ADDRESSING STEM GEEK CULTURE THROUGH PEER LEARNING

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Abstract

STEM is generally considered to be a male-dominated environment. The geek culture that often leads to social issues, and the gender imbalance that leads to fewer girls choosing a STEM subject, are becoming important topics of research. Peer learning has been widely used across the world to support retention and better grades with a more recent focus on adopting this approach to tackle issues around gender imbalance and perceived 'laddish' culture. Through peer learning, students are encouraged to work alongside their tutors, and to practice the critical soft skills that they will need as they move into the workplace.

This paper explores the role of gender and geek culture, considering how students can break down the stereotypes while moving away from didactic approaches. The gender gap in STEM has narrowed, but women are still underrepresented. 'Geek culture' often creates a high-tech, androcentric environment. Policy makers have agreed that the geek culture needs to be researched and its impact identified. Social interactions and relations are the reflection of interpersonal values, and the peer norms may affect a students' engagement and motivations in STEM subjects.

The discussion will examine how peer learning can prepare students in Higher Education and offer insights into creating an environment in which students can become partners. Peer learning can represent a significant step in enabling students to become more engaged in their learning and is becoming an important element across institutions globally.

There is a plethora of approaches to peer learning and it is encouraging to observe how students transform and mature by participating in the scheme. Evidence is accumulating that peer learning can enable students to become more confident and independent, enhancing not only their transition into Higher Education but also into industry.

Peer learning can have a positive influence across the disciplines and supports students in achieving more than they might otherwise do. It can also examine, in an informal way, the gender issues, laddish and geek culture, and promote the sense of belongingness in STEM disciplines. This paper will inform readers about how peer learning can reconstruct the geek culture and transform it from self-centred to forming relationships and overcoming social issues. With regard to Higher Education specifically, we try to understand the different situational frames that are being generated by such cultures, how we can influence those stereotypes, and make them more acceptable and more inclusive.

Keywords: Education, peer support, STEM, lad culture, geek culture, gender culture.

1   INTRODUCTION

Diversity in Higher Education is a rapidly increasing field of interest and research. In areas such as STEM, which are predominately male oriented, academics are looking into creating more inclusive environments via different methods. Diversity and inclusion are not brand-new terms. Traditionally, such terms would refer to race, age and international entry. However, in recent years, the understanding of diversity, inclusion and equal opportunities have widened. Gender and participation have become a new focus. When it comes to diversity discourse, it is important to note that each course and/or discipline is unique in nature and if one set of rules and observations apply to it, it does not mean it applies to all. Therefore, for the purpose of this paper, the main focus will be STEM and in more particular the computing discipline.

Over the past couple of decades, female participation in STEM (and Computing in particular) has declined. Higher Education is changing dramatically by developing a cross-border-education [1]. From a pedagogical point of view, academics are challenged on a daily basis to develop teaching material that will be inclusive for all cultures, ages, and gender identity. Nevertheless, academics often find this very challenging and since one size doesn't fit all, this can lead to frustration and friction. What has been noted in such circumstances, is that when the support comes from peers who share common

backgrounds, such as culture, gender, age etc, then students can adapt more easily. At the same time social learning is becoming peer-driven. As such, peer learning can be an effective teaching and learning approach in developing a cross-cultural environment.

This study focused on the peer learning experiences of two distinct groups – specifically mature age students and female students in the computing discipline. The primary goal of the study was to explore how students feel when they first join, how the peer learning sessions facilitate them in all aspects of learning and adapting in Higher Education. Sets of questionnaires were issued at different stages of their studies and the data was analysed in a qualitative manner.

2   PEER LEARNING AND THE GEEK CULTURE

In discussing peer learning Boud [2] states that *'…learning with and from each other is a necessary and important aspect of all courses. The role it plays varies widely and the forms it takes are very diverse, but without it students gain an impoverished education'*.

What is important when it comes to such schemes, is that no student within the peer learning support group has any authority. Students participate in activities and explain their ideas with a common goal to learn from each other. It has been noted that often traditional teaching approaches such as lectures, have a negative effect on students. They become passive recipients of information and when they are asked to apply it in practice, they feel lost. Although academia is moving forward and trying to be innovative, we still run into situations where students need a more informal environment that supports facilitation and no criticism of abilities. In Peer Learning, students construct their own understanding and meaning of what they need to learn. Students participate in analysing, collecting and evaluating the information received from academics in order to do assignments or solve a problem. Therefore, students engage emotionally and intellectually in completing their tasks.

