Higher education peer mentoring programme to promote student community building using Mobile Device Applications

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***Abstract**: An Italian peer mentoring programme was implemented by second-year undergraduate students (peer mentors) to support first year students (mentees). The scheme aimed to promote student community building and endorse active learning. Twenty mentors and 32 mentees were recruited. Data were extracted through the use of semi-structured questionnaires. For their mentoring, peer mentorsused Mobile Device Applications [MDA]. A qualitative content analysis was employed to evaluate students' perceptions. The findings suggest that the use of MDA improved student academic experience generating a sense of community to facilitate students' learning and social life. Students were satisfied with the adoption of MDA to foster active learning and community building between undergraduate students. Participants adopted MDA for promoting the peer mentoring scheme and planning events for mentees and to stay in touch throughout the peer mentoring programme. However, participants have highlighted criticisms and improvements.*

***Keywords**: peer mentoring; community building; qualitative methodology; Mobile Device Applications; active learning; groupwork; group work*

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Abbreviations used
Mobile Device Applications (MDA)
Peer mentoring (Pm)
Information Communication Technology (ICT)

Introduction

The importance of community building in higher education

Building a sense of community, facilitating connections between students, lecturers and staff represent an important function that the academic system should facilitate. In higher education, the concept of student community has been shown to enhance learning, empower students, and increase engagement in the learning process (Beaudoin, 2012). Feeling a part of the academic community has an impact on students' wellbeing and consequently on their university performance (Wyatt, 2011). Furthermore, a strong sense of community within a department improves the quality of the educational experience and improves staff teaching experience (Basham & Ansburg, 2006). Matthews et al. (2009) highlighted that students who work together outside classes and socialize present higher levels of engagement in learning. In contrast, students less integrated into the academic community have less access to University facilities (Merola, Coelen, & Hofman, 2019).

Previous studies highlight that the development and consolidation of student community building in higher education can enhance learning, encourage student commitment, empowerment, and increase engagement in the learning process. Students who identify as part of a community, actively engaging in activities to support community identity, are deemed as important factors contributing to personal growth, self-awareness, and interpersonal skills (Beaudoin, 2012; Schaber et.al, 2015). Such communities allow for the development of tolerance, social inclusion and the embracing of individual differences (O'Donnell & Tobbell, 2007). Group members can share expectations and norms, having a positive impact on all community members (Bransford, Brown, & Cocking, 2001), ensuring quality and equity in educational opportunities (Rivers & Sanders, 2002; Bussu & Contini, 2020, 2022).

Literature has highlighted the importance of providing a common physical space, where people can interact with each other aiding the development of student communities (Appleby, 2000). Furthermore, involving social leaders, promoting programs, and activities (e.g. peer mentoring) in the academic context can improve reciprocal collaboration

and solidarity among students (Cornelius et al, 2016).

Community building development by peer mentoring

Peer mentoring is a consolidated pedagogical practice that focuses on developing a sense of belonging to a community, enhancing the learning development of both first (mentees) and second-year (peer mentors) (Fox et al, 2010). Peer mentoring programmes have also been adopted to facilitate the transition of students from school to university, to prevent students drop out and support social inclusion and cohesion (Colley, 2002).

Despite this, most studies focus on behaviour effectiveness in preventing drop out and retention supporting (Collings et al, 2014) and the satisfaction of the peer mentor and mentees (Sanchez et al, 2006). Peer mentoring represents one of the most common practices adopted to support first-year students, intending to share useful information about student life and community involvement (Collings et al, 2014; Cornelius et al, 2016).

Generally, the most challenging experiences of academia correspond to the first -year namely concerning issues of self-organization and emotional management (e.g. anxiety, panic disorders, psychological block) and student engagement (Krause & Coates, 2008); or studying with newly experienced freedoms, whilst establishing new relationships (Christie, 2009, 2014). Peer mentoring is a way for students to navigate through the academic system and represents a significant learning opportunity to develop interpersonal skills for both peer mentors and mentees. This practice represents one of the most common and effective strategies adopted (Terrion & Leonard, 2007).

Universities and colleges are increasingly seeking innovative learning approaches to support student performance in addition to traditional classroom learning, especially given the tightening education budgets and rising number of students in many universities (Wyatt, 2011). Adreon and Durocher (2007) have emphasised that the academic system needs to increase educational provisions and support to students with additional educational needs. Other similar experiences in higher education, such as the mentoring circle programme (Darwin & Palmer, 2009) or peer group mentoring (Pololi & Evans, 2015; Skaniakos et al, 2014), have more commonly addressed the aforementioned demands.

Conversely, our case focuses on the student peer mentors who facilitated study groups and peace circles. Through 'peace circle' practices (Boyes Watson & Pranis, 2010) peer mentors create collaborative and dialogical spaces to make decisions, identify mentees' needs, share information, and express personal values and emotions. However, the literature on peer mentoring as a strategy to consolidate community building has significant gaps (Cornelius et al, 2016; Rodger & Tremblay, 2003).

Community building, Peer mentoring and Mobile Device Applications

Internationally during a pandemic (Covid-19), further challenges arise for the students and lecturers to consolidate community building as a result of social distancing. As of the 20th of May 2020, Covid-19 has had a significant impact on education as 68.5% of enrolled learners were not able to physically attend school or university (UNESCO, 2020). Technology and innovation can help to bridge the teaching and learning gap, lack of accessibility to e-learning widens inequalities within the most vulnerable clusters of the population, especially those most disadvantaged contexts (Bussu & Contini, 2020, 2022; WEF, 2020). Given the current climate, lecturers have been required to consider new pedagogical strategies and practices to support students remotely and encourage the active adoption of Information Communications Technology (ICT). Indeed, recent studies have emphasised the importance to implement research on Technology-Enhanced Learning (TEL) and ICT in higher education (Habib & Johannesen, 2020) and new practices to promote peer-to-peer learning (Lang, Craig & Casey, 2017).

Literature on peer mentoring impacts, risks, and benefits is extensive; however, there is a lack of research on the effectiveness of MDA to support mentoring programmes in higher education. Mobile technology can facilitate more innovative educational methods, not only for subject content learning, but also the development of communication, problem-solving, creativity, and other high-level skills among students (Heflin et al, 2017). Despite the proposed advantages of using mobile computing devices, researchers have found mixed results regarding the effectiveness of mobile devices (e.g. Sung et al, 2016; Chen et al, 2020), with very few studies addressing how best to use mobile devices to

maximise effectiveness on learning and teaching. A recent meta-analysis (Sung et al, 2016), demonstrated the positive effects of integrating mobile devices with teaching and learning on students' learning performance. Furthermore, the authors suggested more elaborate instructional design developments are needed to more thoroughly exploit the educational benefits possible by utilizing mobile devices.

