Abstract
The research in this paper is based on the development and introduction of a mobile communications and support application (App) to a cohort of socio-economically disadvantaged adult learners on a blended online programme. This intrinsic case study explores the hypothesis that providing access to a learner communications app improves learner motivation and engagement.

The paper reviews the relevant literature which informed the design and implementation of the App, particularly referencing the area of online learner supports, disadvantaged adult learners and personal learning networks. The author provides a rationale for the methodology and outlines the methods of data collection used.

Using a mixed-methods approach, this case study used quantitative and qualitative learner feedback to explore the themes of engagement and motivation on the programme and the impact of the app on learner experience. This feedback was triangulated with data analysis on Blackboard, the Virtual Learning Environment (VLE) and app analytics. The research critically analyses learner engagement with the App and makes recommendations for future app development and implementation.

Conclusions drawn are limited by the small number of participants in the case study. The research supports a conclusion that providing accessible routes to programme supports tailored to the needs of this cohort aids learner confidence and engagement. Enabling and encouraging the development of a community of learners increases motivation and social inclusion. The research raises noteworthy implications for programme facilitators including identifying at risk learners and calls for further research into support structures for marginalised and disadvantaged demographics.

1 INTRODUCTION
This intrinsic case study explores the hypothesis that providing access to a learner communications app improves learner motivation and engagement.

The research question that this paper aims to address is “What effect does the introduction of a mobile learner support app have on improving learner experience in an online blended programme?” The research will focus on three distinct areas and sub-questions:

- Can a mobile learner support app create a community of learners?
- Can a mobile learner support app increase disadvantaged adult learners' motivation to engage in online learning?
- Can a mobile support app facilitate learner access to programme facilitator supports?

Learner retention on online learning programmes is typically very challenging with little research existing on learner supports for online learners [1]. Disadvantaged adult learners require additional supports to engage in lifelong learning and accepted Androgogical principles do not apply to this unique cohort [2].

Socio-economically disadvantaged learners often have negative educational experiences, suffer anxiety and self-esteem issues and are highly challenged when engaging with learning online [3]. As such, they need additional support and direction to successfully navigate their programmes [4].

This research aims to contribute knowledge to several areas, including utilising mobile apps as a support structure to online blended programmes, and the under-researched area of supporting disadvantaged adult learners to engage in online learning.
2 CONTEXT
Research in this paper arises from a Masters in Science in Applied e-Learning delivered through Dublin Institute of Technology (DIT), Aungier Street.

An Cosán Virtual Community College (VCC) is an educational initiative delivering online blended programmes in community education to adult learners with diverse socio-economic contexts, ages, and educational backgrounds across Ireland.

While VCC offers a supportive and holistic response to individual learner needs, it tends to be reactive in nature and problem-centred. The mobile support App is a pilot project which aims to develop VCC’s support structures and provide a rationale for future app development.

3 LITERATURE REVIEW
Life-long learning has been shown to have significant personal economic and psychological benefit to individuals and in turn, society [3]. Societal disadvantage is the biggest indicator of educational inequality. Educational inequality negatively affects individuals, communities and society as a whole by loss of economic and social potential [4]. Therefore, it is in societal interest to service the socio-economically disadvantaged communities to access education.

Supporting the most vulnerable demographics to successfully access educational opportunities requires proactive, and holistic support services integrated at programme level [5]. As online learning theories emerge from traditional pedagogical practice and technological advances enable deeper interpersonal interactions, connecting learners, tutors and content is becoming increasingly relevant [6].

3.1 Community of Learners
Learning Communities, defined by Ouzts as ‘students who have a sense of belonging’, improve learner performance in line with social constructivist theory ([7], [8]). When collaborative learning theories inform programme design, then learning activities that incorporate learner interaction and tutor presence are highly effective in learner performance and satisfaction ([6], [7], [9]).

Moore’s interaction theory states that the three most important elements in online learning programmes are learner-to-learner interaction, content interaction and tutor presence [10]. In line with Moore’s interaction theory, Shin’s concept of Transactional Presence quantifies learner perception of access to, and availability of, these three elements [11]. It demonstrates that a high perception of transactional presence can result in better learner performance. Research shows that when learners feel that peers, tutors and programme materials are readily available and accessible, then learner engagement and performance benefits [7].

