Key Influencing Factors Behind Moodle Adoption in Irish Small to Medium Sized Higher Education Colleges

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Abstract

This research investigated Irish Small to Medium Sized Educational Institutions (SMSEs) involved in Higher Education (HE) that adopted Moodle, the OSS (Open Source Software) course management system (CMS). As Moodle has only been adopted in the Irish HE sector in the last 5-7 years, this research crucially studied the attitudes of the SMSEs that have invested in it to uncover the influencing factors (lessons learned, rationale) concerning OSS adoption in HE from the view point of the smaller colleges. A full population of Small and Medium Sized Educational Institutions, large colleges and universities in HE operating in Ireland that utilize Moodle were included in this research. A variety of Open Source Moodle service providers (large and small) operating in Ireland were also included in this research.

This research found a high degree of improved confidence in additional Open Source core system adoption and integration in SMSEs resulting from Moodle adoption. This confidence has been a direct result of the Moodle experience and the supportive community that has been found to encapsulate it. The Moodle experience in Ireland has, without doubt, challenged traditional preconceptions and fears concerning core OSS adoption. In addition, proactive SMSEs have benefited greatly in Moodle assistance from other colleges, particularly the universities. Quality external Moodle support service has been viewed very positively. This research also suggests that Moodle has helped to realize long term Managed/Virtual Learning Environment (M/VLE) aspirations of SMSEs as they continuously strive for competitiveness as the most financially vulnerable players in Higher Education.

This research adds to the advancement of what is known about OSS expansion in education that importantly extends beyond the Irish HE domain.

Keywords

Online learning; Open Source Software; Course Management Systems adoption; Moodle; Higher Education

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Introduction

Small and Medium Sized Educational Institutions worldwide are finding it harder to keep financially afloat, particularly those that do not receive consistent/recursive government funding. Operating more effectively and ensuring that technology costs are manageable are key to survival, and the open source movement is an invaluable contributor to this. Courant & Griffiths (2006) supported these assumptions when they stated that "effectiveness and reductions in cost could reduce the total cost of ownership over any period of years". The ability to customize OSS and the potential to collaborate among other similar OSS users (OSS community) are also very strong positives (Hedgebeth, 2007).

Moodle has in many instances, been a journey of first core Open Source exploration by SMSEs, which came from Higher Education's hunger for advancement in online learning, enhanced learning facilitation and increased flexibility that the digital age invited. In a lot of instances existing CMS facilitation did not exist in SMSEs and as a result the Moodle project presented the potential for a highly beneficial, safe and

financially achievable opportunity to assess online learning facilitation by Small and Medium Sized Educational Institutions within HE and to explore the fruits that a vibrant OSS community might bring.

This research details just how positively Moodle has impacted the SMSEs, as well as the large colleges and universities in Ireland. In particular, the results from qualitative and quantitative analysis found Moodle specifically suited to SMSEs. Improved confidence in additional Open Source Software core system adoption and subsequent integration by SMSEs is only possible due to the collaborative nature of Higher Education and the ability to customize OSS. Collaboration has been facilitated by knowledge sharing in open communities, i.e., 'social constructivist theory', where participants work for mutual benefit in advancing individual college systems and services. (Hemetsberger & Reinhardt, 2006). In addition, OSS service providers in Ireland have demonstrated high quality service provision that has facilitated the SMSEs in customizing Moodle. This is crucial to core OSS adoption due to the often limited dedicated Information and Communications Technology (ICT) personnel employed by Small and Medium Sized Educational Institutions, and the reliance of such has been a liberating experience for the SMSEs in breaking free from traditional commercial arrangements for core solutions (Courant & Griffiths, 2006).

As an advanced eLearning tool, Moodle caters to "the development of and the teaching of courses" but as a Learning Management System (LMS), it also "manage[s] the administration of courses and all related course content". (Mooney & Baenziger, 2007). Currently there are over 45,000 registered Moodle sites in over 200 countries worldwide representing over 26 million users. (Moodle.org, 2010).

