

Evaluation of software tools supporting outcomes-based continuous program improvement processes: Part 2

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Abstract –The Canadian engineering accreditation board (CEAB) mandate tasked each engineering program to assess student outcomes in the form of graduate attributes and develop a data-informed continuous program improvement stemming from those assessments.

Administering, collecting and organizing the breadth assessment data is an extensive process, typically centralized through the use of software tools such as learning management systems (LMS), content management systems (CMS), Assessment Platforms (AP) and Curriculum Planning & Mapping tools. These systems serve a variety of roles, ranging from course content delivery, e-learning, distance education, learning outcomes assessment, outcomes data management and learning outcomes analytics. Vendors have been developing various solutions to accommodate the shift towards outcomes based assessment as part of a continuous improvement process.

This paper will continue where the original paper presented at CEEA 2013 left off. It will introduce the new classifications of tools, how well each tool aligns with the EGAD (Engineering Graduate Attribute Development) project 5-step process and compare and contrast software tools supporting outcomes based assessment as part of a continuous improvement process such as Chalk & Wire, Atlas Curriculum Mapping, Entrada, CoursePeer and other systems.

Keywords: Learning Management Systems, Assessment Management Systems, Curriculum Mapping, Academic Analytics, Data Management & Reporting, Outcomes based assessment

1. INTRODUCTION

This year, Canadian engineering programs are required to meet the Canadian Engineering Accreditation Board's mandate. Institutions must show that their graduates possess the outcomes representative of twelve graduate attributes, and must utilize the results of the outcomes assessment for the purposes of continual improvement of the program. At this point in time, the EGAD Project has observed through its workshop offerings and CEEA

conferences that many engineering institutions are quite familiar with creating and assessing student learning outcomes. Despite this familiarity institutions have significant questions on how best to collect, manage, visualize and use outcomes assessment data for the purposes of program improvement. At the heart of these processes is a variety of software tools and solutions that assist with various facets of outcomes assessment, data collection, management, visualization and process planning.

At the annual meeting of the Canadian Engineering Education Association in 2012, the EGAD Project sought to raise awareness regarding available software tools and technologies by providing an evaluation of a select number of tools and the strengths and weaknesses of each[1]. The primary goal of that paper was to communicate to the engineering education community that adopting a software tool or solution is not a quick process, and careful consideration and resources must be invested to ensure the successful, sustainable, long-term adoption of a software tool[2]. If the software tool is adopted without sufficient support, internal championing or consideration to change management issues, then it is unlikely to develop into a sustainable, long-term practice[3], [4].

The landscape of software tools for outcomes based continuous program improvement (CPI) processes is incredibly diverse with an overwhelming number vendors that offer a multitude of products catering to variety of needs, and the list is continually being modified[5]. These solutions offer solutions that range from all encompassing solutions, to planning software, to specialized assessment platforms, to fully integrated analytics-based learning systems. The primary challenge remains unchanged: little comprehensive information exists comparing and contrasting the features and relative strengths of each solution.

It is the continuing purpose of this paper to present, compare and evaluate a variety of commercially and freely available software tools that support outcomes based assessment as part of a CPI process, reflected by the EGAD Projects 5-step approach. To that end, five software tools were evaluated: Chalk & Wire, CoursePeer, Entrada, Atlas Curriculum Mapping, and iSeek Supercruncher. This selection of tools differs from the previous years, as assessment planning tools and

curriculum mapping tools, which do not typically possess assessment capabilities, were included in this review.

2. EVALUATION METHOD

The vendors for each software tool were contacted and asked to deliver a presentation regarding the strengths and contributions of their particular software tool. Presentations were directed towards outcomes based assessment, data management, outcomes analytics and continuous program improvement capabilities. Wherever possible, a live demo or sandbox environment was requested to evaluate the system.

Following the presentations, the software tools were classified by 2 independent criteria and evaluated by 5 independent criteria, illustrated below. In the case of the new tools that do not incorporate the functionality, a N/A will be given for the select criteria. Additionally in this paper, a new classification criteria was established: a measure of how many facets of the EGAD 5-step approach the tool embodies.

