Tackling Transition! Peer Mentoring in Engineering Education – A UK Perspective

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Conference Topic: Educational Research Methods

INTRODUCTION

Abstract

Grounded in the research findings of a study which examined the perceptions of engineering student peer mentors and mentees, this discussion paper critically examines the pedagogic and managerial issues encountered in developing and rolling out a bespoke Peer Mentoring Programme aimed at reducing first year attrition in Engineering and Applied Science. Starting with the research question "*Does Peer Mentoring improve engineering students' transition into university?"*' the study looked closely at two groups of engineering students as they progressed from 'freshers' week into the first year of their studies.

Following an Action Research Design and utilising an approach to Peer Mentoring developed out of a large international study (Clark et al, 2013; Andrews & Clark, 2011), a mixed methodological approach was utilised to examine students' perceptions of the value of Peer Mentoring during transition into undergraduate engineering studies. This paper presents part of the findings of the first 'research cycle' in which new students' perceptions of the value of mentoring in helping them make a successful transition to university were analysed and critiqued.

Background: Student Support at a Time of Change

Over the past twenty year the massification of the UK Higher Education Sector has seen an unprecedented growth in class sizes across all disciplines, with the student body now far more diverse in terms of demographic and education background than ever before (Booth et al, 2013; Walsh, 2010; Jones, 2010). Such diversity is not without its challenges; indeed it is generally accepted that the majority of first year students are generally unprepared for higher level study and enter university with little idea of what will be expected of them (Kreber, 2006; Freid, 2013). One of the consequences of this, compounded by increases in fees and *(unrealistic)* student expectations (Forbes-Mewett, & Nyland, 2013; Morgan, 2013), is that universities find themselves increasingly having to offer significant levels of social and academic support to first year students as they make the transition into university (Freid, 2013; Watson et al, 2004). The question of how to offer such support at a time when budgets are being reduced is one that continues to tax many Higher

Education Institutions (HEIs). In seeking to address this issue a diverse range of interventions have been introduced varying in nature from centralised informal social and 'pastoral' support to formally arranged 'developmental' academic support. Additionally, a number of interventions based around the concept of 'peer support' have been widely introduced. Some of these focus on providing academic support (for example, Peer Assisted Learning, Peer Tutoring) whilst others centre on social and pastoral support (for example Buddying, Befriending). One intervention which crosses the academic-pastoral divide is that of Peer Mentoring. In seeking to critically analyse the value of Peer Mentoring in assisting students make a successful transition into Higher Education a large study was undertaken by the two paper authors who, using a mixed methodological approach, examined the experiences of just under 1,000 students at six universities between 2008-2012 (Andrews & Clark, 2011; Clark et al, 2013). Peer Mentoring in Higher Education generally involves senior students offering pastoral and / or academic support to their first year counterparts. Organised on a formal, but voluntary basis, Peer Mentoring tends to have positive learning and social outcomes for both Peer Mentors and Mentees alike (Enhrich et al, 2004; Joyce et al, 1997; Kram, 1983) with each group benefitting from the reciprocal nature of the relationship (Anderson & Boud, 1996; Topping, 1996; 2005). In examining this issue Andrews & Clark (2011) identified a number of positive benefits afforded to new students who had participated in Peer Mentoring programmes. For first year students, such benefits included the creation of a sense of 'belonging' to the Institution. Being allocated a Peer Mentor allows individuals to quickly get to grips with the nuances of university life, providing the means by which fears of the unknown are swiftly allayed, and meaningful relationships built. For the Peer Mentors benefits tend to focus on the opportunity to gain transferable employability skills but are also related to the philanthropic nature of volunteerism (Andrews & Clark, 2011). Conversely, Andrews & Clark (2011) also identified a number of challenges associated with Peer Mentoring in Higher Education including cultural, pedagogical, institutional and individual barriers. Such barriers reflect the complex nature of Peer Mentoring relationships within an educational setting (Topping, 1996; Fayowski & MacMillan, 2008).