In the last seven years, Higher Education entities of all shapes and sizes in Ireland have embraced OSS by adopting Moodle as a core system and have added greater flexibility to the learning experience. In fact, Williams van Rooij (2007) stated that Moodle's panoramic growth has "contributed to the higher education "buzz" surrounding open source". However, traditionally, the perspective of core OSS system acceptance by the SMSEs in Ireland and beyond has been influenced by misconceptions and valid fears that have prevented cash-strapped educational institutions with small Information and Communications Technology (ICT) infrastructures from adopting it. Hedgebeth (2007) stated that the "common misconceptions" of not choosing to implement Open Source Software can include: OSS not having the same level of support as that of commercial software; OSS developed systems are more open to vulnerabilities; OSS code is not suited to integration and "can only be used in isolation" with existing commercial systems.

The HE (Higher Education) sector has been classified in this research as any Irish educator operating above National Framework of Qualifications (NFQ) level 5 exclusively. Essentially, this research is concerned with post secondary level education. Level 6 and beyond includes Community or Vocational Education Committee (VEC) colleges and institutes as well as degree issuing colleges and universities. Utilizing NFQ levels facilitated HE research findings in Ireland as not only recognizable but comparable throughout Europe and other global cultures. (NFQ, 2006).

Research Design

This research investigated the 'Changing wind' hypothesis; that is, how the SMSEs felt toward the addition of other OSS core systems resulting from Moodle adoption and if this indicates improved confidence in OSS core system adoption in Irish educational institutions with implications for HE abroad.

This research design used the following investigative research cases:

A. SMSE research case

    This case fundamentally captured:

- traditional, mostly negative, key influencing factors affecting the smaller educational institutions' decision making process in not adopting core OSS in the past.
- key influencing factors of the smaller educators affecting the decision making process in adopting Moodle.
- reflective perspectives of the smaller educators, in having adopted and experienced Moodle, and how this impacts the decision making process in potentially adopting additional core OSS.

B. Large college, university and OSS provider research cases

    These cases constituted:

- an OSS community perspective on Moodle adoption by SMSEs.
- important views from the OSS community on their experiences with Moodle.
- the bigger picture and future of OSS core system adoption within HE.

These latter cases were highly beneficial for cross referencing and supporting field data received from the SMSEs as well as defining the environment in which the smaller educators operate, i.e., the OSS community.

Structured qualitative interviews were conducted with OSS service providers that collectively as part of their services to HE, manage Moodle solutions in Irish SMSE's, large colleges and universities. After

assimilation of OSS' provider rationale, quantitative survey design content was fine tuned. Quantitative survey design contained tailored surveys with SMSEs (<1000 students), large colleges (>1000 and <5000 students) and state funded universities operating in Ireland (>5000 students).

Research Results

Twenty-nine Small and Medium Sized Educational Institutions (full population), 7 large colleges (full population) and 5 universities in HE operating in Ireland (full population) that utilize Moodle were included in this research. Two SMSEs did not respond and another one did not complete core sections and all their respondents' data were removed from results analysis. Six Open Source Moodle service providers (large and small) operating in Ireland were also included in this research.

A. HE support within the OSS community

Only 46% of SMSE's stated that they had benefited from other colleges concerning Moodle utilization. In addition, from the 54% that have not benefited from other colleges concerning Moodle utilization, a staggering 93% of those SMSE's would welcome support from other colleges concerning Moodle utilization. (See Figure 1. SMSE's – welcome support from other colleges, below). This data is a significant indication that the majority of SMSE's that are not benefiting from other colleges could do so.
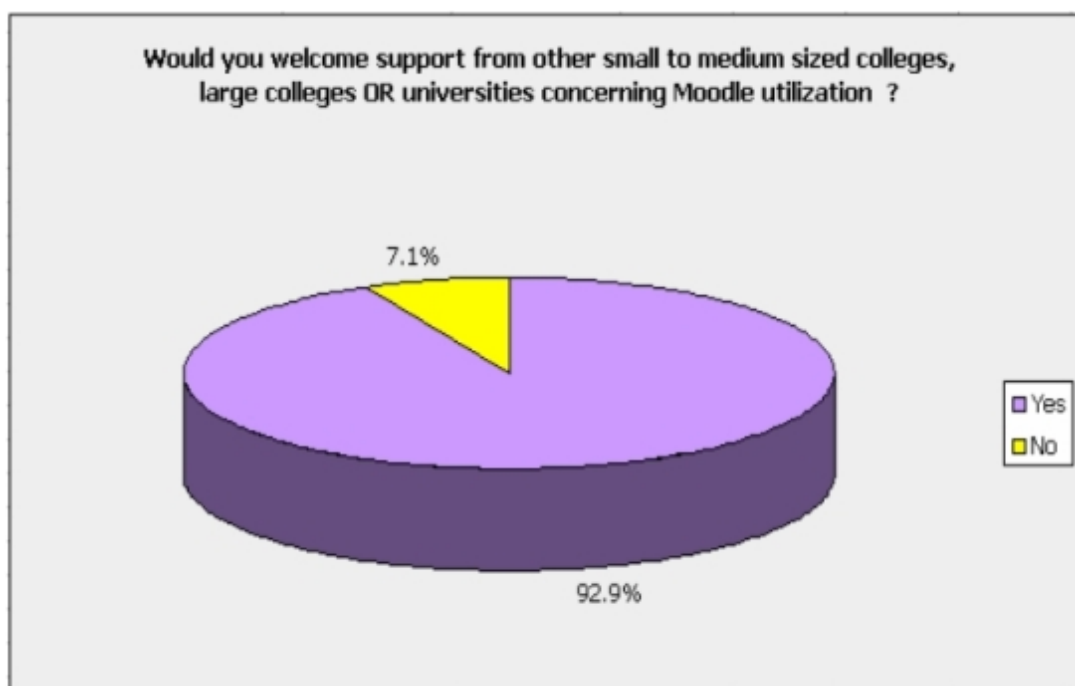