2.1. System Classification

The evaluation element classifies the software tool by the following criteria:

Table 1: System Classification

Category	Description
LMS	Learning management system. Capable of delivering content and administration for course offerings. May offer integrated learning outcomes assessment and analytics.
L/CMS	Learning content management system. Capable of creating and delivering content and managing grades for a multitude of courses. In addition can offer e-learning and distance based courses, supports collaborative content, publishing elements, e-portfolios and facilitated content management. May offer integrated learning outcomes assessment and analytics.
AP	Assessment Platform. Capable of creating assessment elements to evaluate, analyze and report student performance in learning outcomes. Focuses on assessment of select evidence for outcomes. May leverage content creation tools or a common vehicle for the collection of student artifacts (e.g. ePortfolio)
AS	Analytics System. Capable of collecting, aggregating or leveraging multiple and disparate data sources containing assessment information and results. Provides analysis and reporting of assessment data at varying granularities and can be used to present results to a variety of stakeholders.
CMT	Curriculum Mapping Tool. Capable of multiple approaches to plan, link, map and report on plans to

	assess learning outcomes. Focuses on curriculum development and improvement. May offer reporting capabilities regarding aspects of an outcomes-based approach.
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2.2. System Integration

This evaluation element describes how the software tool is integrated with other educational technology, human resource systems and 3rd party applications:

Table 2: System Integration

Category	Description
LTI	Learning Tools Interoperability (LTI). A standard developed by IMS global to allow different learning tools a way to interface with a variety of 3 rd party tools. This standard allows for a secure link to be created from a learning tool to another 3 rd party application. The most recent LTI standard is LTI 1.1.1, with LTI 2.0 in development.
API	Application Programming Interface (API). A standard protocol intended to be used as an interface allowing software tools to communicate with other 3 rd party applications. Current standards for APIs reference the SCORM 2004 version, it's successor the Tin Can API, now commonly referred to as the Experience API (xAPI)
Custom	Custom interface or wizard developed to import or export data into the software or 3 rd party application

2.3. Rubric-based Assessment

This evaluation element focuses on the software tool’s use of rubrics in assessment of student submissions. Ease of rubric creation, customization and storage for future use and sharing is considered.

Table 3: Rubric-based Assessment

Outcome	1 star	2 Stars	3 Stars
Rubric Generation	Rubric generation is present but poorly implemented. User interface is obscuring or confusing requiring comprehensive training	Rubric generation is an implemented feature. User interface requires training prior to use.	Rubric generation is excellently implemented. Allows for quick, easy creation and is easily accessed.
Customization	Rubric outcomes and assessment levels can be customized but is poorly implemented, or customization is limited by imposed restraints.	Rubric outcomes and assessment levels can be customized according to user preference. Outcomes must be specified for each rubric element.	Full customization of rubric outcomes and assessment levels is possible and easily done. Outcomes can be added from repositories into rubrics.
Rubric Repository	Created rubrics are available for future by a template structure.	Created rubrics are archived by specific course or department into a repository. Users can search for rubrics by specific text.	Created rubrics can be placed into a searchable repository available to all faculty or department members.

Table 4: Learning Outcomes

Outcome	1 star	2 Stars	3 Stars
Multi-level capability	Learning outcomes can be created and assessed at select levels with limits or constraints.	Learning outcomes can be created and assessed at select levels (course, department, program, institution)	Learning outcomes can be created and assessed across all levels (course, department, program, institution)
Multi-level mapping	Learning outcomes can be mapped at select levels with limited reporting options.	Learning outcomes can be mapped to select levels of assessment with graphical or tabular reporting options.	Learning outcomes can be comprehensive mapped to all areas of assessment across all levels, with a variety of reporting options
Multi-instance mapping	Learning outcomes can be assessed at select levels with limits or constraints.	Learning outcomes can be assessed in multiple instances across select levels.	Learning outcomes can be assessed in multiple instances or assessments across all levels
Outcomes Repository	Learning outcomes can be archived or viewed at select levels with limits or constraints to link to existing assessments.	Learning outcomes can be archived in a repository available for select groups at specific levels to incorporate into assessments.	Learning outcomes can be archived in a searchable repository available for all levels to incorporate into rubrics and assessments.

2.4 Learning Outcomes

This evaluation element focuses on the software tool’s use of student learning outcomes. It looks at how learning outcomes can be created in an institution and if outcomes can be used at multiple levels (institution, faculty, department, course), if outcomes can be mapped across the levels (outcomes curriculum mapping), if outcomes can be linked to multiple assessment instances, and if outcomes can be archived into a searchable repository.