Current research highlights the importance of strategies for promoting life skills in students whereby they can exert command over their educational path (Billing, 2007; Wurdinger & Qureshi, 2015). ICT is useful to develop said skills (Chih-Yuan Sun & Rueda, 2012), promoting and consolidating community building (Mylläri et al, 2010; Phelps et al, 2005), and improve student satisfaction (Cheng & Chau, 2016). At present we know technology can support peer learning (Bogdanović et al, 2014; Bussu & Contini, 2020, 2022), collaboration and tutoring activities amongst students (De Smet, Van Keer & Valcke, 2008), as well as co-constructing an environment to facilitate transformative learning whilst encouraging safe spaces for private and academic or career reflection (Silverio & Forsythe, 2018).

In recent years there has been increasing interest from pedagogical researchers in the use of mobile technology to promote active learning and build communities of learners (Kirkwood & Price, 2014; Pachler, Pimmer & Seipold, 2011). Mobile learning (e.g. m-Learning), has been found by Bogdanović et al. (2014) to enhance scholarship and pedagogical material sharing, whilst supporting collaborative learning among students (Hsu & Ching, 2013). Furthermore, the current education system needs teachers who can work collaboratively to design effective and innovative teaching (Laurillard, 2013).

The literature highlighted how MDA techniques are particularly useful for retaining part-time and working university students. They have been found to help overcome the difficulties associated with students who have additional educational needs (e.g. dyslexia) by promoting a more active learning style, which in turn prevents attrition from degree programmes (Fernández-López et al, 2013). Recent work has focused on the factors and strategies to promote social networks among students through MDA, to support identity- and community-building (Kasworm, 2010); particularly by encouraging pro-social behaviour (i.e. altruistically benefitting others) and through the creation and consolidation of learning in groups through collaborative learning

(Hsu & Ching, 2013).

Particular MDA (such as Facebook, WhatsApp, and YouTube) permit not only contextual access to information but also both synchronous and asynchronous communication. However, there is little literature on how MDA (e.g. Facebook and WhatsApp) can help university students to implement peer mentoring programmes. Moreover, research projects that evaluate the impact of MDA on learning processes use ICT as an integral part of the research design (Samaie et al, 2016). Currently, the literature on peer mentoring projects facilitated by MDA is limited and is not focused on community building and students' (mentors and mentees) satisfaction aims, partly due to the literature predominantly focusing on one-to-one relationships.

Despite the importance of community building in higher education, there are significant literature gaps: 1) understand whether peer mentoring can be effective in enhancing the sense of belonging to the university community and consolidating it on the one hand; 2) explore if the MDA can facilitate a peer mentoring activity aimed at this purpose. The main results discussed here pertain to the voluntary use of MDA (Facebook; WhatsApp; YouTube) by peer mentors as educational tools and sources of information; with each platform being used for different purposes within the pedagogical framework. The current paper explores students' perception of MDA impact on a student peer mentoring programme, finalized to support community building and facilitate communication between mentors and mentees. Conclusions are drawn about the potential prospects of the adoption of innovative technology-enhanced learning MDA into models of education to build and consolidate student communities beyond the context of the classroom.

Peer mentoring programme design

Training and experience aims

This peer mentoring programme adopted an innovative peer educational model which consisted of peer mentoring processes and practices (Knight et al, 2016). It fostered co-operation and support, particularly amongst the first and second-year students.

Regarding the aforementioned problematic aspects, our peer mentoring programme goals were to:

1. promote students'community building, in particular, increase the academic and social integration of first-year students at the university through peer mentoring;
2. develop peer mentors' life skills through active learning;
3. explore which tools/ new learning strategies could be most useful to involve students;
4. develop mentees' academic skills through peer mentoring and support their learning of academic content (Bussu & Contini, 2020, 2022).

Peer mentoring pedagogical framework

The pedagogical model of our peer mentoring focused on life skills (WHO, 1997), students developed through active learning (Fox et al, 2010). Specifically, training content was designed to develop both self and collective efficacy (Bandura, 2004) referring to the ability of an individual, or group, to define and achieve specific objectives over time in the face of obstacles and setbacks (Bandura, 1997; 2004). In addition to efficacy is 'self-regulation' which refers to the ability of students to develop autonomy and proactive behaviour and a personal commitment for achieving specific goals, known as 'self-regulated learning' (Zimmerman, 2000). In our pedagogical model, the group dimension is crucial and the peer mentor training focused on strategies and techniques to work and manage this, within groups as well as individual sessions.

In general, peer mentoring programmes have focused on one-to-one relationships (mentor and mentee), in this project the group dimension was crucial to develop peer mentors' skills, and several group activities were planned to involve groups of mentees.

Other similar experiences in higher education, such as the *mentoring circle programme* (Darwin & Palmer, 2009) or *peer group mentoring* (Pololi & Evans, 2015; Skaniakos et al, 2014) have more commonly addressed the academic staff. Conversely, the current paper focuses on student peer mentors who facilitated study groups and peace circles with mentees. Through 'peace circle' practices (Boyes Watson & Pranis,

2010) peer mentors created collaborative and dialogical moments to make decisions, identify mentees'needs, share information, and express personal values and emotions.

Design and implementation

Peer mentoring programme and training aims to develop second-year peer mentors' knowledge and skills to support mentees (first-year students). Peer mentors were able to strengthen their identity through the inclusion of an active learning experience (Cornelius et al, 2016). They helped their colleagues to feel more involved in the student community and to pass exams via a peer-learning model. The lecturer ('trainer'), whose role was to train the peer mentors, considered themself to be a learning facilitator. Lecturers promoted, through active learning methodologies, the active role of peer mentors in the learning process. Well-trained and supervised peer mentors, are more confident and empowered to involve mentees in being active members of a student community (Jung & Suzuki, 2015).

The duration of the peer mentoring was 11 months. All activities were designed and implemented by the students, in-line with the organisational and interpersonal training needs of first-year undergraduates (mentees). Peer mentors decided to create seven sub-groups of two to three students, corresponding to the mandatory first-year curriculum.