Figure 1. SMSE's - welcome support from other colleges

From the SMSEs that have benefited from other colleges, the highest category of assistance came from the universities with 50%. Other SMSE assistance represented 17% with assistance from the large colleges being only 8%. Twenty-five percent, captured from text entry (other), showed that SMSEs also benefited from "Moodle online support" and the community. (See Figure 2. SMSE's – who assisted mostly, below).
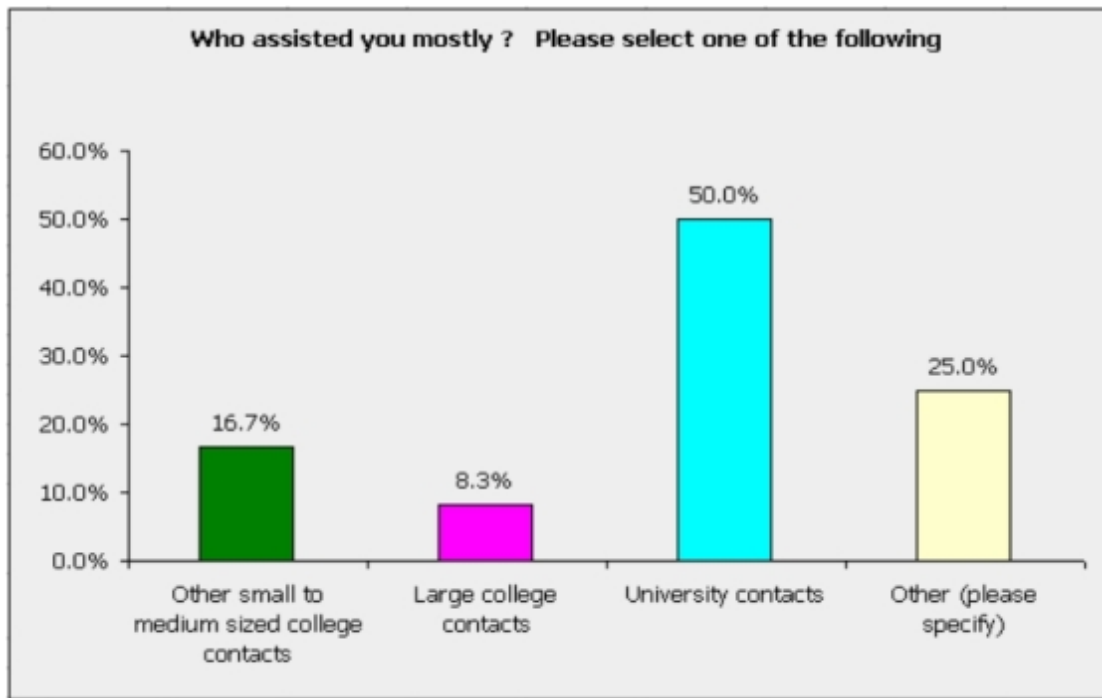
Figure 2. SMSE's - who assisted mostly

Seventy-one percent of large colleges and 60% of universities reported that they had advanced the usage of Moodle in SMSEs. In addition, 50% of interviewed OSS service providers stated that they felt that SMSE's have received support from other colleges with 83% feeling that increased levels of support by large colleges and universities would advance SMSE's in OSS core system adoption.

