University of Hertfordshire

Report on the evaluation of EVS usage and trends at the University of Hertfordshire

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EVS Evaluation Report for iTEAM 2013-14

Contents

1. Executive Summary

The Electronic Voting Systems (EVS) evaluation project for iTEAM has investigated the current level of engagement in the use of EVS across the institution in 2014. It has built on the work and outputs of the JISC supported Evaluating Electronic Voting Systems (EEVS) project in 2011-12 and the work of the iTEAM project through 2011-2013. It offers an up-to-date examination of the trends in EVS adoption and the breadth and nature of EVS use across the different academic schools.

The project adopted a mixed-methods approach to evaluate usage and engagement. The starting point was a desk study to examine the existing data on numbers of EVS handsets purchased by academic schools in 2011, 2012 and 2013 and registered across the University and to explore the details from the School reports previously submitted to iTEAM. Sources of data included Information Hertfordshire and the iTEAM archive. Quantitative surveys were drawn up and information requests for student numbers were made to Senior Administrative Managers (SAM). A series of interviews were held with School-based academics including EVS Champions and Associate Deans for Learning and Teaching.

Three purchasing trends for EVS handsets by different Schools were found:- slow decrease in HUM, LAW and PAM, moderate increase in BS, EDU and HSK and rapid increase in CS, ET and LMS.

In terms of levels of EVS usage in 2013 -14 four different patterns emerged among the schools. These showed: slow increase (CS, LMS and PAM), slow decrease (BS, ET, EDU and HUM), rapid decrease (LAW) and no change (CA and HSK).

The EVS purchasing and usage trends comply with the figures given by Rogers[1] for his technology adoption model. Some schools are characterised by successful ongoing EVS use over several years while other school strategies for EVS, which had showed promise early on, have faltered in their use. There was some evidence that academics in STEMM subjects are more likely to engage willingly with EVS use where larger groups are taught, but this is not yet in evidence across all the STEMM groups at this university. Furthermore good practice exists and flourishes across non-STEMM subjects as well.

The strategies for successful School-based EVS embedding and continued use include the following three hallmarks:-

- Top-down management support for purchasing of handsets and including training for academics and administrators, and alignment with the School teaching and learning strategy.
- The existence of a core of innovators and early adopters of technology including the local EVS champions, who are willing to actively engage with their fellow colleagues in sharing the potential of EVS technology.
- An engagement with the pedagogical implications for changing and developing practice that the greater use of formative or summative polling and questioning requires.

The immediate future of classroom technologies such as EVS offers two main directions. Firstly, there is the continuation of adopting ‘institutionally provided’ handheld devices. This is a low-cost method that can be used easily and flexibly. The other options for classroom polling rely on sufficient wifi availability in the teaching rooms and/or mobile phone signal strength/network availability and capacity. It is anticipated that the capacity issue will present fewer barriers for adoption in future, and that the future of the classroom response systems is inevitably linked to the widespread use of mobile technologies by students.

[1] Rogers, E. (1995) Diffusion of Innovations (4th ed.)The Free Press, New York

2. Evaluation Aims

The evaluation work has investigated the current level of engagement by academic staff in the use of EVS across the institution. It has built on the work and outputs of the EEVS project in 2011-12 and the work of the iTEAM project 2011-2013 and now offers a review which indicates the breadth and nature of EVS use across the different academic Schools at the University of Hertfordshire at the close of the iTEAM project in summer 2014.

The following objectives for the evaluation were addressed:

a) Provide an understanding of the spread of EVS use and the roll out strategies for EVS across different Schools.

b) Provide examples of excellent practice to champion and identify alongside those local success factors which guided the strategies of schools which use EVS widely and reliably with positive feedback from students.

c) Propose an indication of the future requirements for supporting EVS use with academics in terms of pedagogical engagement and practical technical support.

d) Offer an informed opinion on the future strategic use for classroom technologies whether EVS or mobile technology and the opportunities for their linking in with the "next-generation" strategy for StudyNet.

3. Evaluation Approaches

A mixed methods approach using quantitative and qualitative approaches was used to address the objectives.