The main outcome from the study by Andrews & Clark (2011) was the development of an empirically grounded approach to Peer Mentoring for use in Higher Education; the **Transition+ Model** of Peer Mentoring (for further details see Andrews & Clark, 2011, Clark & Andrews, 2011, Clark et al, 2013). It is this model, depicted below in Figure 1, that forms the basis of the intervention discussed in this paper.

Figure 1: Transition+ Model of Peer Mentoring Adapted for Engineering

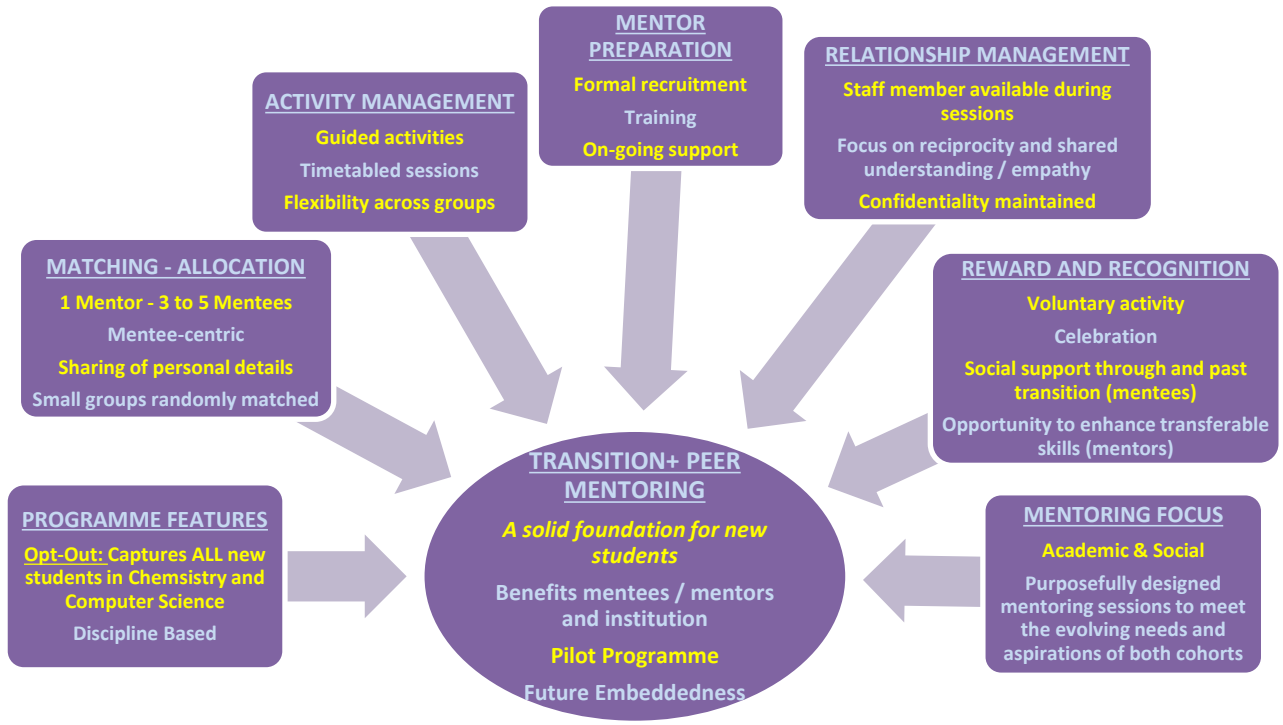


Figure 1 above provides a diagrammatic representation of the adapted Transition+ Model of Peer Mentoring utilised during a 'Pilot' intervention that was put into place to provide pastoral and academic support to first year students in Chemical Engineering and Computer Science at Aston University during the academic year 2013-14. Central to the approach was the fact that Peer Mentoring sessions were purposefully embedded within the timetable with mentoring activities organised and managed in such a manner so as to address the requirements and needs of both groups. Additionally, key to the management of the approach was the appointment of two student coordinators recruited from each of the second year cohorts. Both coordinators, who were formally employed and paid, took responsibility for the administration and facilitation of the mentoring activities, working closely with academic and support members of staff.

