Evaluating an Integrated Course Design Tool for Engineering Graduate Attributes Assessment

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Abstract – The research reported in this paper is concerned with developing a software tool (the Integrated Course Design Tool) based on the principle of constructive alignment. This tool is intended to assist instructors with course planning by linking together course learning outcomes, teaching & learning activities, and assessments. The rationale is to report on student achievement in the context of the Engineers Canada Accreditation Board's graduate attributes and use this information for continual improvement. Our experience with the ICDT has shown it to be a simple, intuitive tool for course-based graduate attributes assessment and continual improvement; however, further work is required to extend the tool for program-wide usage.

Keywords: Engineering accreditation : graduate attributes assessment : continual improvement.

1. INTRODUCTION

As anyone who has been involved in the Engineering Canada Accreditation Board's (ECAB) graduate attributes / continual improvement (GA/CI) process [6, 7] can likely attest, the devil is in the details. On the surface, the process is relatively straightforward. For example, the Engineering Graduate Attributes Development (EGAD) project specifies a "5-step alignment" involving program evaluation, mapping the curriculum, collecting data on student learning, and data-informed curriculum improvement [8, 9]. This is a very logical process for outcomes-based assessment and continual improvement that has close parallels to the time-tested Institute for the Development of Excellence in Assessment Leadership (IDEAL) [11] process used by ABET since the introduction of EC 2000 [15].

Based on our experience at the Schulich School of Engineering, GA/CI is a multifaceted process given the nature of what we are trying to assess/improve. More specifically, like other Canadian engineering schools, our engineering programs involve a large number of courses, requiring assessment by a larger and diverse group of stakeholders (faculty, students, employers, etc.). Graduate

attributes assessment is difficult to coordinate and has the potential to generate a massive amount of data along with the risk of quickly getting "lost in the weeds".

The motivation for the paper is to explore how stakeholders can be better engaged in this process and how we can ensure that the data collected for graduate attributes assessment is meaningful and can be effectively used for continual improvement. In this paper, we propose a simple classroom assessment tool that is designed to assist instructors with graduate attributes assessment, and provide a consistent summary for use in the continual improvement process.

In the next section, we provide a summary of the current approaches to classroom assessment in the context of graduate attributes assessment. Our research question and methods are described in Section 3, and are followed by a description of the proposed Integrated Course Design Tool in Section 4. We conclude the paper with a short summary of current and future work with this tool in Sections 5 and 6 respectively.

2. CLASSROOM ASSESSMENT

In their recent reviews of software tools to support outcomes-based continuous improvement processes, Kaupp and Frank [12-14] note that administering, collecting, and organizing assessment data is an extensive process. To organize the range of software tools that can be used to manage this process, they introduce a useful classification system that not only spans the range of activities involved in GA/CI, but also illustrates just how extensive this process is: learning management system (LMS), learning content management system (L/CMS), assessment platform (AP), analytics system (AS), and curriculum mapping tool (CMT). In this paper, our focus is primarily on the assessment platform (AP): i.e., software tools that are "capable of creating assessment elements to evaluate, analyze and report student performance in learning outcomes" [13].

As a result, our focus is on classroom assessment and continual improvement in the context of the course, and the achievement of intended learning outcomes and graduate attributes within the course where assessment is

“narrowly focused on subsets of the objectives in the course, and the results can be used to make modifications in the course design to improve the learning outcomes” [17].

Although a focus on classroom assessment AP tools may seem like a small step towards the ECAB requirements for program-wide continual improvement, it is an essential first step in this process. Clearly, classroom assessment is an essential input for program assessment: without the direct assessments performed by instructors within a program’s courses, there is no basis for program-wide assessment of student outcomes. However, a focus on classroom assessment is also essential for faculty member buy-in in the CA/GA process.

Faculty member buy-in is not an insignificant issue: as Gopakumar *et al.* [10] note, engineering schools across the country face significant challenges in incorporating attributes-based outcomes assessment. In particular, it is difficult to engage faculty the CA/GA process, let alone make them accountable for program-wide continual improvement. However, faculty members are implicitly engaged in the classroom assessment process (i.e., through the identification of outcomes, delivery of content, design of assessments), and, as such, are clearly accountable for this classroom process. In contrast, when considering program assessment, accountability is not clear and the degree of interest and involvement varies considerably among faculty [17]

Constructive alignment can help explain this difference in engagement. The “constructive alignment” between intended learning outcomes, teaching and learning activities, and classroom assessment is fundamental to course design [1]. Whether this principle is implicitly understood, or deliberately used by faculty members when designing their course, all course instructors understand that one purpose of classroom assessment is to determine if their intended learning outcomes have been achieved: i.e., they must submit final grades at the end of the term.

