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Beyond The Happy Sheets! Evaluating Learning In Information Skills Teaching

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Abstract

This paper reviews three years of data measuring students' immediate reactions to a computer-assisted learning package in information skills and reports on work in progress to establish a more comprehensive programme of evaluation which will assess the medium term impact on learning of both the courseware itself and the way the courseware is delivered to students.

The GAELS courseware was developed in the late 1990s as part of a collaborative project between the Universities of Glasgow and Strathclyde, with funding from the Scottish Higher Education Funding Council. The courseware was designed to teach higher level information skills and was initially developed for use with postgraduate engineering students; it has subsequently been adapted for use with students in other subject areas, including biological and physical sciences, and has been embedded for several years now in workshop sessions undertaken with postgraduate and undergraduate students across the Faculties of Science and Engineering at the University of Strathclyde. The courseware is introduced at the start of the academic session and made available on the Web so that students can use it as needed during their course and project work.

During the first year, the courseware was used in isolation from other teaching methods (although a librarian was present to support students), whilst in the second and third years it was integrated into more traditional workshop-style teaching sessions (led by a librarian).

Library staff wish to assess the longer term impact on learning of both the courseware itself and the way the courseware is delivered to students. The existing evaluation data does not adequately support this type of assessment. Teaching sessions are routinely evaluated by means of simple feedback forms, with four questions answered using a five-point Likert scale, collected at the conclusion of each session. A more comprehensive programme of evaluation, including logging usage of the courseware outside teaching sessions and follow-up of students several months after their introduction to the courseware, is now being established to support a more meaningful assessment of impact of the courseware on student learning.

Introduction

The GAELS courseware was developed as part of a Scottish Higher Education Funding Council Strategic Change Initiative project which began in 1998 and completed its final report in 2001 [1]. This collaborative project between the Universities of Strathclyde and Glasgow (the universities are about four kilometres apart) had two main aims:

- 1) development of collaborative information services in support of engineering research e.g. rationalisation of print collections, creation of a focussed ILL service.

2) development of a CAL (computer assisted learning) package in advanced information skills for engineering research students and staff.

The courseware (CAL package) was developed to improve access to, and use of, engineering information. Existing “information skills” programmes were considered time-consuming, inefficient, and repetitive, with teaching duplicated within and across the universities, and classes were not always available when most relevant and useful. The courseware, designed to teach higher level information skills, was initially developed for use with postgraduate engineering students and staff.

Key requirements were to be its: availability via WWW; easy maintenance and updating by subject librarians after the project was completed; compatibility with existing postgraduate training at the two universities; capability of supporting a wide range of information seeking and information management tasks.

The project team began work in July 1998 and the first module was delivered at the two universities in November 1998. Officially unveiled in mid-1999, the full package used for the first time in the 1999 session.

The courseware was modular, to enable linear or self-directed progression:

- Introduction: Course aims, course map;
- Module 1: Searching for information e.g. databases, Boolean, truncation, fields, citation searching, browsing, current awareness; managing references;
- Module 2: Tools for information seeking e.g. OPACS, internet;
- Module 3: Information types for engineers e.g. journals, standards, patents, product information, technical reports, professional bodies;
- Module 4: Further information and resources.

Among the design features were: clear identification of teaching aims and learning objectives; task-oriented pages; largely text-based to enable easy maintenance; activities involving use of a range of online information sources; no compulsory tests or assessments; use in supported workshops or for self-study.

The GAELS package has subsequently been adapted for use in other subject areas. It was first used with Life Science and Chemistry postgraduate and Honours undergraduate students in the 2000 academic session, and has since been embedded in workshop sessions undertaken with students in the Science, Engineering, Arts & Humanities and Business faculties at the University of Strathclyde.

Phase 1

This section describes the feedback from teaching sessions based around the GAELS courseware from the 2001-2003 academic sessions. The teaching sessions were typically an hour long, although some lasted two.