In general, a geek is defined as a person who is expert in technology. This definition is also often seen as a stereotype for those individuals who have no other interests apart from computing. Alongside the geek stereotype a laddish culture is entrenched in STEM and often hinders support for students with their human relations. The geek culture is continuously reconstructed, and its implications are about overpowering specific individuals. It can be a very androcentric environment and often if someone does not meet such social criteria, they can feel excluded. Moreover, the people who classify themselves as geeks quite often cannot integrate and feel excluded too.

The key features of Peer Learning and some key questions on how to develop the scheme, are shown below on the table.

Table 1. Key features and questions of Peer Learning.

Key Features	What is the purpose of the scheme? a) Subject specific support b) HE context-based support	Approaches may vary, can either be module or programme specific, or based on group demographics and needs.
Participation	When do students attend a Peer Learning session? Do they attend throughout the year or as and when needed?	There needs to be clarification on the nature of the activities involved and what the aim of the scheme is.
Training and Support	Peer Learning Leaders must undertake training to understand the differences between teaching and facilitation.	Issues do arise, academics must be prepared to deal with varying views and what is Peer Learning aiming to achieve.

As mentioned above, in a Peer Learning session there is no authority and the sense of belongingness is fully supported. A standard Peer Learning session would look something like this:
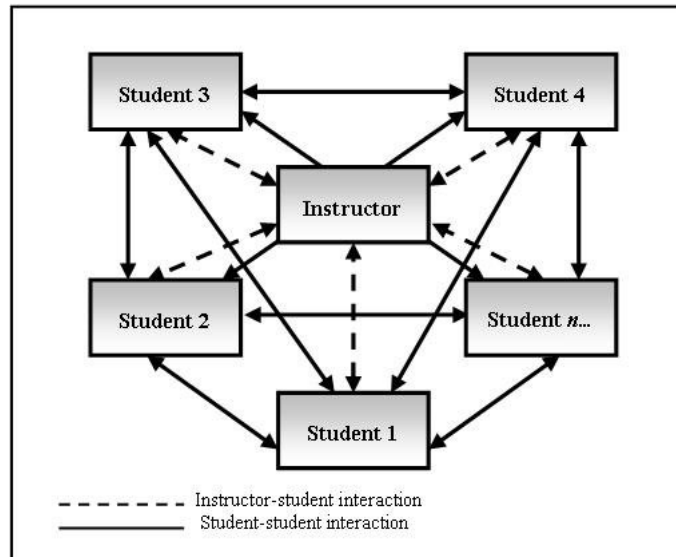
Figure 1. Peer Learning session interactions.

What we notice is that while the Peer Learning Leader/Instructor is at the centre of the interactions, there is interaction happening across all participants. The instructor, is facilitating the environment, ensuring there are no boundaries and stereotypes, and everyone feels welcomed and included. Such schemes aim to identify the needs of the group and ensure clear links between academia's expectations and student expectations. For each session, goals and outcomes need to be identified by the leaders in collaboration with the academics. The scheme should be developed with the view to build relationships and not to benefit one group or demographic. A Peer Learning scheme should be embedded in academic programmes and enhance student commitment and participation.

The overall benefits of Peer Learning can be many, and this will depend on the nature of the scheme and what it tries to achieve.

Figure 2. Benefits of Peer Learning.

3   THE PROJECT

The project was aligned with the University's goals and ambitions in terms of improving National Student Survey (NSS) scores and student retention. In 2014 the HEA report on Peer Learning represented a significant step forward in Higher Education in the UK [3].

Other projects researching the geek culture are gradually emerging across the UK with examples including Aston University running a mentoring scheme, and Surrey University [4] developing a document derived from research into understanding the support that students need.