The training lasted for two months, with students beginning by interviewing each other to assess their life skills, to evaluate strengths and areas requiring improvement. All pedagogic content was prepared by the lecturer and shared with the peer mentor group through Moodle (Bogdanović et al, 2014) (see appendix 1). Training is thought of as a stage whereby students are learning, under trainer supervision, and with mutual group support. After the training phase (10 sessions), the trainer continued to provide supervision every fortnight. During supervision sessions, new activities were suggested by the peer mentors and were discussed along with approaches for implementing them with the mentees. During the training implementation, the peer mentors explored topics that emerged from both the course content and their thoughts. During the experience, peer mentors shared information about 'university life', which included values and behavioural examples

of the university in context. They also shared personal experiences relating to their social backgrounds and life experiences with the new first-year cohort.

During the training and peer mentoring activities, mentees interacted with the peer mentors in group sessions. Peer mentors also planned several group activities to involve mentees, such as study groups, peace circles, and thematic clubs based on different areas of the course they were undertaking, to support learning. It is important to note that the plan of activities aimed at helping mentees was done so in a fortnightly peer mentor meeting facilitated by the trainer (see appendix 1).

Research questions & Methodology

Aim & research questions

This study aims to understand if an undergraduate peer mentoring scheme using MDA can support community building and student sense of belonging. Specifically, our research questions are:

RQ1 What is the students' (peer mentors & mentees) general satisfaction with the peer mentoring scheme?
RQ2 What is the students' general satisfaction with peer mentoring using MDA?
RQ3 How students have used MDA to facilitate their peer mentoring project?
RQ4 What advantages and disadvantages peer mentors have observed using MDA to facilitate their peer mentoring project?
RQ5 What improvements can be implemented?

Research context

The study was conducted within the first and second-year of the communication sciences bachelor's degree programme at the University of Sassari, Italy. The University of Sassari is an Italian medium-sized state university of over 13,000 students. Research, discovery, and promotion of knowledge are core activities of the university, which offers a wide range of undergraduate and graduate programmes (Bussu et al, 2019).

Higher education in Italy is rooted in a traditional academic style (e.g. didactic teaching) that does not usually involve students in active roles, and placements are not compulsory in all degrees. The Italian academic system has poor retention rates (Bussu et al, 2019), and student drop out is amongst the highest in Europe (Schnepf, 2015). It is crucial to develop novel teaching strategies and methodologies, that actively engage students in the learning process and promote student communities.

Specifically, the degree in communication sciences has a high percentage of first year students who drop out and low retention in the second and third years. The board has discussed the risk factors, causes and possible strategies to be adopted; for example, at the start of university students lack academic management skills and a robust study methodology; the high number of students in classes and the barriers to facilitating active involvement during the traditional academic lesson which focuses on the lecturer and not the student. Furthermore, there was a lack of activities to develop the interpersonal skills of students.

Participants

Trainers

A lecturer of social psychology promoted the programme and trained the peer mentors. The lecturer had previous training experience in strategies to manage group dynamics and to facilitate active learning processes. One third-year undergraduate student supported the lecturer and volunteered to observe and monitor the experience and group dynamics, following the lecturer's supervision and guidance.

Peer mentors

Twenty second-year undergraduate students (full-time and part-time) (12 women and 8 men) were trained as peer mentors.

The peer mentoring scheme has been advertised by the University and students decided to participate voluntarily. They completed a form about their motivation to become a peer mentor and their formative expectations. A motivational group interview was also conducted on the first day that the trainer met the students face to face (Söderlund et al, 2011).

All 20 students, belonging to a cohort of 100 first-year students, were genuinely motivated and interested to be trained as peer mentors and they all committed to attending the training programme.

The group's ages ranged from 20 to 36 years of age. One of the students was diagnosed with Asperger's Syndrome, and another was a female with paraplegia. All of the peer mentors completed the peer mentoring scheme.

Peer mentors who engaged and completed the project and the peer mentoring activities were given five university credits (Bussu et al, 2018)).

Mentees

Students taking part in the learning activities were 50 first-year undergraduate students, ranging from 19-55 years of age (including full-time, part-time, and mature students). All first-year undergraduates completed the experience, with 32 students completing our semi-structured questionnaires (27 full-time and 5 part-time).

All first-year students were involved in the activities planned for them by the peer mentors. The peer mentoring scheme has not planned any specific requirement for participating as a mentee. Students' participation in the activities (individual peer mentoring, group peer mentoring, study groups, social events, etc.) was voluntary.

Methods and procedures

Data collection

The variety of data collected facilitated a substantial triangulation (Flick, 1992) and enabled the cross-checking of results obtained from different perspectives with different methods and resources. Data triangulation took place between the following:

1. *Peer mentors' semi-structured* anonymous *and self-administered questionnaire* (n=20) The questionnaire focused on student personal development and training needs. The questionnaire provided a scale on cognitive (e.g. critical and creative thinking; decision making and problem solving), emotional (e.g. empathy and emotional self-management), and interpersonal life skills (e.g. effective communication and interpersonal skills) (WHO, 1997;

1999). Specifically, we explored their self-awareness about their life skills and what life skills they would like to develop through peer mentoring (see appendix 3).

2. A mentees' semi-structured anonymous questionnaire was self-administered (n=32) on peer mentoring satisfaction and needs requirements. The questionnaire also focused on the evaluation of specific activities implemented by the peer mentors (e.g. study groups, pacemaking circles, public events, etc.) and general feedback on their peer mentoring experience. The data from both questionnaires was analysed adopting a mixed-methods content analysis (Johnson & Onwuegbuzie, 2004). The questionnaires required 20/30 minutes to complete and the administration was made in collaboration with the peer mentors, who administered and collected the questionnaires. In accordance with Balderas et al. (2018), qualitative feedback was anonymous to encourage more candid responses (see appendix 3).
3. *Self-report* data. The peer mentors provided a final self-report on their personal experience focused on general student satisfaction, learning development, peer mentoring scheme strengths and weaknesses, and innovative and positive practices and improvements.
4. *Spontaneous feedback and comments* by students through MDA (Facebook and WhatsApp) over 18-months. We analysed the feedback from the interactions on Facebook verbatim, to evaluate the impact of the experience on the individual student and wider community.

The data relevant to the research questions were analysed in this manuscript. Furthermore, data demonstrated how the use of MDA enables peer mentors to immediately share their experiences. Previous research has shown, that Facebook users' comments can be gathered to collate opinions and satisfaction (Reddick et al, 2017).

Data analysis

A qualitative research approach was used which facilitated the gathering of student opinions and needs and to implement a project coherent with students' training needs (Jung & Suzuki 2015; Orland Barak & Rachamim, 2009). Qualitative data were analysed using ATLAS.ti 7.0 (Murh, 2004) software, according to content analysis techniques

(Neuendorf, 2017). This method of inquiry is based on an approach to describe, understand, or interpret daily life experiences and structures based on field observations. A rigorous approach to coding and analysis was conducted by two researchers, which included independent data checking of emerging themes, and minimal loss of valuable information (Neuendorf, 2017).