Teaching sessions within the Library are routinely evaluated through the use of simple feedback forms, with four questions answered using a five-point Likert scale and qualitative comments, collected at the conclusion of each teaching session (response number in brackets):

1. To what extent were you already familiar with the content/skills of the class before the course?
None (1) some (2) fair amount (3) most (4) all (5)
2. How good was the presentation of material to you in this class?
Very poor (1) poor (2) fair (3) good (4) very good (5)

3. How much did you learn from the course/class?
 Nothing (1) a little (2) fair amount (3) quite a lot (4) a lot (5)
4. If there were any, how did you find the exercises?
 Very difficult (1) difficult (2) moderately easy (3) easy (4) very easy (5)

In 2001, the courseware was the only mode of learning delivered, although a librarian was present to support its use. In 2002 and 2003, the courseware was used in hybrid teaching sessions, embedded within a more traditional PowerPoint-based workshop. All sessions were delivered in computer laboratories.

Over the three years 1,187 postgraduate and final year undergraduate students were introduced to the courseware. 62% (735) completed feedback forms [Table 1].

Number of students introduced to GAELS in teaching sessions			
Year	No.	Forms	% return
2001	433	273	63.0%
2002-3	754	462	61.3%
Total	1187	735	61.9%

Table 1.

Overall, students appeared to find the presentation, which included the GAELS courseware, to be good or very good (73.5% of respondents) [Figure 1].

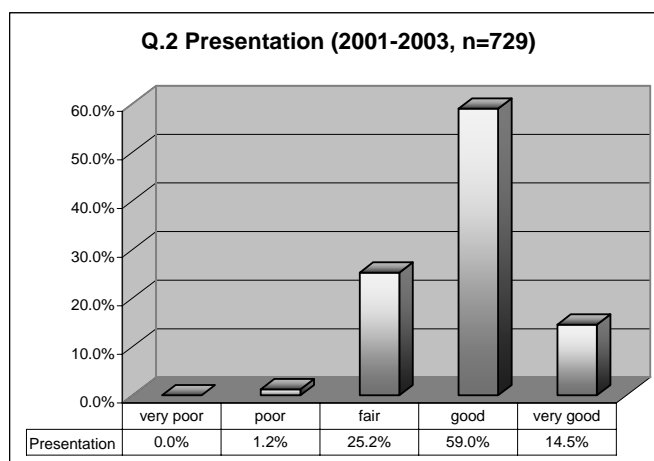


Figure 1. Response to Question 2: "How good was the presentation of material to you in this class?"

In 2001, only the courseware was presented, although a librarian was present to support its use. Responses to questions 1 and 3 are summarised in Figure 2. A large majority (82.4%) of the 267 respondents learnt at least "a fair amount" with over one third (37.8%) learning "quite a lot" or "a lot". A significant minority (17.6%) learnt "a little" or "nothing".

As the Science Librarian did not believe that the courseware covered all that students needed to learn and did not cater for a range of learning styles, in 2002 and 2003 the courseware was embedded within a more traditional PowerPoint-based hybrid teaching workshop. The results for 2002 and 2003 are summarised in Figure 3: an even greater majority (90.4%) of the 462 respondents claimed to have learnt at least "a fair amount" with a greater percentage (42.6%) learning "quite a lot" or "a lot". A smaller minority (9.5%) learnt "a little" or "nothing".

Hybrid sessions appear to show an improvement in learning over the courseware-only approach, nearly halving the percentage of students who learnt little or nothing (17.6% → 9.5%) and increasing the number of students who learnt at least a fair amount (82.4% → 90.4%) and who learned quite a lot or a lot (37.8% → 42.6%). Hybrid sessions are the most expensive to deliver when the time spent updating and maintaining the courseware as well as developing the workshop is taken into consideration.

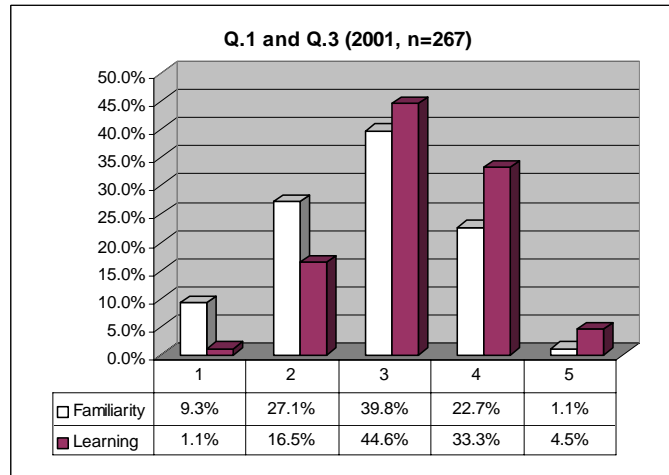


Figure 2. Responses to questions 1 (familiarity with content) and 3 (learning) (2001)