2.5 Assessment

This evaluation element focuses on the system’s assessment capabilities. It looks at the types of student evidence used in assessment, the capability of multiple assessors on submitted evidence, the efficiency of grading student submissions, and the ease and quality of the feedback that can be provided to the student.

Table 5: Assessment

Outcome	1 star	2 Stars	3 Stars
Direct & Indirect Evidence	Learning outcomes can only incorporate multiple forms of evidence are very limited	Assessments can incorporate both direct and indirect evidence of student learning with certain limitations	Assessments can incorporate multiple sources of both direct and indirect evidence of student learning
Multiple Assessors	Assessments can be graded only by course personnel	Assessments can be graded by multiple assessors from a variety of assigned roles	Assessments can be graded by multiple assessors as well as peer-based assessment
In-line grading	Grading can only be done outside the student submission via a grade-book or rubric elements	Grading can be done by within the student submission via selectable grades for rubric elements	Grading can be done quickly in-line with rubrics, while viewing the student submission
In-line feedback	The student submission can only be commented on offline via commenting text boxes	The student submission can be commented on in-line via a comment field. Comments can be added for rubric elements and the overall assessment	The student submission can be ‘marked-up’ and commented on in-line, providing rich feedback. Comments can be added for rubric elements and the overall assessment.

2.6 Analytics

This evaluation element focuses on the system’s outcomes analytic capabilities. It looks at the availability of reporting across institutional levels (down to student level), the flexibility of both tabular and graphical reporting, how on-demand the reporting methods are, the flexibility of longitudinal reporting methods and the ability to create custom groups (demographic or otherwise) for reporting.

Table 6: Analytics

Outcome	1 star	2 Stars	3 Stars
Multi-level reporting	Reporting on standard metrics & learning outcomes are limited	Reporting on standard metrics & learning outcomes can be run at select levels	Reporting on standard metrics & learning outcomes can be run at any level
Tabular reporting	Reporting on standard metrics & learning outcomes is limited to a pre-defined table	Reporting on standard metrics & learning outcomes can be reported on in several pre-defined tabular formats	Reporting on standard metrics & learning outcomes can be reported on in customizable tabular formats
Graphical Reporting	Reporting on standard metrics & learning outcomes is limited to a pre-defined graph	Reporting on standard metrics & learning outcomes can be reported on in several pre-defined graphical formats	Reporting on standard metrics & learning outcomes can be reported on in customizable graphical formats
On-demand reporting	Reporting on standard metrics & learning outcomes is limited.	Reporting on standard metrics & learning outcomes can be run only at specific time points or key assessments	Reporting on standard metrics & learning outcomes can be reported on at any time
Longitudinal reporting	Longitudinal reporting on standard metrics & learning outcomes is limited	Longitudinal reporting on standard metrics & learning outcomes is available for select levels, metrics or outcomes	Reporting on standard metrics & learning outcomes can be reported longitudinally for all levels, metrics and outcomes
Custom group reporting	Reporting on customized groupings is limited	Pre-defined groups can be created for reporting of standard metrics & learning outcomes within a course	Custom groups can be created for reporting of standard metrics & learning outcomes

2.7 Pricing

This evaluation element focuses on the price of the system. It looks at the hosting model of the system, the duration of the subscription or licensing of the system, and the approximate cost of the system typically derived from full-time equivalent numbers.

Table 7: Pricing

Category	Description
Hosting model	Is the software tool hosted on site by the institution (Self) or is “site as a service” (SaaS) hosting available?
Subscription	Is the software tool available by a designated subscription or licensing model (Yearly License) or is it freely available (Open-source)
Cost	Cost model and fee for the software tool. Most software packages are available on pricing that is scaled on full time equivalent (FTE) numbers

2.8 EGAD 5-step Alignment

This evaluation element focuses on how many facets of the tool or solution align with the EGAD 5-step approach for outcomes based, data-informed, continuous improvement, outlined below:

1. Program Evaluation (Defining the key aspects, purposes and outcomes of your program)
2. Curriculum Mapping (Where are outcomes developed and assessed)
3. Assessment & Data Collection
4. Analyzing and Interpreting Data (Reporting and analysis of the data)
5. Data informed Curriculum Improvement (Leveraging data to inform change)

Tools will be given 1 star per aligned aspect. It should be noted that achieving a high star ranking in this category does not imply that one tool is superior to another, as specialized solutions for a single facet of the EGAD 5-step approach would possess a lower ranking than a more comprehensive tool that addresses multiple facets.