In order to examine the main findings, we show the most significant codes that emerged from our analysis (by frequencies table and network), that are associated with a greater number of conceptually similar quotations by participants namely the frequency of a given code within the students' semi-structured anonymous questionnaires. The interpretation of the process was iterative, progressive, and reflexive, carried out by reflecting back on various conceptual issues to unveil new aspects of the data. Data categories and themes emerged directly from the content of the reflections by their structure as described above. We respected the criteria for qualitative research according to Seale's requirements (1999) based on Lincoln and Guba'reflections (1985) (see appendix 2). Validation against his criteria was undertaken both during and after the analysis process in co-construction with the participants.

Findings

The research results presented relate to the main research questions aimed at exploring the students' satisfaction of the peer mentoring scheme and experience (RQ1) (6.1; 6.2) and community building (6.3); peer mentoring using MDA (RQ2) (and how peer mentors have adopted MDA to implement peer mentoring (RQ3) and which advantages and disadvantages they have noticed (RQ4) (6.4). Finally, student improvements are explored and discussed (RQ5) (6.5).

Perception and satisfaction of peer mentors

Peer mentors have expressed their satisfaction with the peer mentoring programme and supervision (Tab 1, *peer mentor training satisfaction* code). The peer mentors have reinforced the importance of the programme in respect of their individual learning and development, allowing them to develop life skills (Table 1, *peer mentor skills development* code; Tab 2, Q1).

Furthermore, it allowed students to be self-aware of their competence to create and implement formative programmes to train and orientate other students. Students highlighted the innovativeness of peer mentoring (Tab 1, *peer mentoring is innovative and creative* code; Tab 2, Q2). The importance of developing knowledge in active methodologies and restorative practices (i.e peace circles) can improve group communication (such as *peace circles* code, Tab 1)

The group dynamic was both a process and outcome of the training. The peer mentor group shared activities needed to achieve the objectives of internal training for peer mentors and were supportive of the mentees. However, students identified some critical aspects (Tab 1, code *criticism and problem management*; Tab 2, Q3) linked to peer mentors' activities management (such as timetable management, lectures, meetings overlapping, and tasks distribution in the peer mentors group).

Questionnaire results showed that student participation was high in planning activities, for example implementing a public event to promote their peer mentoring to support first-year students (see code *public event,* Tab 1). In addition, peer mentors recognised the efficacy to plan study groups, clubs, and meetings according to mentees' educational and personal needs.

Receiving positive feedback from the mentees (Tab 1, code *peer mentoring: positive feedback*) has reinforced peer mentors' effectiveness and personal satisfaction. The peer mentoring programme promoted an active role for the peer mentors supporting mentees. It also involved students who have fewer opportunities to play an active role in the academic community (such as part-time, mature, and students with disabilities) and/or who have experienced personal difficulties during the university course. Students participated actively in their education by sharing and proposing learning strategies. The experience demonstrated the importance of involving students in a more dynamic role, considering themselves active players within the university community (Tab 2, Q4). Finally, the experience generated a chain reaction ('domino effect') of active engagement by students who reported that their involvement in the peer mentoring programme created a critical group that led to increased participation in the political and social life of the university, well beyond the project itself. As active learners and agents of the process, students proposed changes to the training procedures.

Table 1
Codes emerged from Hermeneutic Units

	Frequency
Peer mentoring training satisfaction	17 quotations
Peer mentor skills development	31 quotations
Peer mentoring is innovative and creative	9 quotations
Criticism and problem management	15 quotations
Public event	8 quotations
Peer mentoring: positive feedback	8 quotations
Community building	21 quotations
Mentees satisfaction	8 quotations
Peace circles	6 quotations
Criticism and problems	15 quotations
Pee mentors' strategies to improve peer mentoring	14 quotations

Table 2
Perception and satisfaction of peer mentors

	Quotations
2	(Q1) The experience has made me more aware and conscious of my ability. I hope that the first year students next year can have the opportunities to be trained as peer mentors (Peer mentor 2, student full -time)
3	(Q2) The experience on the whole was beautiful. They created a small revolution within the Department, making us active students/in the institution's life, making us grow in awareness so that we can realise what we would like to see changed. It favoured social relations 'interclass' and has also enabled us to be teachers (Peer mentor 3, student full -time)
1	(Q3) The criticisms concerned mainly the handling of requests from first year students who participated or rather the inability to meet all of them, but of course this can be attributed to our inexperience. Personally, I believe this experience has been extremely formative and has taught me to address a public talk and not least to keep my embarrassment at bay (Peer mentor 1, student with paraplegia)
2	(Q4) I decided to give myself the opportunity (...) to get to know fellow academics as a non-attending student. With hindsight I'm sure you've made the best university experience of my life after all my academic failures of the last 5 years (Peer mentor 2, student part-time).

Perception and satisfaction of mentees

Mentees enthusiastically participated in the activities set up by peer mentors. The results of the questionnaires show that students felt to be supported in their learning experience by peer mentors and at the same time included within the wider student community (Tab 1, *mentee satisfaction*). Satisfaction was highlighted among full-time and part-time students, the latter group renowned for finding it difficult to participate actively with other members of their study cohort (Tab 3, Q5 and Q6). First-year students have in particular appreciated the experience of collegiality and they have considered mentees and mentors together a 'big family' (Q5). The mentees appreciated the availability and commitment of the peer mentors, as well as the empathy created by the peer mentors from having lived similar experiences the year before. Moreover, they appreciated study groups facilitated by students and their ability to create an informal and collaborative atmosphere (Tab 3, Q7).

Table 3
Perception and satisfaction of mentees

	Quotations
1	(Q5) A big family. Relationships which develop between first years and second years are of participation and collaboration in the development of a learning method and a better scenario' (Mentee 1, student full -time).
2	(Q6) Peer mentoring has been very useful. Everything that we had not understood was explained in a simple, understandable and everyday way by others who had faced the same difficulties. (Mentee 2, student full-time).
3	(Q7) I had a lot of fun during the groups facilitated by peer mentors. They were very good because knowing how to manage groups is not easy. They gave their best. It was a really useful support to pass the exams, as well as an opportunity for shared study (Mentee 3, student full -time)

Community building

For peer mentors and mentees one of the most important concepts that emerged was to support *community building* (code *community building*, Table 1, figure 1, Q8). Peer mentors and mentees acknowledged that one of the most important objec-

tives achieved by the project was the ability to create a supportive and sharing network between first and second-year students, to consolidate the relationship between teachers and students, to reinforce the identity of the student community, enhancing students in their diversity and making them feel active members.