Concurrently an Action Research Study is underway aimed at critically evaluating the Programme in such a way so that the model can be further developed prior to being rolled out across the school in 2015-16. The first part of this study, which is discussed in this paper, involved administering a survey to first year students in both groups. The Action Research Study will continue to run alongside the Peer Mentoring Pilot for another 18 months, mapping and evaluating the issues as they emerge and providing evidence-based solutions to any emergent or unforeseen difficulties.

The methodological approach adopted for the first stage of the Action Research Study is now discussed, following which a critique of the emergent findings is given.

Methodology

The primary aim of the Action Research Study is to clearly identify and critically analyse the value of participating in Peer Mentoring from the perspectives of the student volunteer Peer Mentors and the first year student Peer Mentees. To achieve this aim a mixed methodological approach has been developed the first stage of which was the development of a quantitative survey tool. Building on work conducted by the paper authors into Peer Mentoring (Andrews & Clark, 2011; Clark et al, 2013) and

grounded in recently published work introducing a new approach to engineering education (Clark & Andrews, 2014), the survey tool is based around the three distinctive concepts; Relationships, Variety & Synergy. In developing the tool, 15 *experiential statements* were devised, each with the purpose of gaining insight into students' perceptions of their experiences of Peer Mentoring during the first two terms of the university year. The statements were then integrated, non-thematically, into a 'five-point' agreement Likert Scale.

For the purposes of this paper the responses indicating that students either 'Strongly Agreed' or 'Agreed' with the various statements are merged together and displayed in graphical format within the themes on a statement by statement basis. Whilst both Peer Mentors and Mentees have been surveyed this paper relates to the perceptions of Peer Mentees only. Whilst the data from the Peer Mentors is still undergoing analysis, plans are underway for further qualitative investigation (interviews and focus groups) and quantitative analysis (data trawling looking at attrition figures comparing students who have, and have not, participated in mentoring).

- **Sampling**

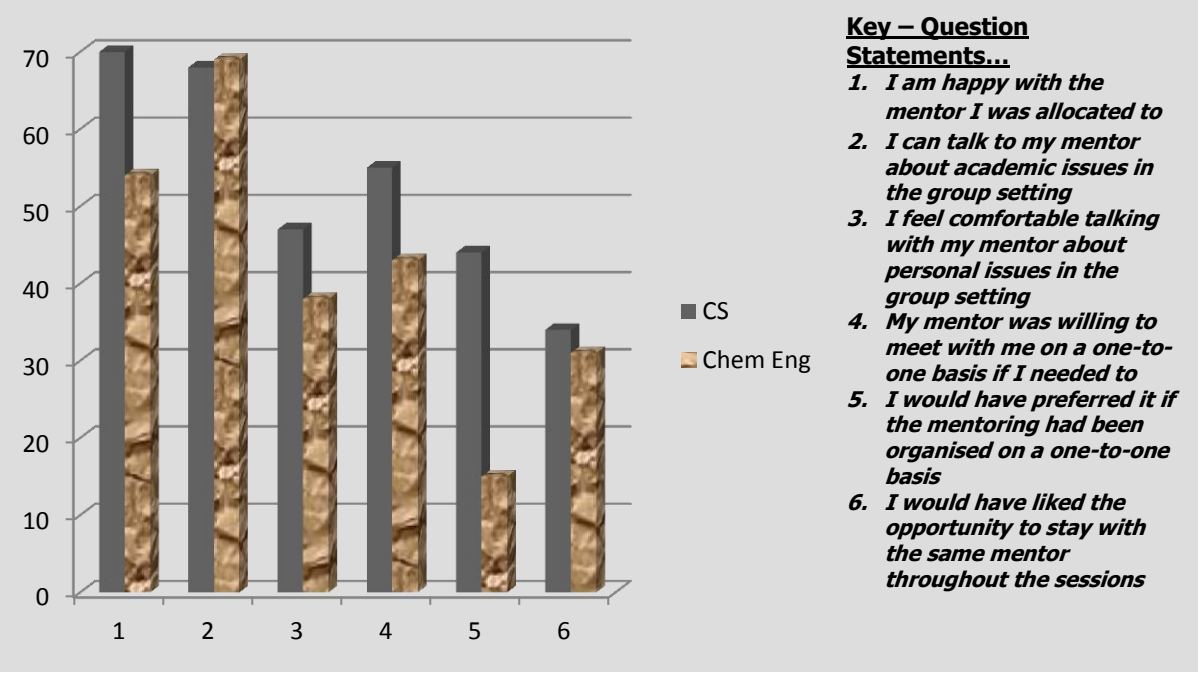
A blanket sampling strategy was utilised in which all peer mentees in both groups were surveyed concurrently. The sample comprised field comprised 95 Computer Science and 148 Chemical Engineering students. The response rate in Computer Science was 77% (73 completed surveys) whilst in Chemical Engineering it was much lower at 41% (61 completed surveys). The difference in response rates reflected the observed levels of engagement between the two groups and is discussed in greater detail in the discussion section of the paper.