3.2 Learner Supports
In their research, Jacklin and Le Riche advocate for a move from reactive, segregated problem-focused learner support services to a proactive and holistic support culture and recommend structuring supports to account for increasing learner diversity [5]. By designing proactive support services integrated with programme design to service the most vulnerable learner demographics, the wider learner communities will benefit from a more dynamic support ecosystem ([6], [12]).

Tait identifies the three main functions of student support as cognitive, affective and systemic and with the addition of technological support [13]. Tait's main functions can be related to Berge’s model of online learner support which classifies support under four categories; social, managerial, pedagogical and technical [14].

3.3 Online Learner supports
While research on supporting online learners is growing, it tends to be contextualised, assuming a large element of face-to-face contact ([1], [15], [16]). Online learning programmes are increasing and appropriate institutional support structures need to be created to respond to this evolving landscape [17].
3.4 Supporting Disadvantaged Online Adult Learners

There are significant similarities between Knowles’ six assumptions of adult learners as self-directed and motivated learners and the traits of successful online learners as reflective, open-minded, self-disciplined and motivated ([2], [18]). This highlights a disparity between adults who are comfortable with technology, and adults with disadvantaged backgrounds.

There is a notable lack of research on support services to assist and promote retention amongst socio-economically disadvantaged adult learners [12]. Socio-economically disadvantaged learners do not conform to accepted androgogical principles who have additional challenges when engaging in online learning including; negative perceptions of education, lack of confidence, digital illiteracy, lack of external supports, financial resources and not understanding academic expectations. ([4], [12], [19])

3.5 Technology

Smartphone use has grown hugely, and while Instant messaging is a recent technological innovation that has yet to be fully researched in relation to educational use, and with potential to take learning beyond the classroom and enhance learner connection [20]. Instant messaging provides an ideal platform to deliver learner support services [21].

Additional relevant literature will be reviewed in a later paper.

4 RESEARCH DESIGN

This research is founded on a transformative worldview based on constructivist principles which posits that individuals interpret their experiences and develop subjective understandings through their interactions with others, while advocating that research be grounded in an agenda for social transformation [22].

Adopting an interpretivist stance built on a constructivist framework which accounts for cultural and sociological differences and seeks to “explore peoples’ experiences and their views or perspectives of these experiences” ([22] p.37), this research will utilise Dewey’s inductive and deductive paradigm of enquiry [22].

The hypotheses of this study, that the provision of a mobile support app will positively effect learner experience will be refined following an initial inductive phase moving “from fragmentary details to a connected view of a situation” ([22], p.21). This hypothesis will inform the design of the intervention.

Combining the deductive approach following the intervention, the research will be grounded in “a universal view of a situation and work back to the particulars” ([22] p.21)

The methodology deemed appropriate was an intrinsic case study as defined by Creswell [28] as the author is directly involved with the programme as a programme facilitator and the research focuses on a set of circumstances under specific conditions.

An explanatory sequential mixed-methods approach formed the basis of this research whereby initial quantitative data will be examined following which qualitative research was conducted. This provided “a more complete understanding of a research problem” ([22] p.4.)

Ethical approval for this research was obtained from DIT, VCC and IT Carlow (VCC’s accrediting institution). Learners were introduced to the research at programme orientation, consent forms obtained and advised that participation was optional. All data was stored securely and identifying information anonymised to protect learner identity.

5 IMPLEMENTATION

The case study focuses on ten socio-disadvantaged adult learners enrolled on a ten week online blended programme. The mobile communications and support App was introduced to the cohort at induction and complemented existing supports for the duration of the programme.

A quantitative survey was emailed to VCC past learners. Feedback obtained informed the design and implementation of the VCC mobile support App in this initial inductive phase.
A suitable platform which accommodated required functionality in the App was researched and selected. Trial apps were built before introducing the finalised tool to a cohort of adult learners on a blended online return-to-education bridging programme.

The programme ran from November 2016 to February 2017. In addition to the induction day, there were eight online sessions and a face-to-face workshop over the duration of the programme. Of an initial fourteen enrolled learners, four withdrew from the programme at early stages with ten learners completing the programmes and required assessments.

Learners were introduced to the App at orientation and encouraged to use it throughout the programme. VCC programme facilitators, the tutor and technology moderator, were active participants on the App, responding to learner queries and posting content encouraging learner engagement.