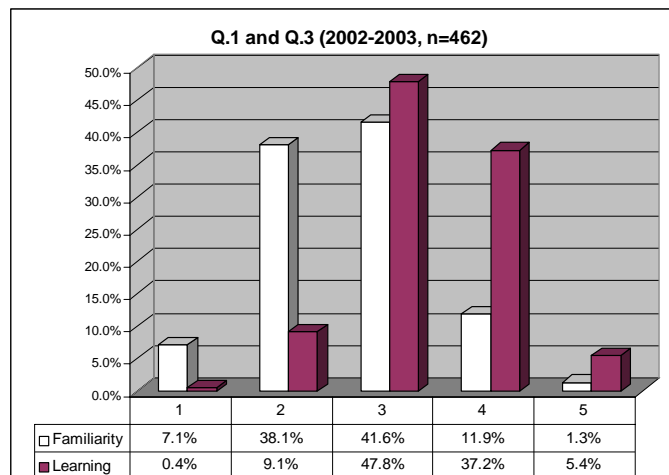


Figure 3. Responses to questions 1 (familiarity with content) and 3 (learning) (2002-2003)

A problem with Likert scales is that many respondents simply mark the middle option for each question. To alleviate this, responses of those students who had not marked “3” were considered in more detail.

When considering the respondents who had marked 1 (none) or 2 (some) to the question “To what extent were you already familiar with the content/skills of the class before the course?” [Figure 4], the 2001 (courseware-only) figures show that an overwhelming proportion (85.5%) of respondents learnt at least “a fair amount”, with nearly half (45.3%) learning “quite a lot” or “a lot”. A significant minority (14.4%) learnt but “a little”. In 2002-03 (hybrid), an even greater proportion (91.7%) than in 2001 learnt at least “a fair amount” and almost the same proportion (44.9%) learnt “quite a lot” or “a lot”. A smaller proportion (8.3%) than in 2001 learnt “a little” or “nothing”.

Even among respondents who had marked 4 (most) or 5 (all) to the question of familiarity with course content [Figure 5], the 2001 (courseware-only) figures show that a large majority (65.7%) learnt at least a “fair amount”, although just over one third (34.4%) learnt “a little” or “nothing”. In 2002-2003 (hybrid), even more (81.9%) learnt at least a “fair amount” while a smaller minority (18%) learnt but “a little” or “nothing”. This confirms that hybrid sessions appear to show an improvement in learning over the courseware-only, with fewer students taking nothing from the sessions.

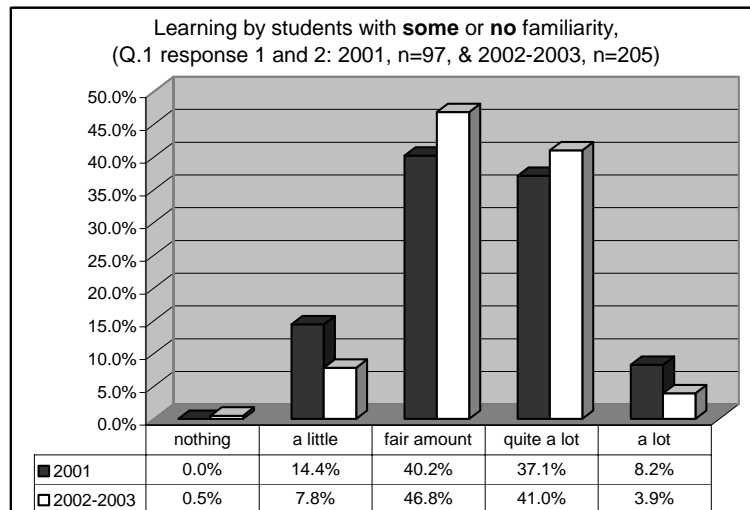


Figure 4. Responses to question 3 (learning) for those familiar with some or none of the course content in 2001 (left columns) and 2002-2003 (right columns)