Description of Findings

This section is divided into the three themes, Relationships, Variety and Synergy. Each column displayed within the graphs relates to the associated statement given in the key.

The first theme 'Relationships' included statements which focused on those experiences which were aimed at quickly promoting a sense of belonging. Figure 2 below shows the percentage of respondents in each group who either strongly agreed or agreed with each statement.

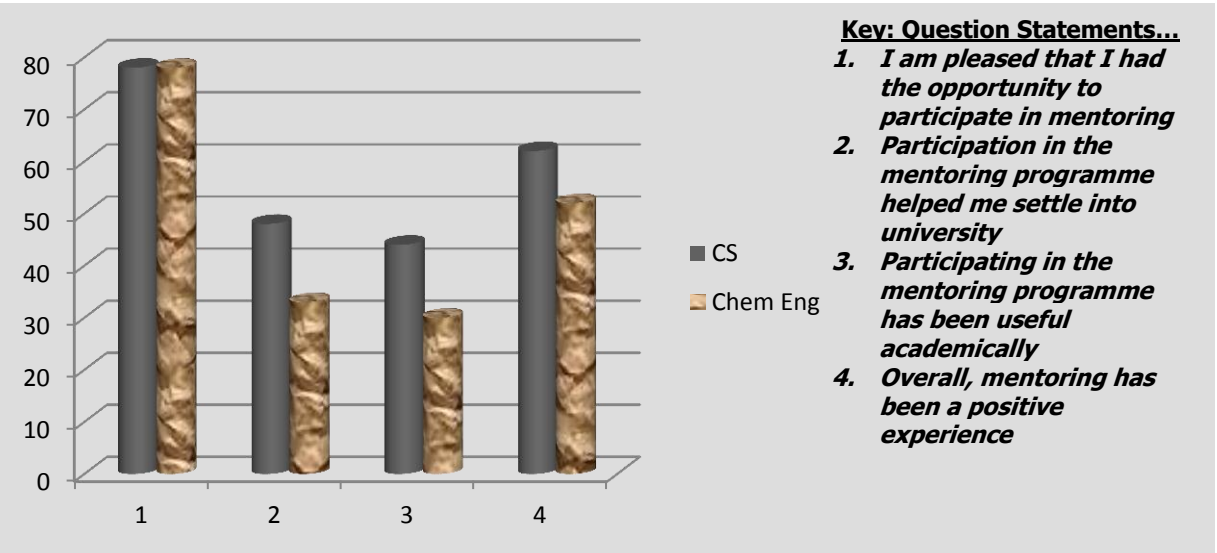
Figure 2: Mentee Responses (%) Relationship Questions