The project investigators undertook:-

- Investigations into existing data arising from the iTEAM reports to date in order to provide an estimate of growth/shrinkage in the use of EVS across different academic schools since the first year of widespread use of EVS in 2011-12. (Desk study addressing objectives a, and d)
- Quantitative surveys for academic users and non-users of EVS to explore the outcomes of EVS use and predictors of requirements for the future use (online using Bristol Online Surveys (BOS) addressing aims a, b, c, and d)
- Qualitative research via a series of interviews with academics across the different disciplines to corroborate and complement the findings from the survey. (Person to person interviews conducted by the investigators addressing aims a, b, c, and d)

A series of quantitative surveys was devised and set up through BOS with links emailed to participants in order to gather information from the following stakeholder groups:

- Programme Tutors
- School Student representatives

Quantitative data on student numbers and programmes were gathered from the Academic Registry as well as from the Senior Administrators in each School and compiled into a series of tables to compare undergraduate and postgraduate student numbers. Handset purchase data was provided by the iTEAM records since 2010 and then compared to the total student population to determine a current figure for "EVS coverage" in the schools.

Qualitative data was gathered through:

- Reviews of the School EVS Champion reports from 2011 and 2012
- Detailed discussions with the EVS Champions plus a focus group and survey
- Individual discussions with the Associate Deans for Learning and Teaching (ADLT)
- A focussed discussion with participants following a project presentation at the University's Annual Learning and Teaching Conference in May 2014
- Individual structured interviews with selected EVS Champions.

The aim of the interviews was to procure examples of standard and excellent practice as well as exploring particular reasons for local success or failure factors and the historic increases or decline in the usage of EVS technologies for different schools. Additionally, attention was paid to the development of school technology use strategies that have supported EVS use and to the school roll out and embedding strategies.

4. Findings

4.1 The spread of EVS use and the roll out strategies for EVS across different Schools.

4.1.1 Trends in EVS purchase and EVS "readiness"

The "EVS coverage" in an academic school in an academic year was calculated as a ratio between the total (cumulative) number of EVS handsets purchased and the total number of students registered on the taught programmes in the school in the academic year. This measure is used to estimate the percentage of student population in each of the academic schools that would be able to loan a handset for the duration of the academic year. Table 1 shows EVS coverage in different academic schools (SBUs) across the three most recent academic years. In a few cases where this number is higher than 100% this indicates that there was either a reduction in the total student population or issues with returning and re-using existing handsets.

SBU	2011-12	2012-13	2013-14
BS	15.67%	18.94%	33.92%
CA	0.00%	0.00%	0.00%
CS	48.06%	53.91%	144.72%
EDU	26.04%	28.90%	44.80%
ET	29.79%	32.37%	231.58%
HSK	12.79%	13.04%	39.80%
HUM	47.87%	51.53%	47.88%
LAW	77.59%	93.10%	105.99%
LMS	40.10%	43.50%	74.75%
PAM	72.73%	78.05%	72.56%

Table 1 EVS coverage of students' population (Students on taught programmes only and not including small SBUs such as APO and LTI (less than 2% of overall population))

This number is used to indicate the school's "readiness" to engage with EVS technology and as can be noticed from the line chart in Figure 1 below there are three different trends that can be identified, excluding the CA where there is no evidence of any EVS purchases:

1. Slow increase followed by slow decrease: HUM, PAM and LAW
2. Slow increase followed by moderate increase (less than 50%) : BS,HSK, and EDU
3. Slow increase followed by rapid increase CS, ET and LMS.