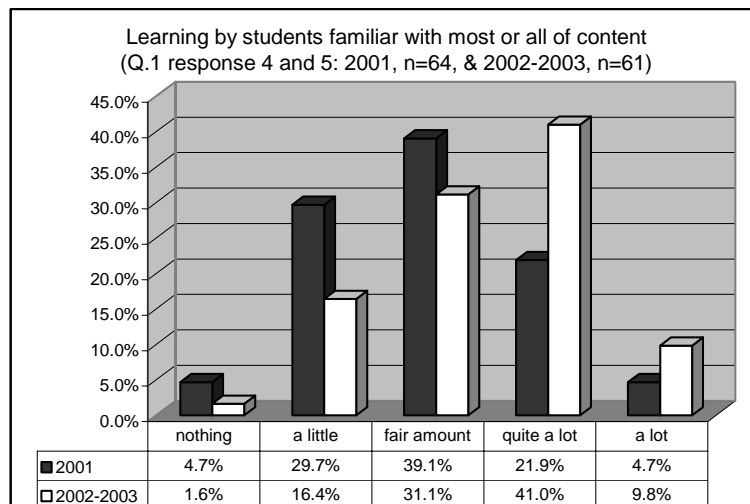


Figure 5. Responses to question 3 (learning) for those familiar with most or all of the course content in 2001 (left columns) and 2002-2003 (right columns)

Phase 1 discussion

“Bibliographic instruction” has a long history, dating back to the 19th century. The University of Strathclyde has an established bibliographic instruction programme dating back many years into the pre-digital era.

The phrase “bibliographic instruction” has evolved to be subsumed within the currently fashionable and much broader concept of “information literacy”. The latter phrase is attributed to Zurkowski in 1974 [2], where it was associated with the effective use of information in a commercial environment. The literature on bibliographic instruction/information skills/information literacy is vast, comprising nearly 4000 papers up to 1998 [3] and showing no sign of abating, although there is still considerable discussion about everything to do with the phrase, well summarised in Bawden’s 2001 paper [4].

The first significant response of the library world to the emerging concept of “information literacy” was from the American Library Association [5], with its 1989 Presidential Commission report stating that “to be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information” [6]. This widely quoted definition has been refined into standards, particularly by the ACRL [7,8] and CAUL [9].

The UK developed a later response with the SCONUL “Seven Pillars” model [10,11,12]. In the United States and Australasia, IL is firmly established in national and institutional policy goals. In contrast, developments in Europe, and particularly the UK, have been episodic and driven by individual institutions. EnIL, the European network on Information Literacy, has been established to define a European information literacy policy [13]. “Let a thousand flowers grow” might be a suitable motto for the approach of UK library organisations to IL: the result has been a fragmented and somewhat wasteful duplication of effort. Many institutions are developing their own IL policies bereft of central direction and support.

GAELS began in 1998 as a way of implementing a joint electronic library service between two Universities. Initial interest was not in information literacy per se or even information skills: there was a need to create a skills and training tool to support services spanning two universities. The reason for having bilateral services was the need to promote resource-sharing. The courseware subsequently became part of the information literacy momentum that built up in the UK. It was a typically British situation, with pragmatism and tools preceding policy.

With the current educational emphasis on user autonomy in satisfying information needs, a minimum set of competencies is required to dominate the universe of information available. Mastering these competencies is the purpose of information literacy [14]. The most complete set of competencies produced so far are those of the ACRL, although SCONUL is soon to produce a set of competencies based on its Seven Pillars model [15].

It would have been better to have had an institutional commitment primarily to information literacy as a concept and then generated the tools from that broadly supportive institutional philosophical foundation, as it has been in North America and Australasia. The University of Strathclyde has not yet developed a fully-fledged institutional policy on information literacy, nor e-learning, though the Library is playing an active part in shaping the evolution of such policy.

The GAELS courseware is an attempt at providing information skills training: information skills is a key component of information literacy. The ALA report saw IL as greater than a library issue: “citizenship in a modern democracy involves more than knowledge of how to access vital information. It also involves a capacity to recognize propaganda, distortion, and other misuses and abuses of information” [16] i.e. it requires critical thinking and analytical skills. “Information literate

people know how to find, evaluate and use information effectively to solve a particular problem or make a decision – whether the information they select comes from a computer, a book, a government agency, a film, or any number of other possible resources” [17]. The Australian Library and Information Association [18] has stated that IL “can contribute to participative citizenship, social inclusion, acquisition of skills, innovation and enterprise, the creation of new knowledge, personal, vocational, corporate and organisational empowerment, and learning for life.”