Looking at the above graph the most notable feature reflects the differences in students' responses to the fifth statement "*I would have preferred it if the mentoring had been organised on a one to one basis".* Previous mentoring at the Institution has traditionally been organised on a one-to-one basis with mentors and mentees being 'paired' in week 3 or 4 of the new term and then staying together throughout the academic year. Previous *mentoring pairs* have not been matched by 'subject' or 'discipline' basis but have instead been paired in accordance with mentees preferences in terms of gender, age, religion and ethnicity. In basing the Engineering Mentoring programme on the Transition+ approach the decision was taken to place the students in mentoring groups based upon discipline. The 'traditional' nature of the engineering students in terms of age and previous education meant that most of the first year students were placed with a mentor of a similar age and educational background. Likewise, the demographic profile of the student population resulted in students being placed in mentoring groups which were of a similar ethnicity or culture to themselves (the majority of students being from a British Asian background). In considering whether the pairing approach worked it is important to note the answers to the first statement *"I am happy with the mentor I was allocated to"* to which the majority of students in both groups gave a positive answer. However, that in Chemical Engineering the fact that just over 50% of the respondents gave a positive answer suggests that this is one area which will need some further consideration in planning next year's activities.

In the second theme 'Variety' the focus shifted slightly and students were asked to consider their responses in the context of the content of the mentoring sessions. Four statements were asked as depicted below in Figure 3.

Figure 3: Mentee Responses (%): Variety Questions

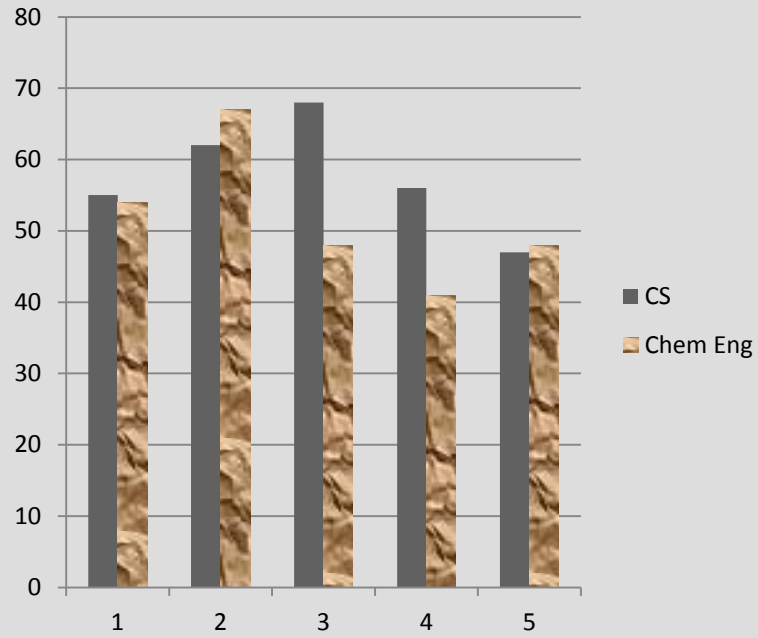


In considering the concept of 'Variety', the purpose of including mentoring on the timetable was to provide students with a meaningful experience that was not directly related to their discipline but was specifically organised so as to promote a sense of identity within their subject group. Bringing first and second year students together under the auspices of 'Peer Mentoring' enabled a supportive and non-threatening learning community to develop which, after the first few weeks, seem to evolve into a form of Peer Assisted Learning. This was particularly the case with the Computer Science students many of whom used the mentoring sessions as an opportunity to discuss work whilst breaking out of their usual 'solitary' study approaches. Perhaps not surprisingly, the chemical engineers, who spend a lot more time working in groups in the classroom, were less inclined to discuss academic issues in the mentoring sessions.

In looking at the data, that a large majority of the respondents (75% of each group) indicated that they were pleased to have had the opportunity to participate in mentoring suggests that the chance to participate in a timetabled 'non-academic' activity was well received.

The third theme addressed by the survey, that of 'Synergy', included statements intended to gauge students' perceptions of how well Peer Mentoring was integrated into the overall first year curriculum and student experience. The responses to these statements are given below in Figure 4.