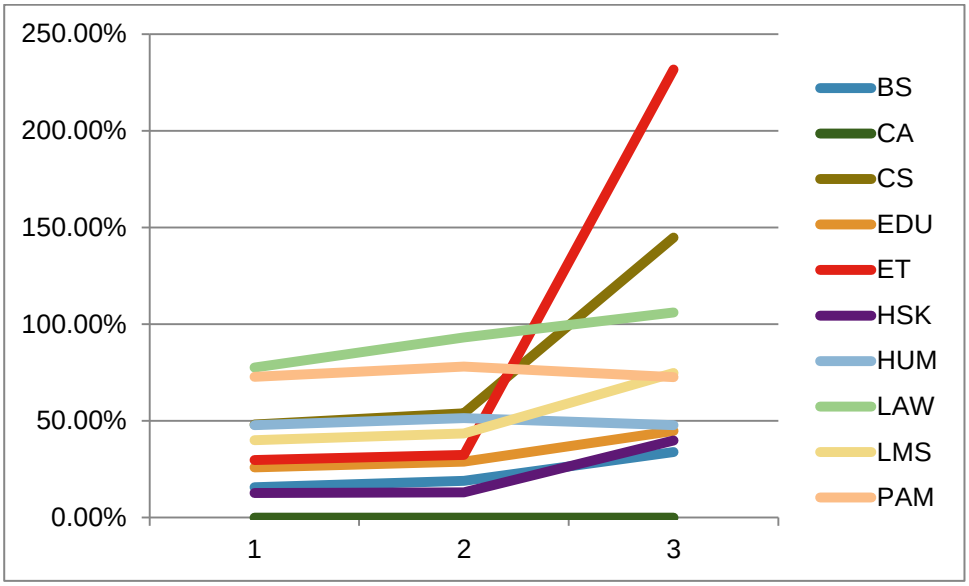

Figure 1 EVS "coverage" over the last three years

Another useful measure for finding out the trends in EVS demand in different schools is the annual increase in number of purchased EVS handsets compared to the last year, see Table 2 below.

SBU	pre 2011	2011-12		2012-13		2013 14	
	N	N	%	N	%	N	%
BS	1000	0	0.00%	200	20.00%	100	8.33%
CA	0	0	0.00%	0	0.00%	0	0.00%
CS	320	300	93.75%	325	52.42%	220	23.28%
EDU	260	240	92.31%	0	0.00%	0	0.00%
ET	0	560	NA	600	107.14%	600	51.72%
HSK	0	600	NA	1150	191.67%	655	37.43%
HUM	575	100	17.39%	200	29.63%	30	3.43%
LAW	450	900	200.00%	100	7.41%	0	0.00%
LMS	920	720	78.26%	600	36.59%	750	33.48%
PAM	320	0	0.00%	0	0	0	0.00%

Table 2 Annual increases in EVS purchase (N is a total number of new EVS purchases; % is the proportion of the new EVS compared to the "old" ones.)

With regards to the annual increase in EVS purchase there are two groups both following the same trend in Table 2 of rapid increase followed by a slower decrease.

1. Early commitment (all schools apart from HSK and ET)
2. Late commitment (HSK and ET)

Other useful components of the “readiness” for the EVS adoption are the total number of the EVS-equipped classrooms (N=120, 35.29%) and the total number of the academic staff trained in using EVS (N=145, 17.85%). Unfortunately per-school data related to these variables is not available.

4.1.2 Trends in EVS usage

While the number of EVS handsets purchased, EVS coverage and annual increase in EVS purchase are all useful measures for indicating the EVS “readiness” and the future EVS demand, these measures are not sufficient in explaining the actual usage of EVS in specific schools, nor the level or the type of EVS adoption.

The following variables are used in estimating the actual usage in 2013-14:

- Module coverage (% of active modules where EVS was used)
- Programme coverage (% of active UG or PG programmes where EVS was used on at least one module)
- Staff coverage (% of FTEs who used EVS in their teaching)
- Student coverage (% of UG students who used EVS in at least one of their teaching sessions).

Table 3 shows the estimated values of the aforementioned variables in different schools, where the value ranges are using the following scale:

- 1-10% - very low
- 11-30% - low
- 31-70% -medium
- 71-90% - high
- 91% and above - very high.

SBU	Coverage 2013-14					Trend
	Modules	UG Progs	PG Progs	Staff	UG Students	c.2012-13
BS	very low	very low	none	very low	very low	↘
CA	none	none	none	none	none	•
CS	low	very high	low	low	high	↗
EDU	low	medium	low	very low	low	↘
ET	low	medium	medium	low	medium	↘
HSK	very low	medium	medium	low	low	•
HUM	very low	medium	none	very low	low	↘
LAW	none	none	none	none	none	↓
LMS	medium	medium	low	medium	medium	↗
PAM	low	medium	none	low	medium	↗

Table 3 EVS usage in 2013-14

The values in Table 3 are estimated using the information obtained from Programme Tutor and Student Representative surveys, interviews with the EVS champions, School Associate Deans for Learning and Teaching as well as the information from SAMs and Academic Registry on the total number of programmes, modules, staff and students. Not all of the information was available but regardless of the missing data, the information provided was sufficient for estimating the adoption state.