The peer mentoring programme promoted the practice of the idea of Equal Educational Opportunity (Schütz et al, 2008) emphasised by the inclusion of two peer mentors and first-year students who required special educational needs. In this regard, we have previous experiences with peer mentoring programmes to facilitate students with Asperger syndrome transition (see i.e Siew et al, 2017), but not vice-versa.

They facilitated formative activities to first-year students with the same measurable impact as the other peer mentors. This was very symbolic and formative to the student community (Tab 4, Q8).

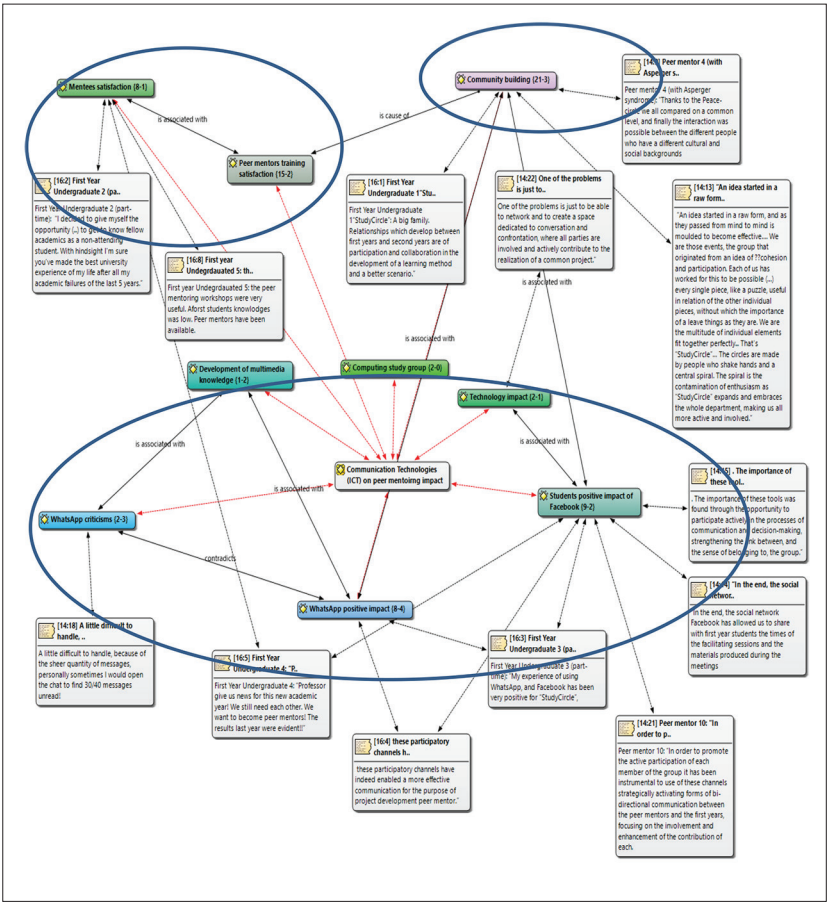
Peer mentors have learned to express their emotions and to have trust in each other (Tab 4, Q9) and facilitate peace circle (such as *peace circles* code, Tab 1). Furthermore, peace circles are innovative practice that usually are not covered in peer mentoring training .

Table 4
Community building

	Quotations
5	(Q8) Participation in this programme was a fantastic experience from my point of view. One reason is that in the course of several meetings it not only helped me to learn more about my other colleagues and I accept them for who they are, with their strengths and weaknesses, but it also helped me to know myself better and accept myself for who I am. (Peer mentor 5, student full - time with Asperger's syndrome)
6	(Q9) (…)We all compared on a common level, and finally the interaction was possible between different people who have different cultural and social background. (…) We have learned to externalise our difficulties, to hear the difficulties of our colleagues and we learned to trust each other's aid (Peer mentor 6 , student full -time)
7	(Q10) An idea started in a raw form, and as they passed from mind to mind is moulded to become effective…. We are those events, the group that

Figure 1

Network 'Information and Communications Technology (ICT) on peer mentoring impact'



Note: This chart is included here for references purposes only. A more legible version will be found as a separate file with the online version of the article.

> originated from an idea of cohesion and participation. Each of us has worked for this to be possible (…) every single piece, like a puzzle, useful in relation to the other individual pieces. We are the multitude of individual elements perfectly fitted together (Peer mentor 7, student full -time)

To consolidate the peer mentor group, students decided to design and share a symbolic logo. This was a significant moment in their training to create a logo that captured their united vision of the project, appearing to solidify the group around a collective vision. For the students, this logo represented the power of the collective to expand outwards and to create an ever-expanding process. This is a powerful metaphor for building communities that empower and embrace the diversity of people who make up a modern university (Tab 4, Q10).

Students' perception of MDA impact on peer mentoring

From the analysis, it emerged that ICT is important, specifically MDA. Students have emphasised the effectiveness of planning for example *computing study group*s with mentees and the importance to *develop multimedia knowledge* to implement peer mentoring activities (See figure 1).

Facebook: involving students and promoting events

Peer mentors used Facebook to inform and involve mentees, promote events, and elicit feedback. Students highlighted the *positive impact of Facebook* on the project (see figure 1). Sharing teaching materials through Facebook enabled members of the Facebook group to have access to it simultaneously. Enabling material to be shared with students who were unable to attend particular sessions arranged by the peer mentors, in turn saving time (Table 5, Q11 and Q12).

Facebook facilitated the sharing of an experience and has generated interest in the peer mentoring programme beyond the participants. People who were not directly involved have requested to be part of the group (Table 5, Q13). Students shared spontaneous feedback through MDA (Facebook and WhatsApp) on experiences in the roles they were taking and asked for continuity for the next academic year.