Figure 4: Mentee Responses (%): Synergy Questions



In looking at the above table question 3 *"I know how to contact my mentor if I need to"* stands out as one area of concern as the positive responses to this are not as high as were expected. Indeed that just over 40% of the chemical engineers indicated that they knew how to contact their mentors suggests that just under 60% did not! The data focusing on the integration of mentoring into the timetable (Qs 1,2,5) implies that on the whole the student's didn't really 'notice' the attempt to *embed* mentoring within the first year experience. In many respects this supports arguments for scheduling mentoring sessions into the main timetable; indeed, there is little doubt that had mentoring not been scheduled into the main curriculum the students' perspectives and experiences would have been very different

Discussion: Challenges & Benefits

A number of practical and cultural challenges emerged during the year some of which are not reflected in the data discussed in this paper. These first of these relates to the purposeful embedding of 'Peer Mentoring' within both the first and second year timetables. Whilst every first year student was allocated a mentor, only about 20% of second year students volunteered to act as Peer Mentors. Although the Mentors were all from either Computer Science or Chemical Engineering, the fact that they were enrolled on a number of different degree programmes made it difficult to align the timetables. This was particularly the case with Chemical Engineering students, resulting in some mentee groups having to swop mentors as the weeks continued. Another, predictable yet largely unforeseen challenge, related to culture and the scheduling of the sessions. A large number of Aston students are from an Islamic background. This means that on occasion religious requirements demand their attendance at various festivals. From time to time such festivals clashed with the timetabled mentoring sessions resulting in poor attendance.

Cultural differences were also noted on a 'discipline-specific' basis with Computer Science students 'bonding' together much more tightly, and seeming to gain a sense of identity much more quickly, than Chemical Engineering students. Indeed, the Peer Mentoring Programme as a whole appeared to be much better received by the Computer Scientists than it was by the Chemical Engineers (who were generally observed to be nonchalant a lot of the time). The reasons for this are difficult to determine although staff noted that on the whole Chemical Engineers appeared to be much more 'extravert' and out-going than their 'Computer Science' counterparts; it could simply be that Chemical Engineering students are naturally more prone to building their own friendship groups and so didn't need the formality of an organised Peer Mentoring Programme.

As the first two terms progressed a number of positive points emerged during the Peer Mentoring sessions. Embedding mentoring into the timetable, whilst difficult, seemed to work well. Having Peer Mentoring as a timetabled activity meant that attendance and participation was relatively high throughout the sessions – although it should be noted that, as expected, engagement did decrease as the term progressed. Likewise, keeping the two disciplines in their own distinctive groups worked very well. The discipline-specific focus quickly engendered a sense of belonging to both the subject and school of study.

The notion of 'mentoring groups' was a new one for the Institution, which, as discussed above, had previously only offered one-to-one mentoring. The Transition+ Model, whilst not completely without problems, worked well for both Peer Mentors and Mentees. The data shown above suggests that the majority of students were happy to work in small groups with first year students feeling that they could talk with their Peer Mentor on a one-to-one basis if they needed to. From a resource perspective, the 'group' mentoring activity meant that every new student in the two groups was given a mentor. Whilst there is clearly much further work to be done in this area, having a named 'senior student' to turn to for support seemed to work well for both Chemical Engineering and Computer Science students.