The reaction sheet results, overall, appear gratifying – most students found the presentation itself good or very good. It appears that the hybrid sessions generated better results in terms of learning than using the courseware on its own, confirming the findings reported by Joint in 2003 [19].

In 1989, the ALA commented the most academic learning was passive, with little in the students’ environment to encourage active thinking. Information has a brief half-life, and “it must be clear that teaching facts is a poor substitute for teaching people how to learn i.e. giving them the skills to be able to locate, evaluate and effectively use information for any given need” [20]. “The current trend in education is to try and facilitate learning, rather than to teach a certain set of material” [21]. In 2001, courseware-only students underwent an active learning experience, and achieved reasonable outcomes (according to the reaction forms); unfortunately, there was no medium-term assessment of actual learning.

Active learning requires more effort from students. Being taught by a person e.g. in a workshop is probably easier for the students, and may be more effective in terms of learning outcomes, but is it more cost-effective than using courseware alone to deliver the learning outcomes? The hybrid sessions of 2002 and 2003 were more passive than the courseware-only sessions of 2001. Though apparently more effective than courseware alone, might not using courseware alone and identifying students who might benefit from an alternative experience, thereby targeting professional librarian time more effectively, be more cost effective? It is difficult to draw conclusions about the benefits of courseware when it is used in a hybrid setting.

However, what were we actually measuring with our reaction sheets? The use of such user-satisfaction forms measures immediate reaction (Level 1 of Fitzpatrick’s four levels [22]) to the session – important as a measure of customer satisfaction - but does not measure whether any learning (Level 2) has taken place. Learning can be considered as increase in knowledge, improved or developed skills, or a change in attitude. Although there are established methodologies for measuring learning, these generally involve pre- and post-testing of students (not undertaken for the current analysis, although carried out in an earlier study [23]).

There are reservations about the effectiveness of pre- and post- testing e.g. it often concentrates on the mechanical rather than the conceptual; replicating the same test after the session as before almost guarantees that improvement will be found. Even with the severe time restraint at the University of Strathclyde, some form of measurement of learning may be necessary for the future.

Phase 2

To gain insight into whether there had been any medium-term benefit from the teaching sessions, a survey of one cohort of 180 final year undergraduate Pharmacy students was undertaken six months into the 2003 academic session. These students had received a typical 90-120 minute hybrid training session in the first week of the

academic session: this approach had been adopted to appeal to a variety of learning styles, with lecture, visual, handout, and practical (courseware) components.

To reach as many students as possible, and to facilitate completion, traditional pen and paper was replaced by an online survey within the Faculty's VLE. To encourage participation, an incentive was offered in the form of a £20 voucher (the questionnaire is reproduced in the Appendix, along with responses).

The survey ran for eight days, with a response rate of 20%. The low response may have been due to a delay of several weeks implementing the survey, resulting in proximity to final exams; because of this, the survey could not run for the four weeks that had been planned.

Such a low response rate suggests caution in interpreting results. Nevertheless, all respondents had taken part in one of the library sessions. 67% had found the session at least "useful", and 61% had seen their use of the library change at least "a fair amount" as an outcome of the session. 64% had increased their knowledge of the library's print resources at least "a fair amount" and 83% had increased their knowledge of the library's electronic resources by at least "a fair amount".

36% were "much more" confident, and 78% at least "a little more" confident of their abilities at constructing a literature search. All had used electronic databases at least "a fair amount" and 67% had used them "a lot" for their university work, with 88% using truncation at least "sometimes", 83% using Boolean operators at least "sometimes", and 86% using database thesauri at least "sometimes".

Despite the GAELS courseware being introduced and the students being given time in the workshop to use it, six months later 71% claimed not to be aware of the courseware: 75% had not used it at all since the teaching session (and the remaining 25% had only used it between one and four times). This finding is of concern, although the teaching session appears to have been effective in achieving learning and behaviour change.

Phase 2 Discussion

Behaviour change (Fitzpatrick's Level 3) cannot occur unless there has been learning. Measuring behaviour change, to see whether information skills are put into practice, is more complex. Surveys and interviews are recommended: although it had been hoped that individual or group interviews with students might have taken place, there was a lack of academic support and therefore no interest from targeted students.