Since all instructors are engaged in this form of summative assessment (and, ideally, in formative assessments over the course of the term), classroom assessment AP tools have the potential to tap into engagement/accountability around assessment and leverage this for course-specific, as well as, program-wide continual improvement.

Chong’s and Romkey’s [4] work on adapting existing classroom assessment tools for graduate attributes assessment is complementary to the notion of a classroom assessment AP tool. More specifically, our proposed classroom assessment AP tool uses existing classroom assessments as inputs to evaluate, analyze and report student and overall class performance in learning outcomes and graduate attributes.

3. RESEARCH QUESTIONS AND METHODS

This research is concerned with developing a software tool (the Integrated Course Design Tool) based on the principle of constructive alignment [1]. This tool is intended to assist instructors with course planning by linking together course learning outcomes, teaching & learning activities, and assessments. The rationale is to be able to report on student achievement in the context of the ECAB’s graduate attributes [6, 7] and use this information for continual improvement.

The objective of this research is to develop a simple tool that allows (1) instructors to reflect on student achievement of learning outcomes in the context of their course design, and (2) engineering programs to report on graduate attribute achievement for students in their programs.

The research questions addressed by this research are:

1. does the Integrated Course Design Tool provide a simple means to report on ECAB graduate attributes?, and
2. can Integrated Course Design Tool reports be effectively used for continual course and program improvement?

A prototype Integrated Course Design Tool has already been developed by the authors in Microsoft Excel that has the look and feel of a typical grade collection sheet. This tool was used in two Winter 2016 engineering courses (the B.Sc. in Mechanical Engineering “senior capstone design” course, and the B.Sc. in Energy Engineering second year “computing techniques” course). The Integrated Course Design Tool links student assessments to course learning outcomes and graduate attributes. At the end of the course, the tool was used to summarize student achievement in the context of the ECAB graduate attributes (i.e., the number of students who are below expectations, meet expectations, and exceed expectations in each graduate attribute). The output of the Integrated Course Design Tool is currently being used by the instructors of each of the courses to determine its efficacy as a means of reporting and reflecting on student achievement.

4. INTEGRATED COURSE DESIGN TOOL

From an engineering program’s perspective, the ECAB requirement for GA/CI is clear: “The institution must demonstrate that the graduates of a program possess the [the 12 graduate attributes]. The attributes will be interpreted in the context of candidates at the time of graduation”[6]. However, the 12 graduate attributes are very general in nature, and as such, do not immediately lend themselves to classroom assessment. For example, if a course instructor is asked to assess graduate attribute

3.1.10 “Ethics and equity” in her course, all she has to guide her is the attribute description, “an ability to apply professional ethics, accountability, and equity” [6]. To assess this GA in a course, the attribute must be further decomposed into indicators, or in other words, “descriptors of what students must do to be considered competent in the attribute; the measurable and pre-determined standards used to evaluate learning (i.e. measurable characteristics of attributes or components of attributes).” [7].

A variety of approaches can be used to identify attribute indicators (e.g., Scales *et al.* [18] provide guidance on choosing indicators in the context of EC2000). For example, at the Schulich School of Engineering, we use the CDIO syllabus [5] to decompose each GA into a set of potential attribute indicators [2]. Instructors can then use this list of attribute indicators to assist with the identification of intended learning outcomes for their courses. For example, one attribute indicator identified for GA 3.1.10 is “demonstrate an ability to make informed ethical choices”, which can be directly applied as a learning outcome in the course noted previously (e.g., this could be assessed using a case study).

In the remainder of this section, we describe a simple, spreadsheet-based tool, the Integrated Course Design Tool (ICDT), that is intended to assist course instructors with the GA/CI process, and more specifically, with addressing their program director’s question: “can you provide assessments of graduate attributes 3.1.x and 3.1.y from your course this term?” In order to help with the description of the ICDT, we use an example of fourth year manufacturing engineering course (ENMF 514) taught by one of the authors.

