwPo_72cD_ysCyuYT2dwaKqgVk82Iz/view?usp=sharing)

Video 2: Benefits of timebanking.

[https://drive.google.com/file/d/1uQ\\_BEsK1YTHG54cQGcVmdKQoNKqfvZ61/view?usp=sharing](https://drive.google.com/file/d/1uQ_BEsK1YTHG54cQGcVmdKQoNKqfvZ61/view?usp=sharing)

Video 3: Example on how to perform exchanges.

[https://drive.google.com/file/d/1fEbU6bOi1kxS\\_fK-AgONl6AMUPvyG3hb/view?usp=sharing](https://drive.google.com/file/d/1fEbU6bOi1kxS_fK-AgONl6AMUPvyG3hb/view?usp=sharing)

## Appendix IV: Skills and Needs Survey

Week 2 survey questions:

1. Full Name
2. Major
3. Skills 1 - 2 (Required)
4. Skills 3 - 5 (Optional)
5. Need 1 - 2 (Required)
6. Need 3 - 5 (Optional)

Examples:

**Example of Online Exchanges**

- Tutoring (any course)
- Peer Reviewing
- Home Workout Session
- Microsoft Office help (PowerPoint, Excel)
- Video Editing Skills
- IT help / set up
- Knitting Lessons
- Art Lessons
- Music Lessons
- Cooking Lessons
- Meditation Lessons
- Business Seminar
- Public Speaking

**Example of Online Exchanges**

- Presentation Skills
- Grammar Checking
- Crafting Tutorials
- Foreign language Practice
- Vehicle Maintenance advice
- How to tie a tie
- Knot Tying
- Resume Critique
- Mock Interviewing / Interviewing Skills
- Nutritional Advice
- Housing Search Help
- Interior Decorating
- Life Skills Coach

Video: Filling out Skills and Needs survey.

[https://drive.google.com/file/d/129aQ\\_U5JCptl600wt70yRX7z4Y4-ukiY/view?usp=sharing](https://drive.google.com/file/d/129aQ_U5JCptl600wt70yRX7z4Y4-ukiY/view?usp=sharing)

## **Appendix V: Time Credits Tracker Survey**

Week 3 & 4 survey questions:

1. Person providing a service.
2. Person receiving a service.
3. Service Provided?
4. Amount of time credit exchanged.

## Appendix VI: Final survey

Week 5 survey questions:

### Rating questions

1. Was it easy to find a match with another participant? (1 = lowest, 5 = highest)
2. How long did it take you to match with another participant? (1 = very fast, 5 = very slow)
3. Were the services you received satisfactory? (1 = lowest, 5 = highest)
4. Did you feel you were able to offer your services to help another community member? (1 = lowest, 5 = highest)
5. How much do you think this study helped you understand timebanking? (1 = lowest, 5 = highest)
6. How useful did you find timebanking with a participant in your own university? (1 = lowest, 5 = highest)
7. How useful did you find the online services? (1 = lowest, 5 = highest)
8. How likely are you to keep participating in timebanking? (1 = lowest, 5 = highest)
9. How likely are you to recommend timebanking to friends or colleagues? (1 = lowest, 5 = highest)
10. How likely would you be to use timebanking as a means of saving money to receive services? (1 = lowest, 5 = highest)

### Open Response:

5. Describe any benefits experienced from this timebanking study.
6. Did you experience difficulties during the exchanges? (e.g., participant didn't work for a full hour but you still paid one hour of time credit)
7. What would you recommend to improve the timebank?
8. Would you recommend timebanking to a friend? Why or why not?



## **Appendix VII: Non-Participation Survey**

1. What was the main reason to not conclude the study? (time constraints; loss of interest; unclear instructions; lack of participants)

### **Time Constraints**

1. Were you too busy with other courses or exams?
2. Would you have participated if the study had more time to conduct all the activities and exchanges?
3. Were the time requirements for the individual exchanges too long?
4. Do you have any additional comments or thoughts that could help us understand how we can improve?

### **Loss of Interest**

1. Did you not participate because it carried on during winter break?
2. Did the project turn out to be different than originally anticipated?
3. Did you lose interest in the idea of timebanking once you learned more about it?
4. Do you have any additional comments or thoughts that could help us understand how we can improve?

### **Unclear Instructions**

1. Did the directions seem unclear or confusing to you?
2. Were the directions given over too long a period of time?
3. Would it have been better to give all the directions at one time?
4. Do you have any additional comments or thoughts that could help us understand how we can improve?

### **Lack of Participants**

1. Did you feel you didn't have much to offer or that your skills didn't match demand?
2. Did you find it difficult to ask for help?
3. Did you find the number of services offered by other participants enough?
4. Do you have any additional comments or thoughts that could help us understand how we can improve?

### **Willingness to Participate Again**

1. Would you still be interested in finishing the study from February 7 to 13 and receive a \$20 Amazon gift card?

## Appendix VIII: Skill & Needs (Academic vs. Non-academic)

Academic	
Skills	Needs
Writing (Professional & Creative)	Learn a new language
Foreign language classes	Presentation skills
Sign Language classes	Interviewing Skills
Grammar Checking	Grammar revision skills
Interview Help / Job Search	Job searching / Networking
Resume critique	Excel Help
Programming (mainly python)	Sign Language lesson
Math and Science Tutoring	Resume Critique
Video Editing	CAD / Solidworks help
Presenting/public speaking	
Excel Help	

Non-academic	
Skills	Needs
Gardening	How to play Chess
Cooking	Trading in stock market / Investment ideas
Mechanical work (cars, motors)	Cooking lessons
Nutritional Advice	Painting & Drawing lessons
Chess	Guitar lessons
Day trading / Investing	Nutrition advice
Ukulele beginner class	Workout sessions
Ski and Snowboard tuning	Wills and Trusts info
Baking	Time management skills

<b>Non-academic (Continued)</b>	
<b>Skills</b>	<b>Needs</b>
Piano and Singing Lessons	Learn how to fish
Guitar / Music Lessons	Book recommendations
Photos Taking	Vehicle Maintenance
Art and drawing help	Music and Song Recommendations
Organizational Skills	Real Estate Planning
Home Workout Session	Meditation Lessons
Fishing Lessons	Real-estate investment strategies
Meditating Session	Keeping daily schedule
Football Class	Piano lessons
Solving a rubik's cube	Knot Tying
How to play League of legends	Yoga lesson
Soldering	
Swim Lessons	
Crafts/Handmade items	