Analysis of normalized data, i.e. the balanced weighting derived from the cross comparison of responses from each of the large college and university cases indicates clearly from the weighted college ratings that large colleges and universities are viewed very favorably concerning their assistance to SMSEs.

B. Quality external OSS support service provision

From examination of the research results from each of the three college categories (from those respondents that had engaged external OSS support for Moodle setup or integration), 63% of SMSEs rated external OSS service provision as being very good with 27% feeling that it was good. Sixty percent of large colleges who had utilized external OSS service provision for Moodle setup or integration rated external OSS service provision as being very good with 40% rating it as good. (See Figure 3. SMSE's – rating external OSS service, below). Seventy-five percent of universities who had utilized external OSS service provision for Moodle setup or integration rated external OSS service provision as being very good with 25% reporting that it was poor.
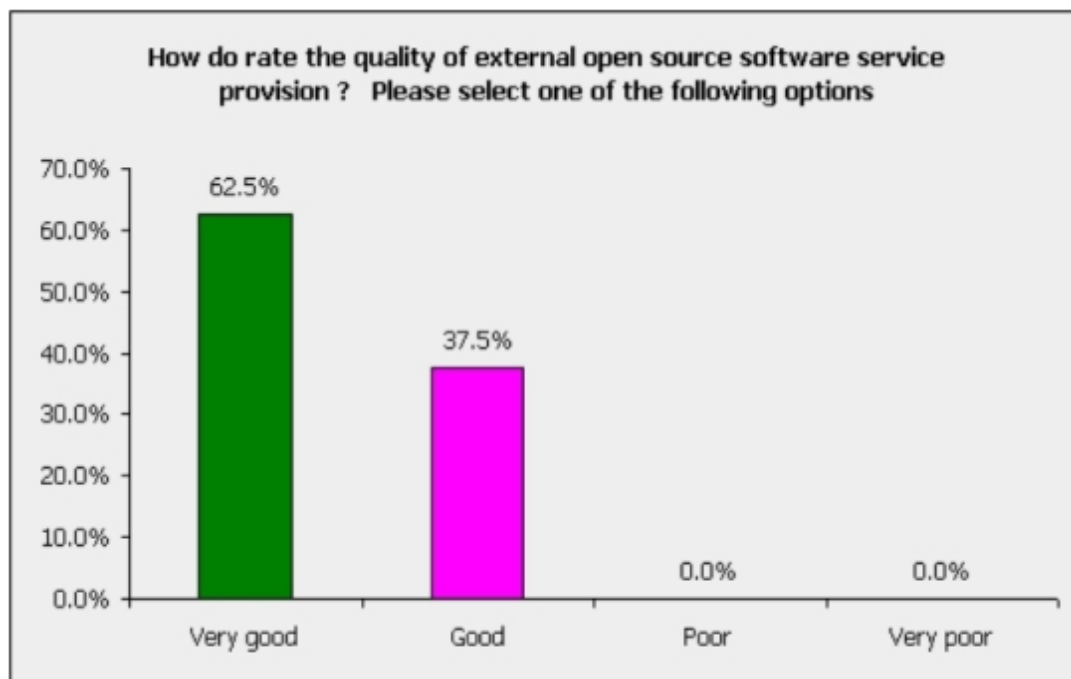

Figure 3. SMSE's - rating external OSS service

Analysis of normalized data found that external OSS provision is viewed very favorably indeed across the board.

