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| University of Lincoln |
| Level 3 Project |
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“*You Scratch My Back, I’ll Scratch Yours: Supporting social collaboration with a virtual economy system*”

# Abstract

# Background

The importance of collaboration between students in all levels of education has been explored thoroughly, with such research as “Processes and Consequences of Peer Collaboration” (Tudge, J., 2008) finding it to be a greatly beneficial learning technique compared to the more old-fashioned and solitary style of studying. The main benefits of small group work is its ability to enhance relations between students of varying backgrounds (Nieto, S., 1992) and provide skills that are “essential for authentic achievement” (Cohen, E., 1992); furthermore, working collaboratively with others improves students’ ability to create strong co-worker relations, which can be transferred to post-education work scenarios (Cohen, E. and Lotan, R., 2014).

In the workplace, it is becoming increasingly important for employees to solve problems collaboratively due to the organisational and social benefits for both the company and its workers (Tjosvold, D. & Tsao, Y., 1989). Cooperative interdependence leads to stronger working relationships and more effective approaches to complex tasks (Tjosvold, D., 1988), given that they require knowledge that no single person could obtain, therefore mandating collaboration between multiple disciplines, as explored by Zhu, et al (2010). The knowledge transfer between peers of varying expertise has been shown to have a positive impact on the productivity of many types of organisation ([Argote](https://scholar.google.co.uk/citations?user=lgaWJAkAAAAJ&hl=en&oi=sra), L. and [Ingram](https://scholar.google.co.uk/citations?user=j8J8D7YAAAAJ&hl=en&oi=sra), P., 2000; Nembhard, D. and Bentefouet, F., 2015) and therefore, it could be determined that a system encouraging peer collaboration and the transfer of knowledge would be a valuable tool for social and economic development.

It is important to note, that while there are obvious benefits to creating a system that encourages cooperative work, certain group dynamics can hinder communication and knowledge transfer, such as a “*leader-centred*” approach (Toseland, R. and Rivas, R., 1984) which constrains groups and stifles creativity in favour of achieving tasks set by the leader. As an addition to the style of group, a further obstacle to effective collaboration is that when rewards are used inappropriately, with win/lose conditions or when collaborators are encouraged to work individually, competition instead of cooperation is induced, leading to each member feeling reluctant to aid others as it may cause their own goals to become more difficult to attain (Tjosvold, D. & Tsao, Y., 1989).

Given the aforementioned pitfalls that are likely to occur in collaborative tasks and the fact that “*student attitudes to group work, in general, are mixed*” ([Elgort](https://scholar.google.co.uk/citations?user=VW_DU3UAAAAJ&hl=en&oi=sra), I., et al, 2008), the creation of an effective system that encourages peer collaboration would have to overcome the obstacle of apathy in a semi-structured manner, as to allow freedom of expression and facilitate a “*group-centred*” experience (Toseland, R. and Rivas, R., 1984). Student apathy has been found to be “*as common as chalk dust*” (Raffini, J., 1988), and has been cited as one of the “*causes for great concern*” by Boyer, E. and Student Personnel Administrators (1990). In the current generation, apathy is thought to be fuelled by the social disconnection brought about by the increase of technological communication (Luther, N., 2009); therefore, in order to challenge apathy and successfully foster a much-needed collaborative work flow, a system that forces a temporary disconnection and social contact between peers is needed.

A second factor that remains important to the effectiveness of any collaborative process is the group size that is forced upon a cooperative team. Much research suggests that, in order to provide all members with an opportunity to participate and learn, groups need to remain small in membership (De Cremer, D. and Leonardelli, G., 2003). Further research into the area of inter-group collaboration shows that the engagement of group members is directly linked to each individual’s need to belong (Baumeister, R. and Leary, M., 1995) and that as group-size increases, the belongingness of each person is reduced (Komorita, S. and Parks, C., 1994).

To persuade peers to work together using a collaborative system, each user needs an incentive so that they have a reason to cooperate and care about each other’s progression (Slavin, R., 1984). With Deterding, et al (2011) stating that the core idea of any persuasive application is “*…to model the reward and reputation systems of gamified applications with economically inspired approaches such as incentive centered design*”, it is suggested that a possible way to challenge apathy and encourage collaboration could be through the use of incentive mechanisms.

Regarding incentive-centred design, it has been found that applications utilising rewards as a product of positive interaction has increased both participant motivation and most importantly, participation (Hummel, et al, 2005; Small, 2002). Further evidence supporting the use of incentive-centred design is the large amount of research concerning the neurological rewards system (i.e. Milner, P., 1991; Thut, G., et al, 1997; McClure, S., et al, 2004[1]), which was originally observed by Olds and Milner (1954), who found that when certain loci of the brain are stimulated, subjects will attempt the action that caused the stimulation again. Through the use of incentive mechanisms such as monetary rewards (McClure, S., et al, 2004[2]), it is hoped that users of a collaborative system will be encouraged to continuously use it as a platform for supporting their own collaboration.

Along with currency, reputation/karma systems have been shown to improve friendly and reliable user interactions with a system due to their ability to visualise the ‘trustworthiness’ of each member (Jøsang, A., et al, 2007) and furthermore are another key activator of the human rewards system (Izuma, K., et al, 2008). Farmer and Glass (2010) note however, that while reputation systems can be used to provide “*a means for trust between users*” and encourage users to contribute to services, they should be used sparingly and almost never be displayed publically.