4.1. The Course Outline

The ICDT is tightly linked to the standard Schulich School of Engineering course outline (i.e., course syllabus): an example is provided in Appendix A. The rationale for this approach is twofold. First, both the standard course outline and the ICDT require instructors to specify intended learning outcomes (Course Outline Section 2), the link between intended learning outcomes and graduate attributes (Course Outline Section 2), and the link between intended learning outcomes and classroom assessments (Course Outline Section 7). Secondly, our intention is to decrease the amount of workload for the course instructor (i.e., the course outline and ICDT can be setup at the same time). As will be discussed later, our intention is to further decrease instructor workload by extending the ICDT functionality such that it will generate the course outline for the instructor.

The basic mapping between intended learning outcomes and the graduate attributes for ENMF 514 is shown in Figure 1.

Fig. 1. Learning outcome / graduate attribute mapping.

In this case, only the first intended learning outcome is shown with its mapping to GA 3.1.11 “Economics and project management”. As noted previously, the initial mapping was identified using the CDIO syllabus and an “ITU” or “introduce-teach-utilize” process: the mapping is shown in Section 7 of the course outline (Appendix A). ITU can be thought of as a parallel classification to the newly introduced ECAB “introduced-developed-applied” or “IDA” content level codes [7]. In future versions of the ICDT and Schulich School of Engineering course outline, we will use this IDA mapping.

As shown in Figure 2, the ICDT follows the very same learning outcome / graduate attribute mapping as the standard course outline.

Fig. 2. ICDT Learning outcome / GA mapping.

At the present time, course instructors simply “cut and paste” learning outcomes from the course outline into the userform shown in Figure 2. They then link each learning outcome to a “drop-down” selection of graduate attributes, and also have the opportunity to select content level codes (i.e., “introduced-developed-applied” levels) for each learning outcome. The first five learning outcomes (with

corresponding graduate attributes) are shown in Figure 2; as well, this “learning outcomes” worksheet also shows the learning outcome mapping to the content level codes (hidden by the userform in this figure).

4.2. Grade Components

Once the course outline (course syllabus) is developed and the learning outcomes have been mapped, the ICDT has the basic look and feel of a typical, spreadsheet-based grade collection sheet. More specifically, instructors are provided with a spreadsheet that can be used to record individual student grades for each of the grade components (e.g., assignments, lab reports, exams) in the course.

The fourth-year manufacturing engineering example used in this section provides the opportunity to assess a variety of graduate attributes. However, given the nature of ENMF 514, we chose to focus on two graduate attributes: GA 3.1.7 “communication skills” and GA 3.1.11 “economics and project management” since this course contained project planning and economic assessment content, and also utilized case studies where students were required to prepare written reports and participate in classroom discussions on the cases.

Although GA 3.1.7 and GA 3.1.11 could be assessed at multiple points in ENMF 514, we also chose to limit our number of assessment points to only those assessments that provided the best opportunity to assess the graduate attributes. In this example, we chose Case #3 (since it contained economics/PM content and required both written and oral communication skills) and the final exam (since it was a comprehensive, terminal assessment for the course). The mapping between the Case #3 assessment, its learning outcomes, and the graduate attributes is shown in Figure 3 (Case #3 mappings shown in red).

Fig. 3. Case #3 grade component mapping.

As noted previously, the ICDT provides a spreadsheet interface that is similar to a typical grade collection sheet to enter the grades for each of the course grade components (e.g., for ENMF 514, the grade components are listed in Section 7 of Appendix A). Instructors typically enter the aggregate score for each of the grade components in their grade collection sheet: e.g., each student’s total score on each assignment, case study, lab report, etc.

The ICDT differs from this typical approach to grade collection for the grade components identified for graduate attributes collection (e.g., Case #3 and the Final Exam in ENMF 514). For these grade components, a feature is provided that allows instructors to enter each of the grade elements (e.g., exam questions, rubric criteria) for the grade component and link them to the intended learning outcomes. For example, in ENMF 514, the rubric used to assess Case #3 contained grade elements that assessed written and oral communication (learning outcomes 6 and 7) as well as technical ability (in economics and project management).

As will be shown in the next section, the ICDT allows each of Case #3’s grade elements (i.e., the case study rubric’s criteria) to be linked to intended learning outcomes, then recorded so that student achievement across the learning outcomes and graduate attributes can be reported.