WhatsApp: communicating outside lecture times and instant information amongst peer mentors

Peer mentors created a WhatsApp group to communicate and share

Table 5
Students' perception of MDA impact on peer mentoring

	Quotations
4	(Q11) My experience of using WhatsApp, and Facebook has been very positive. These participatory channels have indeed enabled a more effective communication for the purpose of developing the peer mentor programme (Mentee 4, student part-time)
8	(Q12) The social network Facebook has allowed us to share with first year students the times of the facilitating sessions and the materials produced during the meetings. The importance of these tools was found through the opportunity to participate actively in the processes of communication and decision-making, strengthening the link between, and the sense of belonging to, the group (Peer mentor 8, student full -time 8)
5	(Q13) Professor give us news for this new academic year! We still need each other. We want to become peer mentors! The results last year were evident!! (Mentee 5, student full time).
9	(Q14) Thanks to using WhatsApp, the instant messaging app for smartphones, we had the opportunity to question and update us in real time, about the organisation and the management of facilities, thematic clubs and of the Round Table (Peer mentor 9, student full -time)
9	(Q15) As for the exchange of communications and updates among the peer mentors, the most simple tool and greatest help was the chat created on WhatsApp (Peer mentor 9, student full -time)
10	(Q16) In order to promote the active participation of each member of the group it has been instrumental to use these channels strategically by activating forms of bi-directional communication between the peer mentors and the mentees, focusing on the involvement and enhancement of the contribution of each. One of the problems is just to be able to network and to create a space dedicated to conversation and confrontation, where all parties are involved and actively contribute to the realization of a common programme. (Peer mentor 10, student full -time).
9	(Q17) A little difficult to handle, because of the sheer quantity of messages, personally sometimes. I would open the chat to find 30/40 messages unread! But I also had the chance to write at any time and receive a response immediately from my colleagues. I do not recall one question asked by one of my colleagues which was not given an answer: it was undoubtedly the best means of communication (Peer mentor 9, student full -time)

internal information to the group (peer mentors, trainer, and tutor) such as dates, activities, and decisions taken in the sub-groups relating to teaching, asking for feedback, or explanations of these components. They also used WhatsApp to organise their formative activities such as study groups and thematic clubs. Furthermore, they planned a round table exercise inviting students, teachers, and members of the local community to promote the programme (Table 5, Q14).

Students have highlighted the *positive impact of WhatsApp* to facilitate peers mentors collaboration (see figure 1).

The WhatsApp group was important not only to share information but in particular to consolidate the group of peer mentors in training, maintaining flexible contact beyond the time constraints of lectures. It was also useful to stay in touch with the lecturer (to ask for information and supervision) and for feedback (figure 1).

It was also used to inform the lecturer and the other peer mentors in the group of the actions taken and to share choices. The students decided to use it in informal situations to share motivational phrases, greetings, photos, events or just to stay in touch. It was also evident that this method of communication was useful to allow constant, but non-intrusive observation of the dynamics within the group (Tab 5, Q15).

Furthermore, it was useful for the trainer to be a member of the Facebook and WhatsApp groups, to supervise peer mentors in their role, to observe student dynamics, to support students to manage issues related to peer mentoring.

YouTube: promoting peer mentoring programme

YouTube was selected to disseminate videos produced by peer mentors to promote activities carried out within the programme. The impact observed was that it prevented intra-group conflict and improved students' loyalty towards a common goal, by ensuring all members had access to the same information, resources, and tools.

The students highlighted the usefulness of being able to adopt technology as positive and rapid communication tools, contributing to the cohesion and identity of the peer mentors group, but facilitating an active dialogue with the first-year students (Tab 5, Q16). MDA like Facebook and WhatsApp, if properly used, can facilitate teaching activities for free when used correctly. MDA allow for considerable time savings in transmitting relevant information among group members to

share positive feedback and suggestions; factors that have influenced the cohesion of the peer mentor group and community building.

On the other hand, the use of MDA also received some criticism from the students. For example, the use of WhatsApp in some cases has been perceived as impractical and tiring to use. Furthermore, whilst it can consolidate the group, it can also present a risk of excluding members who do not constantly use MDA or who feel forced to engage with them so as not to lose information (Q17) (see figure 1, code *WhatApp criticisms*).

Student improvements

As can be seen in Table 1 ('peer mentors strategies to improve Peer Mentoring') peer mentors, in particular, suggested several improvements:

1. Peer mentors think that this programme needs to be considered more than 5 credits for each peer mentor because it requires a lot of time to plan and implement activities during one full academic year or directly transform this experience like part of the placement.
2. Students would like to stabilise this experience at the University and offer all undergraduate second year students the same opportunity to become peer mentors and to have an office/room dedicated to planning and implementing mentoring activities.
3. They would like to experiment with new strategies to involve students who do not have internet access, continuing to use the MDA as support and the only tool to disseminate and promote peer mentoring.
4. Students would like to have an academic timetable that can work better with mentees to have more accessibility to work with mentees.

Discussion

Peer mentors and mentees' perception and satisfaction

Data from the interviews indicate that the peer mentoring programme

developed a sense of community, in which mentees actively engaged with the peer mentors. Interestingly, peer mentors felt they developed from the role themselves allowing them to develop their skills while mentoring others. MDA was found to be particularly important to involve students and facilitate communication outside of lectures.

However, MDA run the risk of excluding individuals who don't have the means or desire to interact with the technology, despite a generally positive view of the scheme. This is an important criticism that lecturers/trainers need to take into consideration on planning peer mentoring programmes adopting MDA/ICT; especially in consideration of the actual global pandemic that has increased the risk of social discriminations and education inequalities (UNESCO, 2020).

Community building

The role of peer mentor was key to consolidating the group identity and self-efficacy, through the management of active methodologies and restorative practices (i.e. peace circles). Restorative practices (see Boyes Watson & Pranis, 2010) are adopted in educative contexts (i.e schools and Universities) to resolve conflict among people and to prevent student misconduct (i.e bullying) towards the promotion of the key life skills and the building of inclusive and caring communities. Peer mentors were trained to conduct peace circles, providing them as a means to promote a community-centred approach, fostering a culture of peace and student welfare.

Moreover, in a peer mentor programme such as ours, activities of the peer mentors were programmed and shared in groups and/or micro-groups (3 peer mentors for each thematic group). Activities were facilitated by the trainer, allowing management of group dynamics and supporting members to use conflict situations as a learning opportunity to develop personal skills (e.g. effective communication, active listening, and tolerance). In this regard, the trainer acted as a 'learning facilitator', having a positive impact on the overall learning experience and community building (Ellerani & Gentile, 2013; Reeves et al, 2018).

'Communication' and 'sharing' among all members of the student community: peer mentors, mentees, and teachers were determining factors for the successful implementation of our peer mentoring programme. Peer mentors decided for this scope to adopt MDA to share

information amongst peer mentors, between peer mentors and first-year students interested in the peer mentoring activities, and also to maintain social relationships outside of the academic context.

Finally, to promote a student community, students need to be actively involved. Peer mentoring is a useful pedagogical practice, but at the same time, the role of the trainer is important in accompanying their learning process and supervising their activities for the mentees. In our pedagogical model, the group dimension is crucial, and the peer mentor training is focused on strategies and techniques. MDA are useful tools for developing a peer mentoring programme, focused on student cohesion (Gikas & Grant, 2013; So, 2016) and to develop the skills of peer mentors.