3. SOFTWARE TOOL SUMMARIES

In the interest of providing a rich evaluation of each software tool, a brief summary of each is provided below. These summaries focus on the particular strengths and weaknesses of the software tool that may not be evident from the evaluation criterion.

3.1 Chalk & Wire

Chalk & Wire (<http://www.chalkandwire.com/>) is a fully integrated assessment platform designed for institutional use and is capable of the management, collection and reporting of student outcomes data for multiple competency based structures simultaneously. The primary strengths of Chalk & Wire can be separated into the technology contained within the platform and the grounded, institutional-culture conscious approach towards implementing the platform.

The approach of Chalk & Wire to implementing the platform is a key focus, and high priority for the successful implementation of the platform. The company is very aware of the change management issues that arise from the adoption of assessment practises, externally or internally motivated. Significant efforts are made to ensure an authentic, well-aligned and sustainable assessment approach that considers the unique culture and environment of your institution. Many vendors offer training, implementation and consulting for their products, but this was a key concern for Chalk & Wire who consider it to be the foremost goal in establishing relationships with institutions.

The platform seeks to represent principles of authentic assessment via e-portfolio submissions as the key method of gathering student evidence. Competency structures and outcomes are easily created or imported in a hierarchical fashion, with the ability to relate and align multiple structures. These are fully sharable to a common library, allowing access for all users to link outcomes to courses and assessments. Portfolios and assessments are structured either in an ad-hoc fashion outside the portfolio, or by using tables of contents and assessment templates which provide students with instructions, resources and information to complete their submission. Assessment rubrics are easily created, stored and linked to competency structures and are able to be viewed in-line while grading. Feedback is easily provided in-line at the rubric and assessment level through direct markup, video and audio comments. The analytics offerings of Chalk & Wire offer flexible, on-demand, customizable reporting on outcomes that can drill down to custom group or student level granularity. Uniquely, the analytics of Chalk & Wire also offers statistical analyses for validity and reliability measures for rubrics, and correlation and cluster analyses for holistic assessments.

A weakness of Chalk & Wire is the 2-stage nature of the platform. Chalk & Wire is not a learning management system, where the majority of students access content, lectures, course grades and other aspects of contemporary course offerings at most institutions. Despite the wealth of integrations and interoperability tools offered by Chalk & Wire this is a drawback to institutions that wish to have a single solution to manage learners, course offerings,

assess and report on outcomes. Overall, Chalk & Wire is very well aligned with all facets of the EGAD 5-step approach, achieving a 5-star ranking, offering institutions a unique solution as part of an outcomes-based, data-informed, continuous improvement process.

3.2 CoursePeer

CoursePeer (<http://www.coursepeer.com/>) is a suite of cloud based tools best classified as a hybrid Learning/Content Management System and Assessment Platform that focuses on flexible teaching and learning in a collaborative, blended, social learning environment. CoursePeer provides a learning environment, content management and delivery, and assessment tools represented by its social learning platform, alongside analytics and reporting represented by its attribute I/O platform. CoursePeer supports many third party applications via both API and LTI integration allowing for fully customizable learning experiences.

The strengths of CoursePeer are the modern social, collaborative and peer centred focus towards learning experiences, the flexibility of its rubric-based assessment, and its data-driven dashboards. The platform offers instructors an easy, module based means to offer content to students that is fully integrated with social media aspects: real-time discussion boards, virtual meetings & office hours, social learner profiles, and tools to create and foster collaborative learning through learning communities. The platform also offers an in-line audience response system, LivePeer, allowing learners both real-time classroom and virtual interactions with instructors, and affords instructors the ability to implement just-in-time strategies through polling, surveys and quizzes. Competency structures can be created or imported, and shared across programs, and are easily assessed by flexible N-level rubrics with dimensions selected from the competency structure. Incorporates multiple assessor roles for student evidence, with transparency between graders and allows for the addition of external data for assessment purposes. Continuing with the social aspect of learning is the ability to offer badges for motivation and recognition of student ability. Analytics are dashboard focused, allowing for fully customizable, easily understood graphical and tabular representations of social analytics (collaboration, engagement, reciprocity, sentiment), management analytics (course & content consumption) and key performance indicators (competency achievement). All analytics reports are available for individuals, cohorts and custom groups in both an on-demand and longitudinal manner.