4.3. Grade Elements

Figure 4 shows the ICDT grade collection interface. As noted previously, the interface is very similar to a typical grade collection sheet with the exception of having options for detailed assessments of individual grade components: i.e., “Case 3” and “Final Exam”.

	A	B	C	D	E	F	G	H	I	J
1	Integrated Course Design Tool - Grade Collection Sheet									
2	Course: ENMF 514 - Integrated Manufacturing Systems (Fall 2013)									
3	Instructor: R.W. Brennan									
4										
5										
6	Last	First	U Calgary	Total	Case 1	Case 2	Case 3	Midterm	Case 4	Final Exam
7	Name	Name	ID	100%	10%	10%	10%	20%	10%	40%
8	Points to --->				0.0	0.0	0.0	-	-	0.0
9	Link to --->				-	-	One	-	-	Two
10	Last_1	First_1	35680162	0.0			0.0			0.0
11	Last_2	First_2	48998132	0.0			0.0			0.0
12	Last_3	First_3	77896340	0.0			0.0			0.0
13	Last_4	First_4	10472860	0.0			0.0			0.0
14	Last_5	First_5	97458323	0.0			0.0			0.0
15	Last_6	First_6	54710323	0.0			0.0			0.0
16	Last_7	First_7	57528013	0.0			0.0			0.0
17	Last_8	First_8	46076400	0.0			0.0			0.0
18	Last_9	First_9	68224023	0.0			0.0			0.0
19	Last_10	First_10	44898071	0.0			0.0			0.0
20	Last_11	First_11	61782509	0.0			0.0			0.0
21	Last_12	First_12	4197486	0.0			0.0			0.0
22	Last_13	First_13	51295906	0.0			0.0			0.0
23	Last_14	First_14	19839573	0.0			0.0			0.0
24	Last_15	First_15	54905777	0.0			0.0			0.0
25	Last_16	First_16	82030073	0.0			0.0			0.0
26	Last_17	First_17	59206627	0.0			0.0			0.0
27	Last_18	First_18	26646083	0.0			0.0			0.0
28	Last_19	First_19	10749714	0.0			0.0			0.0
29	Last_20	First_20	23994145	0.0			0.0			0.0
30	Last_21	First_21	61955455	0.0			0.0			0.0
31	Last_22	First_22	21290182	0.0			0.0			0.0
32	Last_23	First_23	5565200	0.0			0.0			0.0
33	Last_24	First_24	13812850	0.0			0.0			0.0
34	Last_25	First_25	39654039	0.0			0.0			0.0
35	Last_26	First_26	15886570	0.0			0.0			0.0
	LO Grades				One	Two	Three	Summary		

Fig. 4. ICDT grade collection interface.

In order to identify the detailed assessments, the course instructor links the grade component to a new worksheet for detailed assessment using the Link to --> field: i.e., “Case 3” is linked to worksheet “One”, and “Final Exam” is linked to worksheet “Two”.

As the course progresses, the course instructor uses the “Grades” worksheet in a typical fashion for grade collection sheets: i.e., entering the total possible points for each grade component, then entering individual student grades for each grade component. However, when a detailed assessment point is reached (e.g., when “Case 3” is assessed), the instructor uses the linked grade component worksheet (i.e., worksheet “One”) to enter student scores for each grade element for this assessment.

An example of the “Case 3” worksheet is shown in Figure 5. When the course instructor is ready to grade this grade component, the individual grade elements are first entered using the userform shown in the figure: i.e., in this example, the case study rubric criteria c1 to c7).

Fig. 5. ICDT grade component interface.

As shown in this figure, the instructor can enter the weight of each grade element as well as the grade element's link to the course learning outcomes. For example, criterion 7 in this case study rubric is “contribute to case discussion”, which links to learning outcome 7 “meaningfully contribute to an engineering case discussion”.

At this stage, the course instructor does not have to refer back to the learning outcome / graduate attribute mapping described in Section 4.1, as the ICDT automatically determines the mapping as shown in Figure 5.

Once the spreadsheet is setup, the instructor simply enters individual student scores for each grade element; the aggregate score for the grade component (i.e., “Case 3”) is then transferred to the “Grades” worksheet (i.e., the “Case 3” column in Figure 4).