The “trend” variable which estimated the difference in the usage compared to the previous academic year (2012-13) was derived from the values of the four variables (where present)

and the information provided in the iTEAM report for 2012/13. These values show that there were four trends in the level of EVS usage in 2013-14:

1. Slow increase (CS, LMS and PAM)
2. Slow decrease (BS, ET, EDU,HUM)
3. Rapid decrease (LAW)
4. No change (CA and HSK)

The characteristics of the adoption and the specific reasons for increase/decrease in use in individual schools are summarised in the following table.

SBU	Brief Summary points regarding recent trends and current practice in EVS use
BS	Anecdotal evidence from the EVS champion, estimates from the ADLT and information from the students' survey indicates a sharp decrease in the number of users due to a number of factors. These included a less than positive experience in some module teams, lack of active encouragement by the local champions, perceived lack of IH and local support.
CA	There have been pockets of interest but there is no top down support to drive EVS use. No early adopters have emerged. It is not considered to be suitable for the subject by many staff.
CS	A slow increase in use by staff and nearly 100% UG student coverage at levels 4 and 5, EVS are used in a combination of formative and summative activities, with more summative use in 2013-14 compared to previous years. Barriers for further adoption are linked to subject matter and some difficulties in summative use.
EDU	Very slow growth and some decline in the past year in spite of a small group of enthusiasts. EVS are not seen as a useful tool for the subject, plus there are some issues with staff confidence in its use.
ET	Used by a small % of staff, but included on large core UG modules, so high coverage for students. EVS are used mainly in a formative way with the exception of one member of staff (EVS champion) who uses it summatively. There has been a drop in usage compared to last year due to a decrease in summative use & some issues with technology. New local initiatives are in place to increase EVS use through L&T grants and training of new staff members
HSK	A reduction in use by L4 and L5 modules, but slightly more L6 and L7 modules now use EVS than in earlier years; slightly more programmes overall use EVS (60%). Use was discontinued on one programme but introduced on 3 other programmes. Usage was only in a formative way. Issues with staff confidence will be addressed by providing local (programme level) support.
HUM	Reduced adoption by staff who were using EVS primarily for summative assessment. Small cohorts, and technical issues were hindering wider adoption
LAW	While the School policy initially embraced a widespread take up and purchase of EVS, the ongoing pedagogy was not always appropriate or reflected on and after some negative student experiences EVS use was discontinued for large cohorts in 2013-14
LMS*	An increase in HES (new adopters in Sport Studies and N&D); slight decrease in Psychology. Both formative and summative use was evident with a high proportion of HES modules using it in a summative way. Pockets of mature use are evident (Biosciences), as well as new users (Sports Studies and N&D), and a "deep and narrow" embedding pattern in Psychology. *No information available from Pharmacy
PAM	A slow rise in use by staff and 100% L4 student coverage; "Deep and narrow embedding" means that a small number of core staff are committed to using EVS regularly. Perceived additional effort required and/or change in pedagogy is preventing wider adoption.

Table 4 Summary of school adoption and usage in 2013-14 compared to previous years

Based on the characteristics of individual schools' adoption and usage summarized in Table 4, the following findings were observed:

1. Slow increase in usage in some STEMM disciplines (CS, PAM and LMS), and a decrease in non-STEMM disciplines (LAW, BS, HUM, and EDU)
2. Mixture of formative and (low-stake) summative use in most of the STEMM subjects, and mainly formative use in non-STEMM subjects
3. The main barriers to wider adoption were:
    - Difficulties experienced in summative use (BS, HUM, ET),
    - Issues developed with staff confidence (LAW, EDU, HSK)
    - Considered unsuitable for the subject (CA, EDU)
    - Greater effort required including changes in pedagogy (PAM, BS)
    - Perceived lack of IH or local support (BS)
    - Small cohorts where academics know their students personally and encourage questions and contributions (e.g. HUM) thus leading to EVS being redundant
    - An initial under-estimation of the time it would take to develop confidence and proficiency and to see a reduction in teaching and assessment load (BS,LAW)