During the data collection phase, a non-identifying naming convention based on descending grades was used to protect learner identity. Quantitative analysis was completed on available communication platforms, triangulated with qualitative learner feedback and learner grades used an indicative data point to understand the effect of the App on programme outcomes.

6 RESULTS

6.1 Inductive Phase

Several key themes emerged from the past learner survey, which informed the design of the App. Ninety percent of past learners owned a smartphone. Most learners (49%) accessed the internet primarily through a laptop with a further eleven respondents, representing 33%, using smart phones as their primary access point to the internet. Learners reported using smartphones primarily for making phone calls, accessing the internet, checking emails, social media and photography. Facebook, Instagram, Viber and Whatsapp were the social media platforms most widely used amongst the respondents.

The learners reported a strong sense of community existed on their programmes, with discussion boards and emails being the primary method of contact between learners. Half of the respondents were involved in external social media groups for the duration of the programme to discuss the programme, and support each other. The remaining learners who did not participate in social media groups expressed lack of knowledge or initiative as reasons that social media groups were not formed.

While twenty-five learners were satisfied with communications from facilitators, a notable quarter of respondents felt communications were insufficient to support them on their programme. Half of respondents felt programme support was sufficient with twelve learners expressing a need for additional supports. Five learners felt facilitators were not easy to contact.

Ninety percent of respondents felt that a messaging app for smartphones would support learners, with facilitation of social contact being the biggest benefit. Lack of access to a smartphone was reported as the biggest potential disadvantage to a mobile support app.

From the past learner survey, required functionality in the App was identified, and a suitable platform selected.

6.2 App Design

It was decided that the primary functions of the App would respond to learner support needs for a learning community and access to facilitators with secondary functionality offering learner guides and motivational messaging.

The VCC Mobile Support App was published to Google Play and iTunes for download, and access limited to participants by email verification to provide a private and secure space.

The toolset made available within the App aimed to address the four learner support categories; social managerial, technical and pedagogical as defined by Berge [14]. Consideration was given to the fact that not all learners would have access to the App and all information hosted on the App was also posted on the VLE. A decision was made not to use the App to proactively promote pedagogical content to avoid disadvantaging learners who did not engage with the App. Instead a policy of reactive pedagogical support was adopted to respond to inbound learner queries posted on the App.
6.3 Deductive Phase

6.3.1 Data Analytics

Following programme completion, analysis on available data sets was conducted. The primary focus of this research phase was to quantify learner contact points, frequency and content to build understanding of learner communication patterns.

6.3.1.1 App Engagement

Of the ten learners that successfully completed the programme, eight had access to a smartphone. Seven downloaded the App and registered their email for authorisation. Quantitative analysis on instant messages posted by individual learners in the chat rooms was conducted and message content categorised according to Berge’s online learner support needs [14]. There was a broad range of learner engagement with messages categorised as containing social content most prevalent. Messages containing technical content were second most commonly posted.

The technology moderator had a significantly high message count across the social, managerial and technical categories. These messages were both proactive, stimulating engagement and reactive, responding to learner messages. In contrast, the tutor had a very low message count.

6.3.1.2 Email Engagement

Email exchanges between learners and facilitators were tracked by both tutor and moderator. Learner confidentiality was respected and the tutor and moderator were individually responsible for tracking and categorising of emails without examining email content. By a significant majority, learners contacted the tutor by email for managerial purposes, e.g. submitting assignments.

The Tutor recorded the highest number of emails at ninety-three emails sent and received over the duration of the programme. This number represents all emails received by individual learners, group emails being recorded as individual contacts. The Technology Moderator recorded a total of fifty-two emails sent and received.

6.3.1.3 VLE Engagement

Discussion boards provided the third point of asynchronous contact between learners and facilitators. Weekly discussion topics were posted as part of the programme assessment strategy with additional forums available for social and technical messages. As such, learner engagement was a required component for the programme and messages categorised as containing pedagogical content were significantly high in number. There were no messages categorised as managerial or technical in nature, with one learner contributing a high number of social postings.

Analytical tools available within the VLE provided data on individual learner engagement with programme content, showing the frequency of learner interaction with content items. There was a large differential in content access across the cohort.