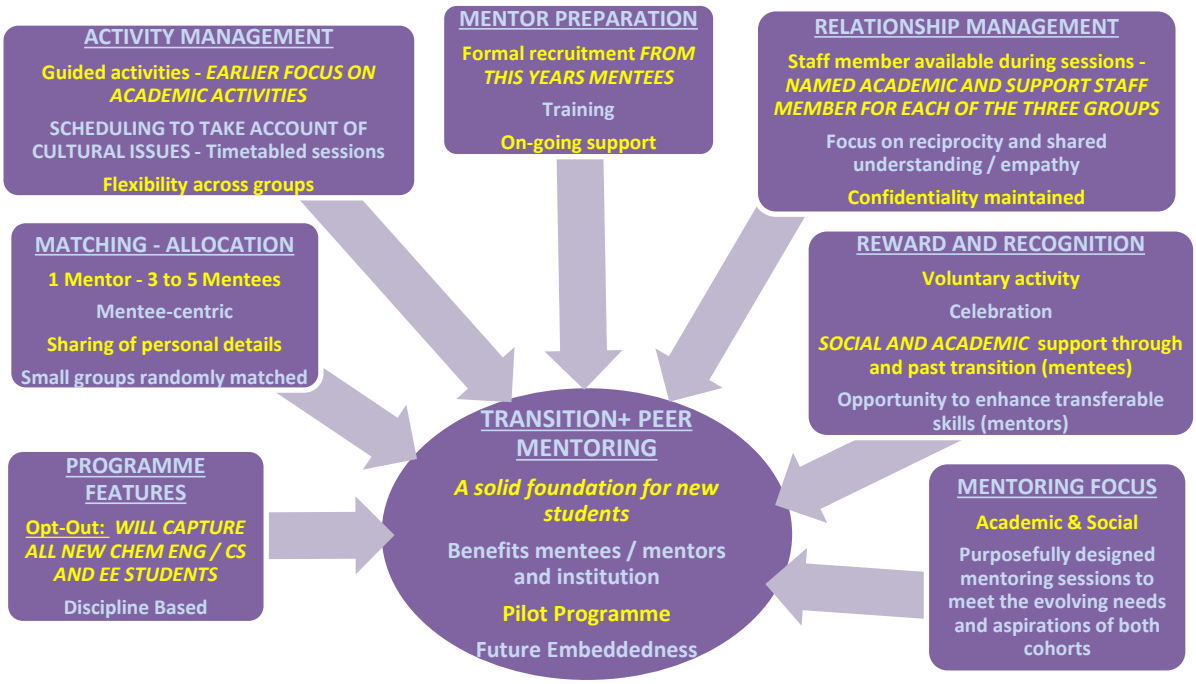
From an academic perspective there was a marked shift in focus in terms of the type of 'activities undertaken' during the mentoring sessions. Starting off as a purely sociable activity, as the term progressed the student-led activities evolved into peer learning. This change in focus was not entirely unexpected as it reflected the findings of earlier research (Andrews & Clark, 2011; Clark et al, 2013) and so was accounted for in the Transition+ Approach. Peer Learning Activities, whilst student led, were guided academically, focusing around threshold concepts and benefitting both mentees and mentors.

One of the main "unrecorded" challenges faced in rolling out mentoring reflected what appeared to be 'sceptical' views of some academic colleagues and support staff. Not all academic colleagues were comfortable with first and second year students being encouraged to meet up and discuss their work. Likewise, some support staff felt that the 'group mentoring' model would not work at Aston. With some careful persuasion and negotiation both groups agreed to 'give it a go', and after a while, scepticism seemed to fade. Indeed, the majority of academics and support staff are now looking forward to the programme being rolled out again next year.

The Future – What Next?

Peer Mentoring will be offered to three groups of students next year as the project is being expanded to include Electrical Engineers. As a result of this around half of the first years in the School of Engineering will be given a named Peer Mentor. Taking account of the Action Research study findings (including interviews with students and staff) several changes have been made to the approach to be rolled out next year. The changes are depicted below in Figure 5 (with differences to Figure 1 shown in ***ITALIC CAPITALS*** for ease of recognition).

Figure 5: Reviewed Transition+ Model of Peer Mentoring: Adapted for Engineering (2014-15)



In conclusion, the Transition+ Model of Peer Mentoring has proved to be successful in helping new students quickly develop a sense of belonging to their Discipline, School of study and University. Whilst not the only solution to the current pressures faced by Higher Education, Peer Mentoring is undoubtedly an effective and efficient tool that Institutions can use to meet students' social and academic needs during transition into Higher Education.

REFERENCES

Anderson, G., & Boud, D. (1996). Extending the role of peer learning in university courses, *Research and Development in Higher Education,* 19. pp 15-19.