4.4 Graduate Attributes

Once all of the student grades are entered into the “Grades” worksheet and the linked grade component worksheets (e.g., worksheets “One” and “Two”), the

instructor's grading is complete. A total percentage score and a corresponding letter grade can then be determined for each student.

However, the graduate attributes / learning outcomes / grade component / grade element mappings established by the instructor with the ICDT now allow the course instructor to assess the overall class performance in the context of the graduate attributes. For example, the graduate attribute summary for ENMF 514 is shown in Figure 6.

Fig. 6. ICDT graduate attributes summary.

We chose to use a letter grade like convention for performance levels: e.g., an “A” represents 80% to 90% on a given grade component. The report shows the performance levels in the upper left, and the class performance for each graduate attribute below. For example, GA 3.1.7 “communication skills” was assessed using “Case #3” at a “Developed” instruction level, and 7.4% of the class achieved a “B” performance level. Given that this is a senior level course, the instructor and curriculum committee would likely want to investigate how communication skills could be improved as part of the CI process in this case.

5. IMPLEMENTING THE ICDT

It should be noted at this point that the assessment results described at the end of the previous section are fictitious; although ENMF 514 was offered in Winter 2013 as described in Section 4, the student performance was randomly generated to show large variation across the GA 3.1.7 assessment. Our students are certainly better communicators than the results imply!

In this section, we provide the results from two courses that were run in the 2015/2016 academic year to illustrate how the ICDT is currently being used. The first course is the third year computing methods course, ENER 350 “Computing Tools for Energy Engineers”; the second course is the senior capstone design course, ENME 538

“Mechanical Engineering Design Methodology and Application”.

Like the example in Section 4, a subset of the graduate attributes was identified for each of these courses; these graduate attributes were then assessed in a subset of each course’s grade components. Table 1 provides a summary of the assessments in each course.

Table 1: The graduate attribute assessments.

Course	Grade Component	GAs Assessed
ENER 350	Project 1	3.1.5, 3.1.7
	Project 2	3.1.5, 3.1.7
	Final Exam	3.1.5, 3.1.7
ENME 538	Design Report	3.1.4, 3.1.7
	Design Fair	3.1.7
	Team Evaluation	3.1.6, 3.1.11

The ICDT graduate attributes summaries for each course is provided in Appendix B. Viewed individually, these graduate attributes summaries are proving to be quite useful as a means to assess graduate attribute achievement within ENER 350 and ENME 538. For example, ENER 350 students have more difficulty with exam work than with project work as shown in Appendix B. Given that final exam may, arguably, be a better reflection of student achievement, the results show that there is room for improvement in GA 3.1.5 “use of engineering tools” and GA 3.1.7 “communication skills” in this course.

4. SUMMARY AND FUTURE WORK

Based on our experience with the ICDT during the 2015/2016 academic year, it does appear to provide a simple and intuitive means to report on ECAB graduate attributes, and appears to position us well continual course and program improvement. Currently, the tool’s focus is on CI in the context of individual courses: i.e., it provides course instructors the opportunity to reflect on student performance in the context of the ECAB graduate attributes.

Although individual ICDT reports like those shown in Appendix B will be used by our curriculum committees to discuss program-wide CI, it will be useful to have this data integrated into a single program-wide report. An example of this type of report for the 2015/2016 assessments is shown in Figure 7.

In this figure we have shown the direct assessment results for ENER 350 and ENME 538 along with indirect assessments from our annual student self-efficacy survey [3]. As suggested by Mamaril *et al.* [16], undergraduate students’ self-efficacy can be used as a means to validate assessments collected from direct evidence of student achievement.

Fig. 7. Multi-course GA summary.

Our next steps with this project are to further refine the graduate attributes summary so that it conforms with the ECAB accreditation templates for graduate attributes reporting, and as part of this process, develop a program-wide reporting tool that can be used to integrate individual course assessments in a single report. As well, we plan to integrate the standard course outline into the tool as an output report of the ICDT.