C. Moodle suitability to SMSE's

From examination of the frequency data from each of the three college surveys, 85% of SMSEs felt that Moodle was very suitable to their needs with 15% feeling it was somewhat suitable. (See Figure 4. SMSE's – suitability, below). Eighty six percent of large colleges felt that Moodle was very suitable to SMSEs with 14% feeling it was somewhat suitable and 80% of universities felt that Moodle was very suitable to SMSEs with 20% feeling it was somewhat suitable. Also, 100% of OSS service providers felt that Moodle was very suitable to SMSEs. In addition, 73% of SMSEs reported that "Its functional capacity is largely in tune with small educators requirements" with 50% stating that "It's an overall reliable system". One hundred percent of large colleges stated that "Its functional capacity is largely in tune with small educators requirements" with 86% stating that "It's an overall reliable system". Sixty percent of surveyed universities stated that "Its functional capacity is largely in tune with small educators requirements" with 60% stating that "It's an overall reliable system". Lastly, 83% of OSS service providers reported that "It's functional capacity is largely in tune with small educator requirements" with 50% feeling "It's an overall reliable system".
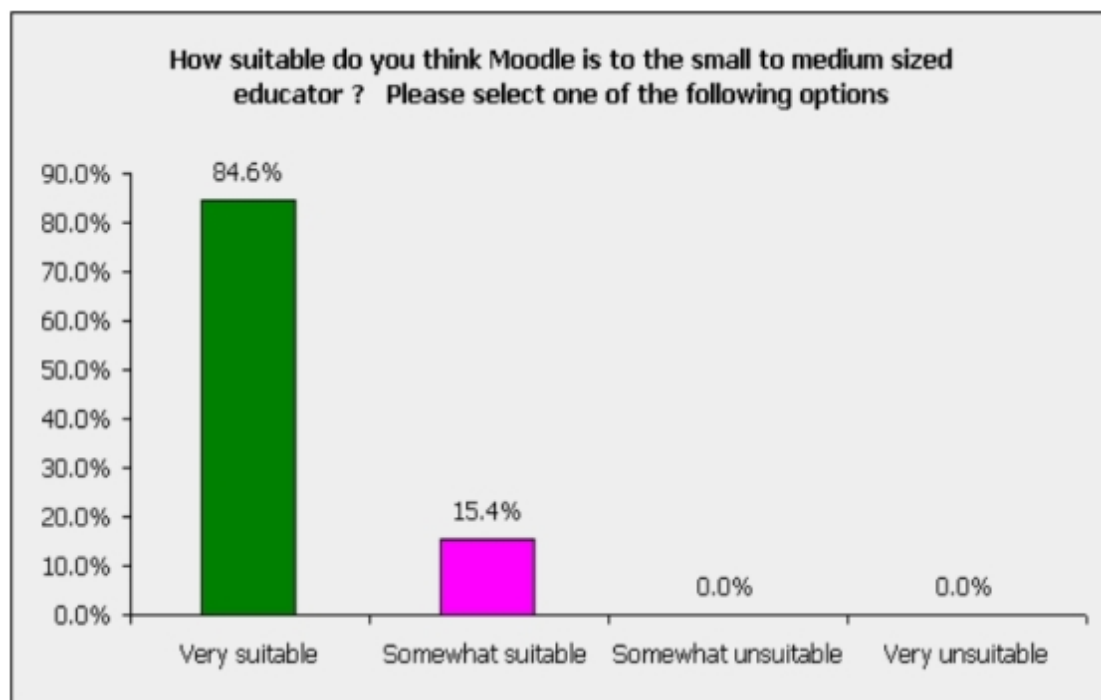

Figure 4. SMSE's - suitability

The normalized data shares the same strong trend, from the weighted college categories, towards Moodle being considered very suitable to the needs of SMSE's.