Learner attendance to the weekly live sessions was high across the course. Learners who achieved the highest academic scores attended each session, however there was little difference in attendance across the programme with most learners attending at least eight of the ten sessions.

6.3.2 Learner Feedback

Data analytics was combined with learner feedback through a mixed-methods survey to triangulate sources and provide a foundation for discussion.

6.3.2.1 Exit survey

Of the ten learners who completed the programme, there were seven responses with limited responses to the qualitative questions. Feedback was coded and summarised and relevant themes identified under five distinct areas. Respondents spoke to the transformative personal impact of completing the programme. The learning community was reported as the primary influencer of engagement and the face-to-face element as enabling a strong sense of community for support and motivation. All respondents agreed the App was a support to learning. Two learners who did not use the App felt at a disadvantage as they ‘could have networked and gained support’. All learners who used the App scored the sense of community as very high, while those that did not use the App scored sense of community lower.
6.3.2.2 Semi-structured Interview

Of the three respondents who agreed to a follow-up interview, Learner A made themselves available for interview. The coding format developed during the quantitative feedback was used to identify important themes for discussion.

Learner A is an early school leaver with a negative experience of education. Lack of confidence was reported throughout the interview as being a major obstacle to engaging in education. Their personal support network was very important to their completion of the course and their past life experiences proved of benefit.

The importance of the sense of community for motivation and encouragement was frequently reported and strongly supported by the face to face element of this programme. Reassurance from programme facilitators and peers was critically important.

Learner A felt the App was a strong support to their learning providing social and technical support. They described it as an appropriate, inclusive and personal space to contact the group and including facilitators as members of the group on the App was positive. The perception of tutor presence was found to be reassuring and authentic.

7 DISCUSSION

The research aimed to address three distinct questions. Can a mobile learner support app create a community of learners, increase disadvantaged adult learners’ motivation to engage in online learning and facilitate learner access to programme facilitator supports?

The group of learners accessed the programme from a shared location. The face-to-face element was the key enabler for a strong sense of community. The VCC learner support App was an additional support structure which complemented existing supports and although it facilitated learners to connect with each other, it was not responsible for creating the community of learners in this instance. However, a notable result from the exit survey was that it appeared to influence the sense of community, with learners who utilised the app scoring sense of community higher.

The App was found to be a personal and appropriate space for learners to engage with each other and facilitators. It also helped build a strong sense of facilitator presence. It was found to support learner motivation through conversations with peers and facilitators. In conjunction with email and discussion boards it was primarily used for social and technical communications between learners and facilitators. Other communication platforms were found to be more appropriate for managerial and pedagogical messages.

7.1 Communication frequency can be combined with VLE data to predict performance

There were three measurable platforms used by learners to contact each other and facilitators; email, discussion boards and the App. Results show that learners who downloaded and used the App were likely to use email correspondence less. They used the App primarily for social and technical support needs.

Data from the VLE, tracking the frequency that learners interacted with content, was cross referenced by communication engagement. It is observed that learners who achieved high grades either communicated more often and tended not to access content on the VLE, or communicated less but accessed the course content more frequently.

7.2 The Learning Community plays a critical role in learner engagement.

The primary motivation for these learners to engage in the programme was the strong sense of community in the cohort. In this research, the social media group was facilitated by the App. The programme facilitator’s influence and engagement with the app was what primarily drove learner engagement across all platforms. Learners who used the App and learners who did not use the App felt it was an advantage to learning.
7.3 Facilitator presence is important in supporting the community of learners

The responses to the exit survey showed a disparity between learners. Those who used the app felt programme support was sufficient and facilitators were easy to contact. However, those that didn't use the app felt support was insufficient or were undecided. This indicates the App provided an important support function with all App users reporting the App as their preferred means of contacting facilitators.

It is found that learners engaged more on all platforms when facilitators posted prompting messages Learner A's interview expanded on the importance of perceived presence. “The couple of times that I did look for help on different things, my texts were answered on the app... and I think that having the app encouraged you to feel that presence, you knew it was there, if you needed it.” This importance of perceived availability of facilitators agrees with Shin’s Transactional Presence as having high influence on learner outcomes [11].

7.4 Different platforms are more appropriate to different support needs

There were several platforms employed to correspond with learners during this programme. As categorised by Berge’s learner support classifications, it was found that the App which was deployed to mobile devices was used primarily for social and technical support [14]. As an immediately accessible device with limited text input tools, it was easier for learners and facilitators to quickly engage.