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APPENDIX A: ENMF 515 COURSE OUTLINE

1. Calendar Information

ENMF 514 Integrated Manufacturing Systems

Fundamentals of integrated and competitive manufacturing. Manufacturing and operations strategy. Topics in production and operations management including: production planning and control systems; inventory management systems; process analysis and improvement; quality management systems.
Course Hours: H(3-2)

2. Learning Outcomes and Graduate Attributes

At the end of this course, you will be able to:

1. use your understanding of operations activities and manufacturing strategy to assess the competitiveness of a product or company
2. apply process analysis and capacity management techniques to design efficient manufacturing operations
3. apply the fundamentals of quality management theory and systems to manufacturing operations
4. explain the principles of supply chain strategy, logistics, and lean production
5. implement appropriate medium- and short-range demand management and inventory control techniques to satisfy manufacturing operations planning objectives
6. prepare a written engineering case analysis
7. meaningfully contribute to an engineering case discussion

Learning Outcome	Graduate Attribute											
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12
1.											T	
2.					T							
3.	I											
4.	I											
5.											U	
6.							T					
7.							T					

*Graduate Attributes are generic characteristics specified by the CEAB (Canadian Engineering Accreditation Board), expected to be exhibited by graduates of Canadian engineering schools.

A1. A knowledge base for engineering
A2. Problem analysis
A3. Investigation
A4. Design
A5. Use of engineering tools
A6. Individual and team work

A7. Communication skills
A8. Professionalism
A9. Impact of engineering on society/environment
A10. Ethics and equity
A11. Economics and project management
A12. Life-long learning

**How the learning outcome is addressed in this course:

I (Introduced): brief introduction to the topic; typically, not assessed

T (Taught): detailed coverage of the topic; assessed as noted in Section 7

U (Utilized): taught in prior course(s); may be assessed as noted in Section 7

3. Timetable

...

5. Examinations

...

6. Use of Calculators in Examinations

...

7. Final Grade Determination

The final grade in this course will be based on the following components:

Component	Learning Outcome(s) Evaluated	Weight
Case Study #1	1, 2, 6, 7	10 %
Case Study #2	3, 4, 6, 7	10 %
Case Study #3	5, 6, 7	10 %
Case Study #4	4	10 %
Midterm Exam	1,2,3	20 %
Final Examination	1-5	40 %

Total: 100 %

APPENDIX B: ICDT Reports

Integrated Course Design Tool - Graduate Attributes Summary

Course: ENER 350 Computing Tools for Energy Engineers (Winter 2016)
Instructor: M. Taboun

Performance Levels

A 80% - 100%
B 70% - 79%
C 60% - 69%
D 50% - 59%
F 0% - 49%

3.1.5 Use of engineering tools

Assessment Tools	Instruction Level	Performance Descriptors				
		F	D	C	B	A
Project #1	Developed	0.0%	0.0%	2.2%	8.9%	88.9%
Project #2	Developed	2.2%	6.7%	11.1%	26.7%	53.3%
Final Exam	Developed	22.2%	15.6%	17.8%	2.2%	42.2%

3.1.7 Communication skills

Assessment Tools	Instruction Level	Performance Descriptors				
		F	D	C	B	A
Project #1	Developed	0.0%	0.0%	2.2%	8.9%	88.9%
Project #2	Developed	2.2%	6.7%	11.1%	26.7%	53.3%
Final Exam	Developed	26.7%	22.2%	22.2%	22.2%	6.7%

Integrated Course Design Tool - Graduate Attributes Summary

Course: ENME 538 Mechanical Engineering Design Methodology and Application (Fall 2015 / Winter 2016)
Instructor: S. Li

Performance Levels

A 80% - 100%
B 70% - 79%
C 60% - 69%
D 50% - 59%
F 0% - 49%

3.1.4 Design

Assessment Tools	Instruction Level	Performance Descriptors				
		F	D	C	B	A
Design Reports		0.0%	0.0%	0.0%	16.8%	83.2%
-						

3.1.6 Individual and team work

Assessment Tools	Instruction Level	Performance Descriptors				
		F	D	C	B	A
-						
-						
Project Team Assessments		0.0%	0.6%	0.6%	7.1%	91.6%

3.1.7 Communication skills

Assessment Tools	Instruction Level	Performance Descriptors				
		F	D	C	B	A
Design Reports		0.0%	0.0%	0.0%	10.3%	89.7%
Design Fair		0.0%	0.0%	0.0%	0.0%	100.0%
-						

3.1.11 Economics and project management

Assessment Tools	Instruction Level	Performance Descriptors				
		F	D	C	B	A
-						
-						
Project Team Assessments		0.0%	0.0%	0.0%	3.2%	96.8%