The weaknesses of the CoursePeer platform primarily lie in the lack of in-line feedback and rubric grading of student evidence, and the hybrid nature of the tool. The ability to efficiently and accurately assess student

evidence is hindered by having to view student submissions in a separate window or area, which potentially affects courses with limited resources. Formative feedback is also essential to the development of student outcomes, and the ability to directly indicate areas for improvement on submissions by graders and peers would be an improvement to this socially focused platform. Overall, CoursePeer is well-aligned with the EGAD 5-step approach achieving a 4 star rating, as the curriculum mapping features of the platform could be extended beyond their current capabilities to offer more comprehensive map.

3.3 Entrada

Entrada (<http://www.entrada-project.org/>) is an open source, web-based platform that is best classified as a learning management system but with a different approach that is “meant to be more than an LMS”. This approach sees the platform integrate education and social networking to promote a collaborative, community-building, e-learning experience. Entrada, being an open-source project available on GitHub, can be customized and further developed by any party upon completion of a contributor’s agreement. Users seeking a more developed, supported platform can also “buy-in” to join a collaboration group of developer institutions that will offer more customized options and modules over the base platform. The developers also intended Entrada to be customizable to a variety of e-learning tools and offer integration capabilities through LTI standards and plans to develop integration using the experience API (xAPI) in future versions.

Entrada is constructed around 6 pillars that encompass the core functionality of the platform: (1) Academic scheduling, (2) Curriculum mapping, (3) Learning management system, (4) Community & social networking integration, (5) Evaluation & assessment, and (6) Internal accountability & accreditation.

The strengths of Entrada lie within the platforms focus for competency based learning and its social and collaborative approach to e-learning through the adoption of learning communities. Another interesting feature is the student dashboard, which ties into the academic scheduling pillar and offers students an at-a-glance view of their courses, social, community and learning events. The platform embodies a bottom-up model, with a competency or outcomes-based structure embedded in the curriculum as the key element on which learning experiences and courses are constructed. The platform can accommodate a number of competency/outcomes structures, which can be associated to courses, learning events, and a number of assessment and evaluation forms. Curriculum maps are easily produced and detail associations of competencies down to individual learning events. The learning events are the key areas for student

evaluation and incorporate a wide variety of contexts, methods and structures for competency-based assessment.

The community and social networking allow instructors and learners to interact in a meaningful way beyond the classroom, increasing the interaction between users through online meetings and tutorials using Fuze meeting, encouraging collaboration through Google Apps integration, and e-portfolios for student-lead evidence of learning.

The weaknesses of Entrada are the limited capability for rubrics for assessment and the limited analytics capabilities. Assessment via rubrics is possible in the current version, but lacks the capability to associate rubric dimensions with a specific aspect of a competency or outcome. The analytics capabilities of the platform are limited primarily to summary reports and statistics from the LMS use and interactions rather than measures of student performance. Expanding functionality in these areas is a focus for future versions of the platform and a key goal for Entrada developers. Overall, Entrada obtained a 3 star rating, representing fair alignment with the EGAD 5-step approach, which would be improved with the continued development of rubric functionality and improved analytics capacity.

3.4 Atlas Curriculum Mapping

Rubicon International's Atlas Curriculum Mapping (<http://www.rubicon.com/AtlasCurriculumMapping.php>) is a web-based curriculum mapping tool designed to facilitate collaborative curriculum enhancement. Atlas offers users a means to develop a well-aligned, outcomes-based curriculum that can incorporate many competency structures or accreditation standards. Atlas incorporates many curriculum design approaches and allows the users to comprehensively map the location, sequence and instructional strategy used to develop learning outcomes within courses and across programs. The key features of the tool are easily and readily accessible through a persistent navigation menu, which provides users the ability to quickly view calendar, course and program descriptions, alignment standards and competency structures, curriculum maps, references and collaborative communities. Atlas allows for a high level of customization, with each user being able to create an interactive dashboard, allowing them to select the arrangement of reports and modules to best fit their workflow or needs.