MDA in peer mentoring

Students have emphasised the usefulness of adopting MDA to implement peer mentoring. The peer mentors independently decided to adopt MDA, to implement the programme and to facilitate their internal communication. The finding supports the potential feasibility of MDA to maintain social relationships among students outside of an academic context (Augustsson, 2010). The effectiveness and satisfaction of students, both peer mentors and mentees, were achieved through the fast, free, and instant communication mediated by technology-enhanced learning (Risquez & Sanchez-Garcia, 2012).

Peer mentors felt they needed tools to have straightforward contact with mentees in real-time without it being invasive, hence adopting Facebook and Whatsapp. Most peer mentors used MDA to share activities whilst also engaging and motivating students, by sharing useful learning materials and recording feedback. Our findings complement literature highlighting the benefits of MDA to communicate (Cheng & Chau, 2016; Kittinger et al, 2012), train (Kirkwood & Price, 2014), and transmit pedagogical content among students (Cheng & Chau, 2016). Findings fit with research focusing on the impact of MDA to promote community building as they allow communication, instantaneously with ease and without costs (Gunawardena et al, 2009) and can support higher education learning (So, 2016).

According to previous research (Frohberg et al, 2009; Pachler et al, 2011), our findings have demonstrated the usefulness of social networks

to share information and pedagogical material. In effect, peer mentors have shared the prepared materials via Facebook, in turn facilitating discussions and allowing individuals to make educational requests. Specifically, WhatsApp was useful to consolidate the peer mentor group, maintaining flexible contact with the trainer, sharing motivational phrases, greetings, photos, events or just to stay in touch (Samaie et al, 2016); in turn positively influencing the group's identity (Top, 2011).

However, general satisfaction was high, and students have continued to use WhatsApp even after the end of the programme, demonstrating the volition to stay in touch. Moreover, if on one side MDA can help to consolidate group identity (Mylläri et al, 2010); there is the potential on the other side, the possibility that MDA presents a risk by facilitating the exclusion of members who do not constantly use MDA (Kittinger, 2012).

Advantages and disadvantages of MDA in community building

In the previous sections 6.4, 7.3 and 7.4 we have explored the effectiveness of MDA on delivering the peer mentoring scheme and the most relevant advantages and disadvantages that students have noticed in adopting them for the promotion of community building.

In this section, we discuss the advantages and disadvantages of MDA. We also provide some recommendations for adopting them in group activities taking into consideration the two-sided potential of MDA: consolidate *community building* and 'vice-versa' *risk and /or negative impact on group identity* and *equality*.

Advantages

1. According to our research findings and previous literature (see Bogdanović et al, 2014; Hsu & Ching, 2013) Mobile Devices (e.g Facebook and WhatApp) are useful for sharing pedagogical/ informative material and promoting events and activities, disseminating 'peer mentoring culture' across the University and having access to it simultaneously, whilst supporting collaborative learning among students and their relationships and building communities of learners (Kirkwood & Price, 2014; Pachler et al, 2011).
2. MDAs allow for considerable time-saving in transmitting relevant information among group members to share positive feedback

and suggestions and can support learners' effectiveness and performance (Sung et al, 2016).

3. MDA and ICT within teaching and learning can have a positive effect on students' learning performance (Sung et al, 2016). According to a recent systematic review (Crompton & Burke, 2018) involving 72 research studies on mobile learning's impact on student achievement and methodologies adopted, the majority of studies reported positive outcomes.
4. Mobile devices can positively influence the cohesion of the peer mentor group and community building (Bose et al, 2020) and consolidate the relationship among peer mentors and mentees (community building), while also useful in making students feel part of an academic community.
5. MDA and ICT can facilitate teaching activities and formative exchange for free when used correctly (Bose et al, 2020). In this regard, the Covid-19 pandemic has highlighted the importance to adopt ICT and designing effective and innovative teaching for online learning environments when we cannot meet face to face (Laurillard, 2013).
6. MDA can also give easy access to learning and teaching experiences for people with physical and learning disabilities and/or illnesses (Bussu et al, 2018; Sánchez-Serrano et al, 2020)
7. Furthermore learners and practitioners involved in professional development, usually appreciate training and tools variety (Mishra et al, 2020).
8. Finally students have continued to use MDA to stay in touch during and after the academic year and to plan community-based events (Bose et al, 2020).

Disadvantages

1. MDAs run the risk of excluding people who don't have the means or desire to interact with technology or who feel forced to engage with them so as not to lose information, or who have less material, cultural and cognitive resources required to make good use of ICT (Digital inequality) (González-Betancor et al, 2021; UNESCO, 2020). This is an important criticism that professionals need to take into consideration when planning learning programmes like peer mentoring adopting ICT. According to UNESCO (2020), the actual

global pandemic has increased social discrimination and education inequalities. Trainers and group facilitators therefore need to be sure that the most important information will be shared through other channels (e.g email; papers, etc.).

2. MDA in some cases has been perceived as impractical and tiring to use. In this regard, we need to share in the group some limits/ boundaries for using MDA, taking into consideration 'time-consuming' and the potential for distraction among peers.
3. Furthermore trainers and professionals need to be conscious of the risk linked to communicating by MDA and how easily messages can be misinterpreted in the absence of non-verbal and para-verbal communication, which consequentially can generate conflicts in the peer group.
4. Concerning mobile application devices, we should be aware that increasing the benefits of information disclosure, via the app, may have the counterintuitive effect of risk self-perception and concern regarding confidentiality and data security (Dennen & Hao, 2014; Wallace, Clark, & White, 2012).

According to our programme and previous studies (Sánchez-Serrano et al, 2020; Bussu et al, 2016; 2018), we consider the MDA useful tools for developing community-building across disciplines and practice settings and not exclusively in education. However, it is important to take into consideration the potential risks, previously highlighted, that professionals eventually need to face and which strategies would be useful to implement for mitigating the risks.

Limitations

As with all new initiatives, this study presents some limitations. One factor to consider when implementing our peer mentoring project is the role of the teacher, which is crucial to facilitating and enabling students as mentors. The trainer role was useful to foster an ethical climate of trust; exploring values, needs, and identities, using active teaching methods, and finally, the co-construction of a space for dialogue that facilitated transformative learning (Haber-Curran & Tillapaugh, 2015). However, the trainer role represents at the same time a limitation because

the impact of this peer mentoring programme has not been explored with another trainer, who may have a different communication style or pedagogical background. This programme with the same trainer has been implemented in other international academic settings, the findings of which are reported elsewhere (Bussu et al., 2016, 2020). At the moment this aspect could be a limitation to the replicability of this programme until replicated with other trainers. Another limitation can be considered the sample size involved (20 peer mentors and 32 mentees who responded to questionnaires). Future studies need to provide extended samples, from a variety of demographic backgrounds. Additionally, there were some mentees with 'special educational needs', while not the focus of this paper future research should examine how such programmes can aid these populations. Finally, although over 60% of peer mentors involved in this programme graduated on time, the long-term impact on the peer mentors' and mentees' careers has not been monitored. Future research should implement a longitudinal study to evaluate the academic and career impact on students after completion for both mentors and mentees.