The Peer Learning scheme has been running successfully across many disciplines at the University of Plymouth since 2011. This project differed from the existing Peer Learning Schemes because it aimed to:

a) focus on the issues students face in terms of culture and identity;

b) develop pedagogical research in that aligns to the teaching and learning incentives;

STEM students have previously shared concerns including, though not confined, to the following:

a) work-life balance

b) returning to study after being out of education for a considerable period of time;

c) understanding the expectations of HE and becoming an independent learner [5].

In this project Peer Learning was used as a vehicle to address those concerns and provide a supportive environment for STEM students on Foundation and Level 4. Peer Learning can be used to sculpt social identities which are influenced by social groups. One of the aims of this research was to use peer learning to enhance the group's belongingness [6], remove the barriers and stereotypes and make students feel more part of a degree cohort. The project conducted an enhanced evaluation of the pilot that will ran within the School of Computing and Mathematics during Semester 2 of 2016/2017. In 2017/2018 it was expanded across the Faculty (Science and Engineering) and the evaluation provided a framework to make it available across the entire university.

The success of the project was assessed and measured via:

- Analysis of qualitative data gathered through session attendance records and survey responses

- Analysis of qualitative data gathered through debrief records, session observations and focus groups

- Throughout the duration of the project, the progress and the data were shared at the relevant teaching and learning committees, and equality and inclusion committees. This demonstrated the effectiveness Peer Learning has in providing a supportive environment for STEM students.

Throughout the life of the project the perceptions and attitudes towards geek and non-geek students were measured and explored how those students have been feeling and adapting in an HE environment. Teaching and learning was informed through collaborations and Peer Learning was the vehicle to influence such changes within the school but also beyond within the faculty. Peer Learning helped the school, and the Peer Learning community more generally, to take proactive steps towards making the learning environment supportive for various students with different cultural backgrounds.

Internally, the exploration of how to raise awareness and provide further support for students was the key aspect of this project. Being part of the University's Peer Learning Group, it enabled further exploration of the policies and procedures required to support new models for mentoring and supporting STEM students in HE as well as offering robust channels for the transfer of good practice to a varied range of academic disciplines. It helped with outreach activities, open days and applicant days, which can act as a means of promotion and awareness-raising. The project made stronger links and enhanced the research that already existed with the view to obtain and maintain a better understanding of students entering HE and the impact the geek culture has.

One of the university's strategies is with regards to student retention. For computing disciplines in particular, the statistics placed the school well below the national average. This project offered rich data on why students drop out and what can be done so they successfully complete their studies.

Furthermore, it identified areas of support and training academic staff might need, such as training on inclusion, equality and unconscious bias. This reinforced the approach towards the students and enhanced the understanding of all academics on how to approach such a matter.

4   DISCUSSION

The evaluation process interrogated how students felt joining a very male-dominated environment where the geek culture was very prevalent. The evaluation suggested that peer support and having students talking and interacting with other students, boosted their confidence and broke the stereotypes. It was identified that quite often perceptions are not accurate, and it was reported that peer learning can strengthen communities of students with the same or similar characteristics. The Peer Learning framework appears to be necessary especially at the begging of studies for an individual. It helps to set the scene and explain any jargon in plain language. Often, academics do not achieve such a potential when they try to adapt their approaches to large audiences. STEM students can overcome issues of isolation that could lead to low retention and engagement with the studies. Equally, whilst students and many academics recognized the value of peer learning, there were still some that either found it difficult to have social interactions or from the academics' perspective, they were worried that some more formal teaching would take place.

Although the research focused mainly on the positives of the scheme in an attempt to develop an institutional framework for peer learning, at the same time it recognised the challenges both academics and students might be facing. The authors believe that intervention techniques as and when needed can only help and support those specific groups and can contribute positively in raising awareness and removing boundaries and stereotypes from the learning environments.

5   CONCLUSIONS

Effective learning communities are highly important in Higher Education. Facilitating learning and understanding quite often stops at school level and traditionally academia relied on didactic approaches only. Schemes such as peer learning, can break boundaries and stereotypes. Although this study was conducted within one school only, the fact that the students already had very diverse backgrounds and studied in different areas within STEM, we are confident that the scheme was successful. A challenge is to increase the academic involvement and embed peer learning across all elements of learning. Opportunities for recognising and rewarding participation may also be possible through more formal professional development and ongoing accreditation.

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