The strengths of Atlas are: the flexibility in mapping approach; the ability to map, link and align multiple competency structures and outcomes; assessment level and instructional level granularity in mapping; and providing a fully indexed, searchable curriculum that can be visualized many ways. Perhaps the most unique features of Atlas are the inclusion of a reference library, and the ability to collaborative develop and plan

curriculum. The reference library allows an institution to provide a wealth of references, examples, materials and techniques to help define, collect and display best practises in numerous aspects of teaching & learning.

The collaborative elements within Atlas exceed the typical notion of collaboration for curriculum improvement, allowing any and all users of Atlas to be able to be granted access to develop anything. In the context of higher education this allows for collaboration across the typical bounds of department, faculty or unity and allows users to bring in experts and collaborators from other structures on campus, such as a center for teaching and learning. Even more unique is the ability to link instances of Atlas between institutions, allowing for a large-scale collaboration and sharing methods and approaches towards the development and assessment of student outcomes and competencies.

The weaknesses of Atlas are the stand-alone nature of the tool, and the nature and format of the reporting. Atlas doesn't offer integration between existing platforms, meaning that all course information and data that exists in registrar systems, a LMS or CMS has to be manually entered or imported into Atlas. Reporting and analytics in the system applies primarily to aspects of curriculum mapping, offering information regarding integration, development and assessment of competencies and outcomes. These take the form of ITU analyses, gap analyses, alignment and assessment reports, these reports are available in a limited number of graphical and tabular formats and can be filtered by a variety of conditions.

While these filters and wizards offer some flexibility and customization in reports, improving the flexibility of the reporting would be a benefit to the system. Overall, Atlas obtained a three star rating demonstrating alignment with three of the five steps of the EGAD approach. This is primarily due to the specific focus of the tool limits its use in assessment (beyond planning) and in the analysis and interpretation of the assessment data.

3.5 iSeek Supercruncher

Vantage Learning's iSeek Supercruncher (<http://www.vantagelearning.com/products/iseek-supercruncher/>) is a web-based data-analysis platform, best classified as an analytics system. iSeek provides an unstructured interaction with assessment data, that is gathered from numerous sources from within an institution (LMS, CMS, SIS), the interaction with the data is provided through two intelligence agents: Curriculum and Accreditation. These intelligence agents each provide a different focus and utility for its users, but are accessed through similar means. Each agent integrates with different data silos through a custom API, and data is accessed through two key means by injector (automated wizards) or by crawling (indexing by natural language understanding and metadata tagging).

The curriculum agent is a web-based application that uses natural language understanding and metadata tagging to produce curriculum map. It resembles a search page that presents results as an unfolding hierarchical structure with links to relevant materials and results. This part of the system allows multiple stakeholders to search the curriculum for keywords, outcomes, competencies and standards and be able to drill down as far as the data is structured or tagged. The curriculum map produced by the curriculum agent is a living map, which is fully indexed and updated continuously, allowing stakeholders to have a unique access and interaction with the progression, development and assessment of learning outcomes. It allows students to see exactly where specific outcomes in a program are developed and see any tagged element: related syllabi, course, assessment, discussion forum, portfolio section or captured lecture.

The accreditation agent is a web-based application that provides the capabilities for analytics, accreditation and annual reporting. This part of iSeek is accessed via a web-portal, or through single-sign on through a learning management system, and presents users with a dashboard-style interface. Information is provided to a user's dashboard through multiple intervention intelligence assistants, which provide administrators and educators with information on student performance. Aptly named, the accreditation agent can be configured to answer common accreditation questions easily and quickly through easily developed reports, but also offers users flexible reporting capabilities supplemented with many search options, including the metadata tagging and natural language understanding elements present in the curriculum agent supplemented with more standard options like real-time filter selection and keyword searching. Data generated through reporting can be visualized graphically or in tables, and can be saved as an enduring snapshot or exported.

The strengths of iSeek are related to the core functionality and intent of the program. The ability to tag,

index and automatically process a multitude of data sources provides users with an extremely flexible way to view and interact with both the curriculum and the measures of student performance developed by the curriculum. The combination of the two intelligence agents provides an excellent means to answer many accreditation related questions, as well as freely explore any internal questions or purposes that a process may uncover. Additionally, both agents can be used to communicate with a variety of stakeholders, a means to demonstrate program effectiveness, and offer accountability measures for professional programs.