Conclusion and implications

The results highlighted student satisfaction (peer mentors and mentees) following active involvement in a peer mentoring programme focused on the group dimension. Peer mentors feel they developed cognitive, emotional, and socio-relational skills through the project. Peer mentors were given full autonomy to develop functions and activities, encouraging them to take responsibility to stimulate their ideation and participation and consequently to involve the academic community (Bussu et al, 2018). At the same time, the mentees appreciated peer mentoring facilitation through a variety of activities that the peer mentors planned for them to involve them in a student community. Students highlighted the importance of using MDA to implement the peer mentoring programme effectively and especially to promote community building.

An interesting systematic review implemented by Cromption and Burke (2018) has identified an important gap in the research, in particular, that pedagogical experiences adopting mobile learning initiatives are explored just 20% of the time. We do not know exactly how mobile learning/MDA are being used and we need to explore this

field further to understand the best pedagogical practices and their real impact on people and learning.

The peer mentoring programme facilitated a change in teaching methodology which has subsequently been adopted by the university. The project was therefore seen as a cohesive experience that increased a sense of self-responsibility in learning from colleagues surpassing the formality of lectures. At the same time, it assisted both full-time and part-time first-year undergraduates in a cooperative and relaxed environment. The adoption of MDA facilitated the sharing of information inside and outside the group, during and after the academic year. Students have continued to use MDA to stay in touch and disseminate various initiatives. Using MDA in this manner was a result that had not been anticipated at the beginning of the project.

It is recommended that universities adopt peer mentoring programmes, adopting MDA and further methods, like coaching, restorative practices, etc to focus on a student-centred approach to learning (Naciri et al, 2020) and create true partnerships between institutional providers and student-consumers. Recent work, during the Covid-19 pandemic, has highlighted the need for instruction, content, motivation, relationships and mental health which are key aspects that the educator or mentor must account for in online environments (Martin, 2020). Through the use of MDA, educators improve students' education experiences, with our findings showing how our paradigm could help generate a sense of community to facilitate students learning and social life. For educators the use of MDA allows for a new manner of reflective practices, by capturing interactions with their students and their teaching practices, allowing for introspection and personal development (Aubusson et al, 2016). However, there is a need to be mindful that such innovative technology-enhanced practice must provide valuable learning, reliable ICT infrastructure (Huang et al, 2020) whilst being cost-effective in the face of higher education budgetary constraints (Silverio, 2016). In effect, this peer mentoring programme implemented by a lecturer trained on peer mentoring and restorative practices does not require a specific budget. The results can substantially contribute to the ongoing debate on the use of MDA to implement peer mentoring projects in higher education.

According to previous studies (Cromption and Burke; 2018; Schrum, 2015; Ferriter, 2013), Innovation technology is only a tool and it is

what we do with that technology that makes the difference. In our experience, to promote 'community building' it is important to design and facilitate experiences useful for facilitating groupwork and sharing goals. Technology, including MDA, can facilitate the learning process and develop effective communication among group members, as long as it is well applied and the participants can negotiate how to use it.

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APPENDIX 1	*Contents of the training*
Peer mentoring training contents	**Training Hours: 25** • Motivational interviewing group; • The psychological contract in the classroom; • Sharing the educational objectives and facilitators roles; • Learning by doing. How to manage the team? Active teaching methodologies for learning how to manage study groups (as organize them, what methods to adopt, how to relate with the teacher reference of teaching, how to promote the activity etc.). • Life skills in practice • Returning in the courtroom on the first study groups activated. What to improve? Effective communication: Exercise couples and groups; Simulate the students in plenary statements of the first study groups.
	Activities implemented by peer mentors
Creation of facilitators subgroup	7 subgroups (1 for each first year module) 1. Group of Constitutional right 2. Group of Computer science 3. Group of English 4. Group of Philosophy of Language 5. Group of sociology 6. Group of sociology of communication 7. Group of Social psychology **Meeting facilitated by each group with first year students 3/4**
Peace circles	**Peace circle: 13** *Talking circle*: **8** (we used to share perspectives/opinions on specific issue and we used to:1)to explore and to share the expectations on the training for the facilitators (1 day of the training- **1 circle**) 2)to stimulate a decision making process on the roles of the facilitators, the activities to implement with de freshman students (**2 circles**) 3)to share the logo of study circle (**1 circle**) 4) to stimulate perceptions on the degree on the positive and negative effects in other classes of the degree and in the master (**4 circles**).*Community-Building Circles*: To support effective collection action and mutual responsibility on the "StudyCircle" group (**1 circle**). *Conflict circle*: (To manage conflict for the relational problems in the group and for the individual responsibility in study circle (**2 circles**) *Celebration or Honoring Circles*: To celebrate the learning process of the facilitator and their results (**2 circles**)
Public Event	**1 conference**
MDA	1 Facebook account, 1 what's group for peer mentors and 1 video on you tube

APPENDIX 2 Qualitative research criteria

- **Credibility** (internal validity): public workshop was organized by peer mentors to develop a discussion among students about the academic impact of the project and on the student's interpretation of the results/outcome.
- **Transferability** (external validity): A description of the peer mentoring training and research design and procedures was provided to the participants (first year and peer mentors) and in this paper too.
- **Confirmability:** The research team has shared the research project and procedures externally (external confirmability). The codification and data analysis were shared in the research
- **Authenticity**: all participants could develop understanding of peer mentoring, peer mentors and mentees have developed their personal skills and knowledge of research.
- **Dependability**: all research project phases were documented, codified, analysed and interpreted.

Seale's qualitative research criteria requirements (1999)

Appendix 3 Questionnaire dimensions

Peer mentors	Mentees
1.Sociodemographic characteristics	1.Sociodemographic characteristics
2. Life skills scales	2. Mentee's satisfaction on mentoring activities
3. Students' satisfactions on peer mentor role	3. Peer mentoring strengths and weaknesses
4. Peer mentoring strengths and weaknesses	4. Improvements
5 Improvements	5. Final conclusions and suggestions
6. Final conclusions and suggestions	