D. Moodle integration and M/VLE development within SMSE's

Sixty-five percent of SMSEs stated that very good potential exists for Moodle integration with existing systems with 15% stating that a lot of potential exists. (See Figure 5. SMSE's – potential for Moodle integration, below).
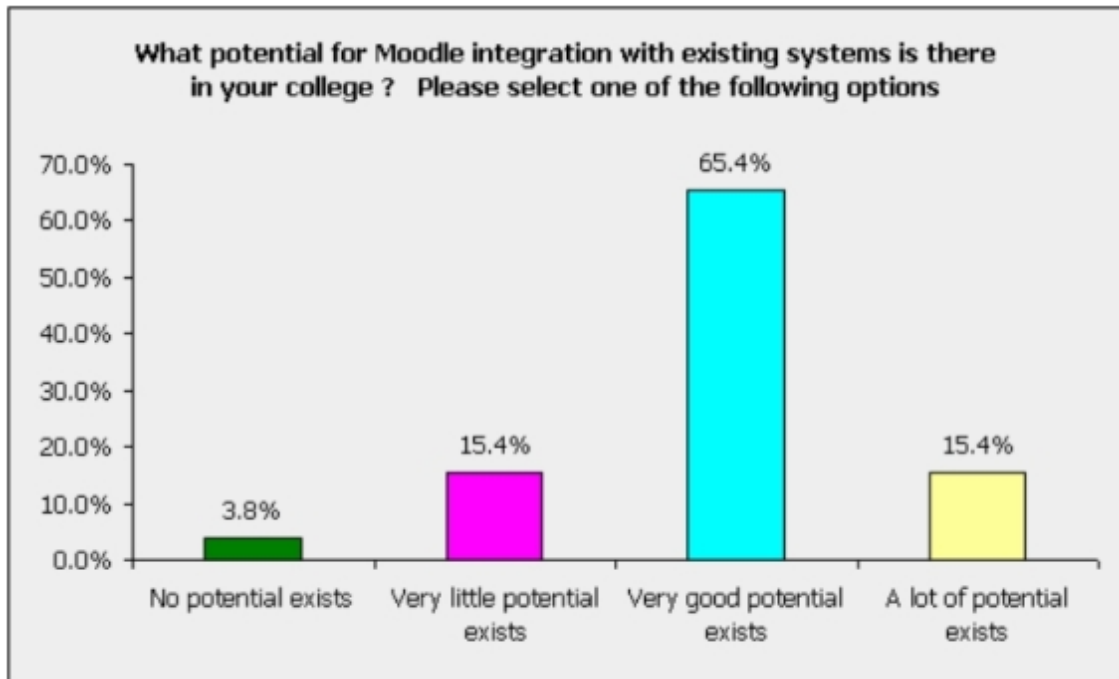
Figure 5. SMSE's - potential for Moodle integration

Eighty-six percent of large colleges reported that very good potential exists for Moodle integration with existing systems with 14% stating that a lot of potential exists. 40% of universities stated that very good potential exists for Moodle integration with existing systems. Sixty-six percent of interviewed OSS service providers stated that a lot of potential exists for additional Moodle integration in the organizations they provide services to and 33% stated that very good potential exists.

The normalized data indicates clearly from the weighted college's ratings that the potential for Moodle integration with existing systems is very good.

A very impressive 92% of surveyed SMSEs stated that there is potential for 'long term' Managed/Virtual Learning Environment (M/VLE) development in their organizations and 100% of OSS service providers felt that there was good potential for the long term progression of M/VLE development within SMSEs. One hundred percent of large colleges and universities felt that there was potential for M/VLE development in their organizations. In addition, OSS service providers stated that Moodle colleges have worked on innovative systems in colleges such as "integration with student management", "backend systems", "administrative, automated attendance", "SMS connectivity" and "courseware" solutions, thus indicating favorable integrative and innovative enhancements for potential M/VLE development.

E. Improved confidence

Seventy-seven percent of SMSEs stated that as a result of the Moodle take-on, there was improved confidence towards additional OSS core system adoption. (See Figure 6. SMSE's – improved confidence, below).
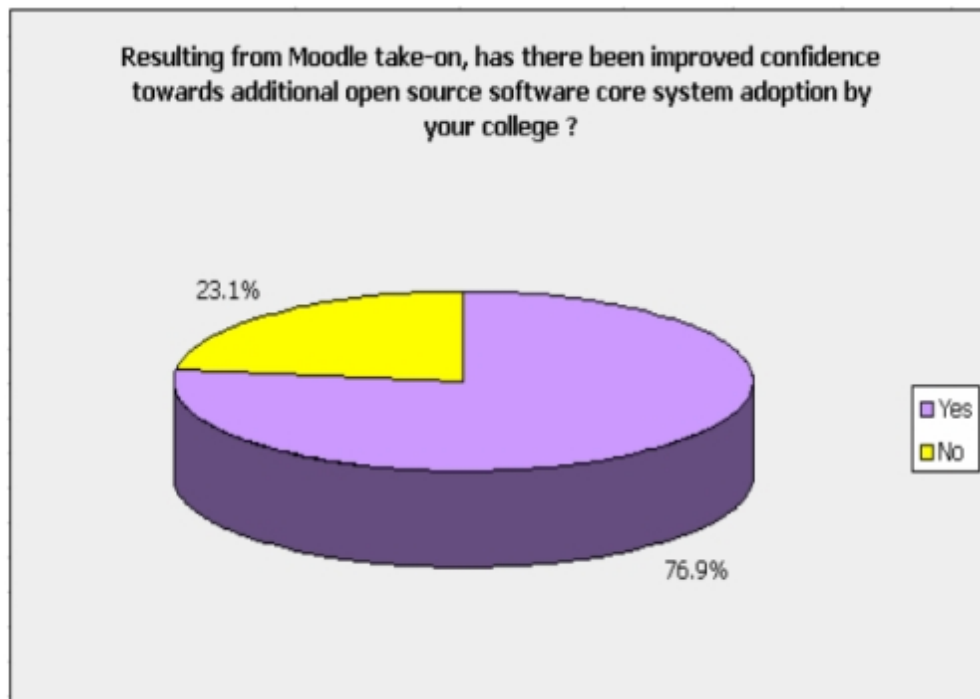
Figure 6. SMSE's - improved confidence