Andrews J., & Clark, R. (2011). *Peer Mentoring Works!* Aston University & Higher Education Academy. ISBN. 978 1 85449 417 7**.** [Final Report: HEFCE / Paul Hamlyn. What Works! Final Project Report]. Available from: http://www1.aston.ac.uk/eas/research/groups/eerg/current-projects/

Booth, T., Masterson, M., Potts, P., & Swann, W. (2013). *Policies for diversity in education* (Vol. 2). London. Routledge.

Capstick, S., & Fleming, H., (2002). Peer Assisted Learning in an Undergraduate Hospitality Course: Second Year Students Supporting First Year Students in Group Learning, *Journal of Hospitality, Sport and Tourism Education,* 1. 1. pp 69-75.

Clark, R. (2009). 'The Importance and Challenges of Alignment in Engineering Education', presented at *Total Engineering Education 09 Symposium*, Shanghai, China, 22 - 25 October 2009

Clark R., & Andrews J., (2011) Clark, R. & Andrews, J. (2011). *Bringing Engineering education to Life – An Empirical Approach.* Pr**esented at** Research in Engineering education International Symposium. 3-4th October, Madrid. Available from: http://www1.aston.ac.uk/eas/research/groups/eerg/current-projects/

Clark, R., Andrews, J. & Gorman, P. (2013). "Tackling Transition: The Value of Peer Mentoring". *What Works? Special Edition of the Journal of Widening Participation and Lifelong Learning*. 14. pp. 57-75.

Clark, R. & Andrews, J. (2014). "Relationships, Variety & Synergy: The vital ingredients for scholarship in engineering education?" Accepted for publication in the *European Journal of Engineering Education* on 6th February 2014. Awaiting publication details

Enhrich, L.C., Hansford, B., & Tennent, L., (2004). Formal Mentoring Programs in Education and Other Professions: A Review of the Literature, *Educational Administration Quarterly,* 40. 4. pp. 518-540.

Fayowski, V., & MacMillan, P.D., (2008).'An Evaluation of the Supplemental Instruction programme in a first year calculus course, *International Journal of Mathematical Education in Science Technology,* 39. 7. pp. 843-855.

Forbes-Mewett, H., & Nyland, C. (2013). Funding international student support services: tension and power in the university. *Higher Education*, *65*(2), 181-192.

Fried, J. (2013) Transformative Learning Through Engagement. Virginia. Stylus Publishing

Jones, E. (Ed.). (2010). *Internationalisation and the student voice: Higher education perspectives*. London. Routledge.

Joyce, E.A., Russell, D., & Adams, M., (1997). 'The Changing Nature of Mentoring in Organizations: An Introduction to the Special Issue on Mentoring in Organizations', *Journal of Vocational Behavior,* 51. pp. 1–14.

Kram, K.E., (1983). Phases of the mentor relationship, *Academy of Management Journal,* 26. 4. pp. 608–625.

Kreber, C., (2006). Introduction: The Possibility in Interpreting and Promoting Research Based Teaching. In Kreber, C. (ed), *Exploring Research-Based Teaching: Edited Volume: New Directions for Teaching and Learning,* San Francisco: Jossey Bass. 107. pp. 7-12

Morgan, M. (2013). *Supporting Student Diversity in Higher Education: A Practical Guide*. London. Routledge.

Topping, K.J., (1996). The Effectiveness of Peer Tutoring in Further and Higher Education: A Typology and Review of the Literature, *Higher Education,* 32. pp, 321-345.

Topping, K.J., (2005). Trends in Peer Learning, *Educational Psychology,* 25. 6. pp. 631–645.

Walsh, E. (2010). A model of research group microclimate: environmental and cultural factors affecting the experiences of overseas research students in the UK. *Studies in Higher Education*, *35*(5), 545-560.

Watson, G., Johnson, G.C., & Austin, H., (2004). Exploring Relatedness to Field of Study as an Indicator of Student Retention. *Higher Education Research & Development.* 23. 1. pp. 57-72