A comparison between Table 1 and Table 3 indicates that the EVS "readiness" in specific schools was not always a good indicator of the actual usage, with the differences observed in the following cases:

- The very high "EVS coverage" in ET (1760 EVS handsets/ 760 students) and the slowdown in staff usage might indicate less or no demand for the new handsets in 2014/15.
- In PAM, slow decrease in EVS coverage but slow increase in actual usage might indicate a need to purchase more handsets.

4.2. Examples of developing good practice

In this section we present examples of good practices, which were not mentioned in the earlier reports.

- Experienced teachers and technology adopters supporting the use of EVS with large core cohorts in early years of undergraduate programmes resulted in an overall positive student experience. Good examples included practice in CS, PAM, ET, LMS
- Active and committed support and engagement by the local EVS champions, who are themselves the prime users of technology, supports their peers. Good examples included practice in CS, LMS-HES, LMS-Psychology, ET.
- Central support should not be limited to training and the equipping of the classroom, but also and very importantly extend to the sharing of good practice and new ideas across different schools. An example of this was the bi-monthly EVS champions meetings organized by the LTI.
- The scholarly approach to technology adoption by the local Learning and Teaching workshops and the provision of regular user conferences and staff training all

supported users and especially the small pockets of local adopters. Good examples included practice in BS, ET, HSK.

- Placing the main focus on the "affordances" of the technology, i.e. exploring EVS for interaction, engagement and conceptual understanding, and less on the "100+ new things to do with EVS" approach, developed thoughtful and repeat engagement in users. Good examples included practice in LMS, CS.

- When the ADLTs led on the pedagogical consistency, local engagement was extended. Good examples included practice in HSK where the ADLT's approach invited proposals on how the EVS will be used.

- The establishment of a core database of questions per subject that could be re-used or adapted by the new users. This was especially useful for the non-STEMM subjects (e.g. in HUM, LAW) where historically objective tests have been under-used but was developed by users in CS and ET too.

5 Discussion points

In deciding to invest in large-scale technology adoption it has been shown in recent research that certain critical factors point to a successful embedding of technology which is more likely to be sustainable. The findings recorded in the authors' report from the EEVS project[2] as part of the JISC Assessment and Feedback Strand B programme remain valid and are reinforced by the current work which has explored in more detail the nature of the embedding of EVS technology.

Top-down management support was known to be one of the critical success factors for successfully introducing new technologies to the academy; the importance of leadership is now not only evident at the institutional level but seen as essential at the school and departmental level too. It is here that local budgets are decided, staff workload is allocated, staff development is prioritised and pedagogic decisions are made for programmes. The areas of responsibilities with respect to technology adoption between the Schools, the Centre and Information Management should be clearly defined, with the Centre overseeing the implementation across different schools and enabling and promoting the sharing of good practices. The importance of this for supporting technology for learning has already been shown in the 2012 research into the embedding of technology into universities.

*'**Availability of TEL support staff** remains the leading factor in encouraging the development of TEL, followed by **central university and school/departmental senior management support**, which have overtaken **availability and access to tools** in the rankings."* [3]

An additional hallmark of successful embedding of technology identified here has been the existence of a core of innovators and early adopters who are willing to engage with their local colleagues in sharing the potential of the technology. Whether the trend for technology adoption within the classroom develops fast or slowly it is the peer support for colleagues at a local level in developing their pedagogy and scaffolding their use of technology to enhance learning, which has been shown to be crucial to the impact and embedding of EVS. The enthusiasm, commitment and competences of the EVS Champions, the local leaders from each academic school, for using EVS handsets in their own teaching and assessments have

[2] Jefferies, A. & Cubric, M. (2012) Evaluating Electronic Voting Systems (EEVS) Final report for JISC Assessment and Feedback Programme, Strand B available online at: http://jiscdesignstudio.pbworks.com/w/page/48734953/EEVS%20Project

[3] Walker, R., Voce, J., & Ahmed, J. (2012). 2012 Survey of Technology Enhanced Learning for higher education in the UK. A JISC/UCISA funded survey. Available at: http://www.ucisa.ac.uk/en/bestpractice/surveys/tel.aspx

proved to be invaluable, where these 'early adopters' of the technology have provided essential pedagogic and technical direction to support other local users.