Email correspondence was more suited to managerial support, with learners corresponding directly with the tutor when discussing assignment supports both pedagogical and managerial in nature.

The discussion boards were a required part of programme assessment and pedagogical discussions were posted in the VLE. Learners who did not have access to the App used the discussion boards for social support. These trends can perhaps be understood within the context of each platform’s functionality. Both App and discussion boards were public and accessible to all, while email was a private correspondence. The App was not used by all learners, with email and discussion boards being used to various degrees by all learners. If added functionality can be employed across the platforms, these trends might behave differently.

7.5 Appropriate functionality in platform selection is critical

While the App was made available to all learners, there were several learners who did not access it due to lack of smartphone access. With this awareness from the outset, it was decided that App content should not disadvantage non-users and all pedagogical support was reactive by principle and no pedagogical content was delivered through the App. If the App had been available through laptops, it would have been a universal tool for all and opened new opportunities for engagement and content delivery.

7.6 Limitations of this research

While the findings of this research fit within a general body of literature, due to the small-scale nature of this case study, conclusions should not be generalised. Without a control cohort to reference, it is difficult to understand the actual impact of the App on learner engagement and outcomes.

There were several faults reported by learners on functionality of the App platform. Including lack of notifications and issues signing in, these had an unquantified effect on learner engagement.

Research into the support networks outside of programme supports was beyond the scope of this study. Learners accessed several other supports including familial, organisational and on the ground supports. Without understanding the impact these networks had a complete picture of the support structures in place around the cohort could not be determined.

Learners who withdrew from the programme weren't included in this research, and it is unclear what reasons this group had for disengaging from the programme.
8 CONCLUSIONS
This research represents a rethinking of learner supports within VCC from reactive to proactive. As Jacklin and Le Riche suggest, a holistic support ecosystem which aims to serve a diverse learner base proactively should be adopted and integrated at programme design [5].

There are strong indications that embedding a social media group within the programme and moderated by facilitators can support the formation of an effective learning community. Learners benefit from a perceived availability and presence of facilitators.

Notably, there is a suggestion that VLE analytics alone cannot be used as an indicator of at-risk learners but if communications can be included in performance analysis, a more accurate picture of at-risk learners emerge. While trends indicated that high engagement was an indicator of academic achievement, the research did not uncover why some learners opted not to engage and subsequently achieve lower grades.

The socio-economically disadvantaged learners on this programme did not fit with accepted Androgogical principles [2]. They reported high degrees of anxiety, significant lack of confidence, digital illiteracy and negative educational experience requiring more support than a self-directed and motivated adult learner. However, learners spoke to the transformative nature of the programme outcomes including increase in confidence, motivation to continue learning and the positive effect on their social circle.

Technological advance and the increase of mobile content opens new opportunities to deliver learner support and bring learning beyond the classroom. Any platform that is used to deliver support should allow equal access for all learners and policies for programme facilitator engagement with learners should manage learner expectations of frequency and not increase facilitator workload if possible.

9 RECOMMENDATIONS
Learner supports should be proactive and integrated at programme level moving from a problem-centred approach. Institutions should implement learner supports in line with technology advances, with consideration given to the evolution of the mobile platform as a means for programme delivery and support.

Academic institutions should proactively facilitate learning communities through the provision of a learner social media group. When facilitating social support, the programme facilitator should be an active member of the learning community delivering motivational and encouraging messaging.

A learner support platform including informational content, educational readiness exercises and time management information would benefit learners if offered at the earliest possible opportunity. This support could be available following registration.

An integrated support platform allows learners to access supports and pedagogical content from any device and be designed with a tutor dashboard which captures all communication points and allows effective course management. Future research needs to be undertaken in the utilisation of mobile platforms as a vehicle for learner supports.

There is a societal obligation on expanding the very limited research available on supporting the socio-economically disadvantaged adult learner, particularly in online learning. While there are several widely-accepted principles of adult learners, this demographic does not fit standard models and future research should aim to create a model that supports educational engagement. Providing equity of educational access to the most marginalised and disadvantaged individuals will benefit the person, their network, their wider community and society.

Further conclusions and recommendations will be explored in a later paper.

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