The survey was an attempt to gain some insight into learning and behaviour change. The students reported benefits from the teaching sessions six months after the session, but most did not remember the GAELS courseware package, and 75% had not used it at all subsequent to its use in the teaching session. This suggests that the usefulness of the sessions reported did not arise from the use of the GAELS package, but rather from the face-to-face contact. Nevertheless, the results showed that there is value in user education classes that persists beyond any immediate impact.

Conclusions

The GAELS courseware originated in a collaborative project in the late 1990's, and its use preceded the publication of the SCONUL Seven Pillars model of 1999. The original goal of the project has been extended by implementing project courseware across four of the University's faculties and then reconsidering this experience in

the context of the worldwide interest in information literacy. GAELS Science has become the cornerstone of information skills training among postgraduates and senior undergraduates in the Faculty of Science.

1. The 2001 results clearly demonstrate that the GAELS courseware achieved its aims in effectively delivering information skills training to postgraduate and senior undergraduate students.
2. Although hybrid sessions appear to be more effective in improving learning outcomes and decreasing the proportion of respondents who took little from the session, one cannot really draw any conclusions about the usefulness of courseware in a hybrid context.
3. The survey, despite its limitations, showed that students value user education classes beyond the immediate impact of the class, and provided clear indicators for future directions in research.

Whither GAELS Science?

- GAELS courseware will remain the cornerstone of postgraduate and senior undergraduate information skills teaching in Science. Not all Departments in the Faculty utilise the services of the Science Librarian: the courseware offers a proven resource to reach students in these Departments.
- The GAELS courseware is now five years old. The courseware will be redesigned to more closely align with the SCONUL Seven Pillars model and the (anticipated) SCONUL manual for outcome measurement. This should enable the courseware to again stand alone.
- The courseware may be embedded in the Science Faculty VLE.
- More systematic evaluation will be undertaken, in line with SCONUL recommendations, developing the use of interviews and VLE-based questionnaires.
- Effort will be made to identify that sizeable percentage of students who learn little from the package, and offer them alternative training.

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Appendix. Follow-up questionnaire

Responses are listed beneath the Likert scale

1. Did you attend one of the Library sessions at the start of the first semester?
Yes (36) No (0) (If Yes, please continue from Q.2 – if No, please continue from Q.7)
2. Have you found the material covered in that Library session useful to your university work?

Not at all useful	not very useful	a little useful	useful	very useful
0	1	11	21	3
3. Has your use of the Library changed as a result of the Library session?

A lot	quite a lot	a fair amount	a little	not at all
2	10	10	13	1
4. Did the Library session improve your knowledge of the **print** resources available to help your university work?

Not at all	a little	a fair amount	quite a lot	a lot
5	8	12	10	1
5. Did the Library session improve your knowledge of the **electronic** resources available to help your university work?

Not at all	a little	a fair amount	quite a lot	a lot
0	6	12	11	7
6. Since the Library session, how confident are you at constructing a literature search strategy?

Much more	a little more	about the same	a little less	much less
13	15	6	1	1
7. How often have you used electronic databases (e.g. PubMed, Embase, Web of Science) for your university work since the start of 1st semester?

A lot	quite a lot	a fair amount	a little	not at all
24	8	4	0	0
8. Do you use truncation to improve your search strategies?

Never	almost never	sometimes	fairly often	very often
2	2	18	12	2
9. Do you use Boolean operators (AND, OR and NOT) to improve your search strategies?

Never	almost never	sometimes	fairly often	very often
3	3	13	10	7
10. Do you use thesauri available with databases such as PubMed (MeSH) and Embase (Emtree) to assist your searching?

Very often	fairly often	sometimes	almost never	never
2	3	11	13	7
11. Are you aware of the Library's GAELS information skills packages? Yes (10) No (25)
12. How often have you used the GAELS information skills package (<http://gaels.lib.strath.ac.uk/biomed/>) in the last six months?

>10 times	5 – 10 times	2 – 5 times	once	not at all
0	0	3	6	27
13. Has the GAELS information skills package been useful?

Not at all useful	not very useful	a little useful	fairly useful	very useful
15	7	10	2	0