One size does not of course fit all users and it has become evident that some academic subjects are less suitable for EVS use, although not as many as assumed initially it might be unsuitable. Additionally the particular handset technology chosen for use at Hertfordshire, Turningpoint™, was not found to be easily compatible with the large Mac user-group. A key lesson learned over the past three to four years is that the process of adoption requires more time and effort invested initially for the meaningful fitting of the technology to one's teaching practice, and less so in every subsequent usage period.

In the JISC Assessment and Feedback Strand B EEVS project the focus was primarily on the quantitative and qualitative evidence from the students' experience. In this 2014 evaluation the concentration has been on understanding the trends of usage and adoption across different academic schools. A pattern was discerned here however which showed how students were driving technology adoption. The students who used EVS successfully have been requesting its use for other modules, years or Schools. These requests, emanating through either Programme Committee Meetings (PCMs) or via Student Feedback Questionnaires (SFQs) could in future be captured in a more formal way, and used as another means to justify the investment. This could be facilitated in future by having more feedback from the Student Representatives (SRs) and Programme Tutors (PTs) in general technology adoption scenarios and including this during the planning and introduction of modules and new programme validation.

The main limitation of this study is the lack of availability of specific usage data in some cases, resulting in the estimates from ADLT and EVS champions being used for assessing the state of the EVS adoption is specific schools. This suggests the need for the SBUs to record the use of, not only EVS, but other learning technologies, as only then the scholarly approach to adoption and use of technologies for learning will be enabled.

6. Future requirements for supporting EVS use

The immediate future of classroom technologies such as EVS offers two main directions. Firstly, there is the continuation within the university of handheld devices which are loaned or given to the students, now that the classroom infrastructure is in place and stable. This is a low-cost method that has been shown to be used easily and flexibly. The other options for classroom polling, which are currently being promoted by, for example, publishing companies or which use online application providers such as Poll Everywhere™, rely on sufficient wifi availability in the teaching rooms and/ or mobile phone signal strength/network availability and capacity.

Although current wifi and mobile phone capacity is not yet sufficient for large-scale use involving large numbers (i.e. 100s) of simultaneous respondents, it is anticipated that the capacity issue will present few barriers for adoption in future, and that the future of the classroom response systems is inevitably linked to the widespread student use of mobile technologies. Looking further ahead[4] it appears likely that the use of voting systems for formative and summative use whether facilitated via EVS or mobile technologies, will be integrated with the 'learner analytics' provided by a central LMS.

[4] Sharples, M., McAndrew, P., Weller, M., Ferguson, R., FitzGerald, E., Hirst, T., and Gaved, M. (2013). Innovating Pedagogy 2013: Open University Innovation Report 2. Milton Keynes: The Open University.

Glossary

ADLT	Associate Deans for Learning and Teaching
APO	Academic Partnership Office
BOS	Bristol Online Surveys
BS	Business School
CA	School of Creative Arts
CS	School of Computer Science
EDU	School of Education
EEVS	Evaluating Electronic Voting Systems Project
ET	School of Engineering and Technology
HES	Department of Human and Environmental Sciences
HSK	School of Health and Social Work
HUM	School of Humanities
IH	Information Hertfordshire
LMS	School of Life and Medical Sciences
LTI	Learning and Teaching Institute
N&D	Department of Nutrition and Dietetics
PAM	School of Physics, Astronomy and Mathematics
PCM	Programme Committee Meeting
PG	Postgraduate
PT	Programme Tutor
SAM	Senior Administrative Manager
SBU	Strategic Business Unit
SFQ	Student Feedback Questionnaire
SR	Student Representative
STEMM	Science, Technology, Engineering, Maths and Medical subjects
UG	Undergraduate