Twenty-three percent of all SMSE respondents did not feel that Moodle had improved confidence in additional OSS core system adoption. When questioned on what was needed to improve confidence, there were several suggestions: more awareness as well as knowledge, training and education; more college community involvement and confidence was mentioned. Eighty-six percent of large colleges as well as 80% of universities stated that there has been improved confidence towards additional OSS core system adoption resulting from Moodle adoption. In addition, 67% of OSS service providers stated that, in their opinion, there has been an improvement in confidence towards additional open source software core system take-on by SMSE's, resulting from Moodle adoption.

The normalized data indicates very clearly that across the board, but most importantly within the SMSEs, there has been improved confidence towards additional OSS core system adoption resulting from Moodle take-on. These results very positively indicate that Moodle has indeed improved confidence in additional core OSS system adoption by SMSEs, as well as in the large colleges and universities in Higher Education. There are also implications for HE internationally. Experiencing a universally applicable quality core OSS system to HE like Moodle combined with a supportive OSS community (i.e. OSS providers & HE support) can be a liberating experience for small educators anywhere. This supports Chavan & Pavri (2004) who stated that "Moodle is a fine example of how and why open source works" detailing that "the greatest strength of Moodle is the community that has grown around the project".

General quality, cost and support were mentioned across the board as the rationale behind improved confidence in additional open source software core system adoption by all surveyed colleges and interviewed OSS service providers. Reliability and "other colleges using it", was also mentioned strongly. The SMSEs, most importantly to this research, have improved confidence from Moodle adoption in additional core OSS adoption where quality, cost and support from HE colleges as well as OSS providers, have been proven to be key influences to adoption.

F. Bigger picture of core OSS advancement

Fifty seven percent of surveyed large colleges are aware of increased political backing in Ireland for OSS core systems adoption within HE and 75% of those felt that the economic downturn had accelerated this. Sixty percent of the surveyed universities are aware of increased political backing in Ireland for OSS core systems adoption within HE and 100% of those felt that the economic downturn had accelerated this. Eighty-three percent of interviewed OSS service providers reported that there will be increased political interest in the growth of open source software take-on due to the economic downturn.

Collectively, this suggests that the economic downturn could potentially further advance OSS core system adoption from increased "political activism", as there is greater interest in reducing costs and improving competitiveness. (Kettell, 2008).

Evaluation and Analysis

A high degree of support has been provided to SMSE's (Small to Medium Sized Educational Institutions) from the universities primarily as well as from other SMSE's, online Moodle communities and large colleges. (Oh & Joen, 2007). SMSE interaction in the OSS (Open Source Software) community is active and thriving. This research details how beneficial this actually is. In addition, the universities and large colleges

are open to assisting SMSE's.

The results of this research strongly contest Cheung's (2006) comparative study of the market leading online learning systems (WebCT, Blackboard and OSS Moodle), when stating that commercial software can be superior "in terms of technical support". The high quality ratings concerning external OSS support to SMSE's (and other college categories) as evident in this research, demonstrates that taking the OSS path using Moodle was the best option for SMSE's from a support perspective. Moodle is a quality in-tune OSS system and the community is highly supportive when engaged. The realization of quality external OSS service provision by SMSE's is of core importance to additional core OSS adoption. Quality external OSS service provision is also very important to small educators in HE internationally. (Hedgebeth, 2007).