Contrasting the merits of incentive-centred design is the human nature of altruism, where an agent provides aid to someone with whom they are not related, for no personal gain (Trivers, R., 1971). Fehr and Fischbacher (2003) state that, while not every person in a group can be fully selfless and altruistic, the existence of a few altruists can positively affect the nature of those around them; therefore in an online community, it may be possible for altruism to become to main motivator for collaboration. The biggest drawback to relying on altruistic agents in a collaborative system is that ‘true altruism’ is very difficult for people to attain, due to the high probability of subconscious motives for aiding another, such as: “*social pressure, guilt, sympathy or simply a desire for a ‘warm glow’*” (Andreoni, J., 1990). Further research concerning group work supports Andreoni’s idea of ‘impure altruism’, where it has been found that while some groups appear to collaborate, each member is driven to complete their own personal goals due to a lack of understanding the value of others within the team (Sonnenwald, D. and Pierce, L., 2000). Through the use of incentive-centred design and ‘gamification’, it would be possible to define rules and rewards for cooperation (Pagulayan, R., et al, 2002) and therefore discourage the selfishness that Sonnenwald and Pierce describe.

Given the findings of the literature review, this project will involve designing and creating an app that encourages collaboration by providing virtual monetary rewards for collaboratively aiding fellow users, with a specific feature of allowing people to post tasks with which they require assistance. To determine the artefact’s effectiveness, user-testing will be conducted with a group of computer science students at the University of Lincoln.

The development of this system, hereby referred to as ‘Backscratcher’, will be split into the following objectives:

Minimum Viable Product

* New users can create a ‘Backscratcher’ profile, which has its own credit balance and linked tasks
* Users will be able to create tasks, which will then be viewable by others in the task forum; the credits offered should then be removed from the current user’s account
* After a task has been accepted by a user and subsequently completed (via a dual-user authentication), the pre-set credit reward should be added to the helper’s account

Further Improvement

* There could be a messaging system on each task, which allows users to find out more details concerning the desired collaboration
* A tipping feature could be added, allowing users to tip others an amount of credits, which would provide an interesting metric concerning altruistic behaviour in collaboration

The decision to only test ‘Backscratcher’ with students from the University’s School of Computer Science was so that use-case testing could be done quicker, given the control groups common subject and location. Furthermore, it is understood that whilst the system has the potential to be used by all students and even the general public, the scope should be limited for the length of this research, as it is most important that the system’s ability to support collaboration be determined before any extra features are added.

Find in library?

<http://sw.oxfordjournals.org/content/48/3/297.short>

<http://sth.sagepub.com/content/21/1/54.short>

<http://dl.acm.org/citation.cfm?id=332502>

<http://www.sciencedirect.com/science/article/pii/S0360131504000570>

* Importance of collaboration (refer to education)
* Collaboration in education/development

1. (<https://books.google.co.uk/books?hl=en&lr=&id=pXDHAAAAQBAJ&oi=fnd&pg=PP1&dq=social+collaboration&ots=ZXUB2TfyEf&sig=CgWoJdv_pWzLZlj7cKSdF1uuqiw#v=onepage&q=collaboration&f=false>) Book - Digital Education: Opportunities for Social Collaboration
2. (<http://www.tandfonline.com/doi/abs/10.1207/s1532690xci1004_1>)

* Collaboration in the workplace and knowledge transfer

1. (<http://onlinelibrary.wiley.com/doi/10.1111/1467-6486.00214/abstract;jsessionid=665EB4E0A7B5ACFA616EC181403936C3.f02t01?userIsAuthenticated=false&deniedAccessCustomisedMessage>=)
2. (<http://www.sciencedirect.com/science/article/pii/S0749597800928838>)
3. General link to knowledge transfer articles

* Gaining an understanding of teamwork

1. (<http://www.emeraldinsight.com/doi/10.1108/TPM-02-2015-0006>)

* Critique group work
* Ways to encourage collaboration and overcome boundaries
* Link to previous

1. (<http://researcharchive.vuw.ac.nz/handle/10063/334>)
2. “The results highlight the fact that student attitudes to group work, in general, are mixed, and that the use of wikis per se is not enough to improve these attitudes.”

* “Bystander apathy”/”Student Apathy” -> Discuss problem and define solution

1. (<http://eric.ed.gov/?id=ED297198>)
2. “student apathy is as common as chalk dust in many… classrooms”
3. “A fourth strategy for inviting apathetic students back to the learning process is through the use of cooperative learning activities.”
4. (<http://boyerarchives.messiah.edu/files/Documents4/1000%200001%206749ocr.pdf>)
5. “But we also found that student apathy… and acts of incivility are causes for great concern.”
6. “…a purposeful community, a place where the intellectual life is central, and where faculty and students "work, together" to strengthen teaching and learning on the campus.”

* Maintaining small groups (also mentioned above)
* Importance of social contact in learning

1. (<http://www.nacada.ksu.edu/Resources/Academic-Advising-Today/View-Articles/Advising-in-the-Face-of-Apathy-Collaboration--Connection--and-Communication-in-Higher-Education.aspx>)
2. “student dependence upon technology is actually resulting in disconnection and disengagement from the human, social contact needed to successfully collaborate, connect, and communicate.”

* Incentive-Centred design
* Why?
* Reputation/Karma Systems
* Altruism
* Contrast to Altruism
* Aims and objectives (derived from lit review)

# Methodology

# Design, Development and Evaluation

# Project Conclusion

# Reflective Analysis

# List of References