The weaknesses of iSeek are the external nature of the tool, which is dependent upon a system to provide information to leverage. This is a potential barrier to those institutions seeking a streamlined process, and it should also be noted that the curriculum intelligence agent is part of the base package of the tool, and the accreditation agent is an add-on available for an additional fee. The 'two-stage' concern is mitigated to a certain extent through the API integration and automated searching, but specific elements not accessible via API require a manual process. iSeek is cloud hosted, and based out of the United States, posing potential hazards regarding data security and access depending upon institutional policy. Overall, the iSeek platform achieved a four out of five star ranking for alignment with the EGAD 5-step process, primarily because the scope of the platform does not include the assessment of student performance.

4. EVALUATION RESULTS

Each software tool was classified and evaluated for each criterion and the results tabulated into the table shown in Fig. 1.

		Chalk & Wire	CoursePeer	Entrada	Atlas Curriculum Mapping	iSeek Supercruncher
1. Classification		AP	LMS/AP	L/CMS	CMT	AS
2. Integration		LTI & API	LTI & API	API	-	API
3. Rubric-based assessment						
3a.	Rubric Generation	☆☆☆	☆☆☆	☆	-	-
3b.	Customizable	☆☆☆	☆☆☆	☆☆	-	-
3c.	Rubric Repository	☆☆☆	☆☆☆	☆☆	-	☆☆
4. Learning Outcomes						
4a.	Multi-level capability	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
4b.	Multi-level mapping	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
4c.	Multi-instance mapping	☆☆☆	☆☆☆	☆☆☆	☆☆☆	☆☆☆
4d.	Outcomes Repository	☆☆☆	☆☆	☆☆☆	☆☆☆	☆☆
5. Assessment						
5a.	Direct & Indirect Evidence	☆☆☆	☆☆☆	☆☆	-	-
5b.	Multiple assessors	☆☆☆	☆☆☆	☆☆	-	-
5c.	In-line grading	☆☆☆	☆☆	☆	-	-
5d.	In-line feedback	☆☆☆	☆☆	☆	-	-
6. Analytics						
6a.	Multi-level reporting	☆☆☆	☆☆☆	☆	☆☆	☆☆☆
6b.	Tabular reporting	☆☆☆	☆☆	☆	☆☆	☆☆
6c.	Graphical reporting	☆☆☆	☆☆	☆	☆☆	☆
6d.	On-demand reporting	☆☆☆	☆☆☆	☆	☆☆	☆☆☆
6e.	Longitudinal reporting	☆☆☆	☆☆☆	☆	☆☆	☆☆☆
6f.	Custom group reporting	☆☆☆	☆☆	☆	☆	☆☆☆
7. Pricing						
7a.	Hosting Model	SaaS	SaaS	Self	SaaS	SaaS
7b.	Subscription	Yearly License	Yearly License	Open-source	Yearly License	Yearly License
7c.	Cost	FTE Scaled	FTE Scaled	Free	FTE Scaled	FTE Scaled
8. EGAD 5-Step Alignment		☆☆☆☆☆	☆☆☆☆☆	☆☆☆☆	☆☆☆☆	☆☆☆☆☆

Figure 1 - Selected software evaluation results

5. CONCLUSIONS

Similar to the inaugural version of this paper, it should be noted that the evaluations presented are not intended to objectively rank or promote the use of a single tool. The purpose of these reviews is to offer a brief review of the tool and its purpose and highlight its strengths and weaknesses. All of the evaluated solutions are capable of being an integral part of an outcomes-based, data-informed continuous improvement process.

With the recent and quick rise of analytics as a potential solution to a number of problems in higher education, institutions must carefully consider the adoption of technology into their unique culture. Technologies should be carefully evaluated and scrutinized before adopting, rather than choosing a solution in haste. This is an issue in change management and institutions should carefully consider a variety of factors before adopting a new tool or solution as part of their process[6]. To reiterate from the previous paper[1]

Such factors include, but are not limited to[3], [7], [8]:

1. Stakeholder needs and requirements
2. Direction and leadership of CPI processes
3. Existing climate regarding new technology
4. Complexity & sustainability of tools

This series of evaluations will continue with the third installment, reviewing vendors with a significant focus on analytics approaches as part of a data-informed, outcomes based, continuous program improvement process.

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