Overall, Moodle as a perceived high quality core system is very well suited to the SMSE's who are financially vulnerable educators with limited dedicated ICT personnel. This is of key influencing importance to SMSE's in Ireland as well as small educators in HE internationally. This concurs with Weekes (2008) who stated that Moodle is very well suited to SMSE's. In addition, Courant & Griffiths (2006) also detailed that Martin Dougiamas had both a technical development and educational perspective in executing "his particular vision of what course management software should do". Moodle's suitability combined with it's active community helps to refute Bonk & Dennen's research on collaboration via interactive technologies which included Moodle, with other market leading OSS and commercial CMS systems, in stating collectively that available pedagogical strategy was poor. (Lee, Magjuka, Liu & Bonk, 2006).

Courant & Griffiths (2006), citing a US A-HEC study, stated that the larger educational players with "operating budgets of greater than $100 million" were the very ones most prolific in adopting OSS infrastructures, in contrast to the smaller higher educational entities operating on far less budget investment. When considering the long term M/VLE aspirations of SMSE's, this research demonstrates that adoption of a high quality OSS core system like Moodle has been a shining example of how core OSS adoption by the smaller educators operating on far less budget investment than the universities can really work for those that potentially need it most of all. One key OSS provider stated that "there needs to be a framework or model in place" and this is certainly beneficial to SMSE's in solution evaluation, and it also enhances OSS community collaboration.

Improvement in confidence of SMSE's in additional OSS core system adoption, irrespective of the integrative potential of Moodle or Moodle's international success and it's impact in Irish HE, is strongly influenced by the OSS community. Collectively, high degrees of HE support within the OSS community as well as Quality external OSS service provision exists which details quite positively that a 'changing wind' has indeed occurred.

Conclusions and Future Research

A proactive attitude by SMSE's in enlisting other college support appears to be beneficial. Those that have engaged other colleges have clearly benefited in support, and those that have not engaged other colleges would welcome community support from them. This research proposes that a more proactive approach by SMSE's in engaging other colleges concerning additional core OSS adoption would be highly beneficial. From the surveyed SMSE's, a key influencing factor in Moodle adoption was Moodle's presence in other colleges. This research proves that HE support from universities and other colleges, in a collaborative OSS community environment, is a key influencing factor in core OSS adoption by SMSE's.

Lee, Kimb & Guptab (2007) stated that "the OSS development community can play a role similar to that of the IS department in providing services", but quality must be high. This research analysis finds that a high level of OSS service provision has been received.

Moodle suitability is a key influencing factor to SMSE's because as they often have limited dedicated ICT personnel or access to funding for external service providers, large resources do not have to be invested to get the system operational quickly. Designing core OSS that has suitability geared to small sector users in general, on the strength of this research, is advantageous to increased adoption by the very users that could benefit most.

A C/LMS (Course/Learning Management System) system can be considered a core component in M/VLE (Managed/Virtual Learning Environment) development. With the strong potential for Moodle integration with existing systems combined with the very high volume of SMSE's sentiment that there is the potential for long term M/VLE development in their organizations (as with the larger colleges and universities), there is sufficient evidence to suggest that Moodle integration with existing systems also presents the opportunity to considerably advance M/VLE aspirations. How M/VLE development within SMSE's can be further advanced is of core strategic advantage to small educators in higher education internationally, and an area of future research which can be potentially built upon from this investigation. Impacting this, one of the key responding OSS (Open Source Software) providers stated that "contracts are important for prolonged integration". This potentially gives SMSE's (Small to Medium Sized Educational Institutions) the reassurance of continued support if engaged in long term systems development, i.e. M/VLE's. Essentially, this could provide the best of both worlds for SMSE's, as source code ownership and cost benefits combined with working the OSS community for effective college support can also be met with the security of having OSS providers tied into ongoing support provision, if SMSE's so require it.

In all cases , a very high proportion of surveyed colleges as well as OSS service providers reported improved

confidence in additional OSS core system adoption as a result of their Moodle adoption. This research included full populations of Moodle SMSE's, large colleges and universities in HE operating in Ireland as well as a variety of Open Source Moodle service providers (large and small) operating in Ireland.

When SMSE's where questioned on what exactly has improved confidence - overall quality, reliability, support as well as cost were the most common responses, where such key influencing factors are applicable to the wider educational domain as indicated by scholarly research.

Acknowledgement

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