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Abstract: Teamwork skills and the ability to effectively collaborate with peers continue to be hailed as essential skills by employers and higher education funding authorities, and many employers require new graduates to demonstrate these skills as part of the selection criteria. How then can we prepare graduates for this employment market that actively assesses teamwork and other generic skills such as communication, problem solving and leadership skills? This paper outlines the self-assessment component of an on-line learning tool designed to help students develop understandings of themselves and their skill levels. These results are used to help select team roles and provide a basis for planning, monitoring and evaluating their performance within the team.

Introduction

The ability to assess one's own skills through self-reflection is a valuable ability for students to learn. If the student is aware of where they need to improve in their learning, they are can focus more on areas of need. By the same token, if they are aware of areas where they have a natural strength or ability, they can use this knowledge to make important decisions about how they might best use their skills.

Often, after students graduate, they are required to work in various roles as part of a team. It they are unclear about their strengths and weaknesses, it can be difficult for them to decide on what role to take. For example, in a multimedia project environment team members from varied backgrounds must work together effectively in order to produce a successful product. Each member must successfully complete their job specific tasks and as well as successfully using appropriate generic skills such as collaboration, team and time management and leadership skills. Some generic skills might be considered important in almost every job situation. These vary in importance depending on the job, however many jobs will have some element of these. Almost all employers want graduates to have teamwork skills, and graduating students should know what their skills are, how they can be best used and in what areas need improvement.

Students do not always possess a naturally ability for self-reflection, and whenever possible should be nurtured during their course of study. JAMTART (Joe and Mark's Tracking and Reflection Tool) is an online tool that has been developed specifically to help students develop reflective skills. The tool helps them decide what team role they should take, as well as helping assess generic skills needed in the workforce. This paper describes the self-assessment component of JAMTART, and proposes an approach to assist learners in selecting team roles.

JAMTART Self-Assessment Component

JAMTART uses open source software (PHP/MySQL), and has administration, tutor and student views. Educators have the flexibility to define assessment criteria through the use of a wizard to help contextualise for any discipline. As shown in figure 1 the tool contains the following modules:

1. *Self-Assessment Questionnaire*
2. *Team Operational Plan*
3. *Student Contract*
4. *Monitoring.*
5. *Overall Evaluation and Reflection.*

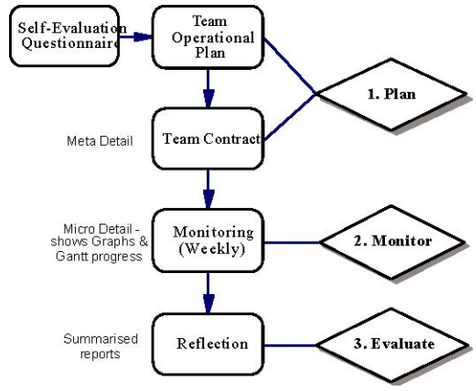

Figure 1: JAMTART – an online EPSS

The tool enables storage and access of items from a database that can be integrated into learning management systems. The roles of setting up questionnaires (lecturer), and responding to questionnaires (student) are defined by the access modes of "administrator" and "user" and contains the following four components (Luca & McMahon, 2006):

1. Dimensions
2. Statements
3. Rules; and
4. Feedback

Administrators have the ability to create and edit required dimensions, statements, rules and feedback through two broad processes. The first involves setting up the dimensions and statements, while the second involves creating the means to assess those statements, particularly with regard to the feedback provided to users and the rules that govern the provision of that feedback.

This is a generic tool in that all dimensions, statements, rules and feedback can be modified. For the purpose of this implementation however, the aim was to define the dimensions that support specific roles within multimedia project teams and develop and understanding of the generic and specific skills required in each. This context informed the creation of statements, rules, and feedback to provide feedback to students on what role they would be best suited for, with a view to using these as the bas is for the team operational plan and student contract.

Team Roles for Multimedia Development

There are a range of team roles required in a multimedia project development, which include project management, programmer, graphic designer, and instructional designer. Information about generic skills inherent in each role was garnered from a variety of sources. These included a wide literature review of journals and professional texts as part of a Research Master Degree thesis (John, 2006).

Generic skills identified by John (2006) as required by multimedia developers were triangulated by collating and analysing current job advertisements in both online and newspaper sources. We also interviewed practitioners in multimedia professions within different job roles (project managers, designers, and programmers). Patterns emerged from the data that allowed common themes to be developed. Based upon the frequency with which these themes emerged and the relative importance that was placed on them within the data, a hierarchy of importance was developed. This was inevitably interpretative in nature but provided some face validity through the triangulation of the different forms of data.

Findings are described below with a view of collating a questionnaire (Appendix 1) to assess students generic skills needed for these roles. While the questionnaire does not represent a statistically valid or reliable instrument, the authors believe that it still has strong value as a tool to prompt students to reflect on the skills they need to fulfil the following roles.

Project Management

Without proper planning any project may run out of time or money and will end up as a failure. “It is unfortunately true that *most* crises that arise during the course of a project can be traced to lack of adequate advance planning.” (Gaddis, 1991, p.33). Also, when dealing with a team of diverse individuals with different backgrounds, culture, religion and gender a project manager has to be patient (Burnett, 1998; Lientz & Rea, 2002). Differences can influence a team’s performance that may result in an unsatisfactory project product. Great importance should therefore be laid upon the team-building process (Harris, 1997).

From the literature on Project Management, a hierarchy of generic skills can be established as being required for a project manager to be successful. One of the most important characteristics is to have excellent communication skills, including spoken, written, graphical, numerical, and electronic (Dingle, 1997), or verbal, nonverbal, written, graphic, or multimedia symbols (Verma, 1996, p.16). Successful communication also enables the project manager to identify, understand, analyse, synthesize, and solve problems and conflicts. (Lientz & Rea, 2002, p.111). It is essential that project managers be able to clearly communicate their requirements, and understand others needs (Harris, 1997).

Other skills required by project managers that were are ranked equally important included planning/organising, being tolerant, teamwork skills, leadership skills, and being an effective negotiator. Excellent negotiation skills also enable the project manager to handle conflicts as well as difficult situation that can arise in managing project work (Lewis, 1998, p.31).

A project manager (as well as their team) should develop positive relationships with the rest of the team. “If you have good human relations on a project you can expect reasonable performance. If this breaks down you can never achieve good project performance, no matter how good the technical systems are” (Harris, 1997, p.29).

Graphic Designer

The field of graphic design is quite broad as there is no single, fixed career path for a graphic designer and careers can range from working in printing and/or the digital field. Heller and Talarico (1987) describe the task of a graphic designer as “the aesthetic ordering of type and image to frame and convey a message. A *graphic designer* is one who understands the techniques, technology, and requisites of the print media, combining this knowledge with skill and taste in the act of visual problem solving…” (p.ix). Hood (1985) describes the job of a graphic designer in a different way: “the artwork that is created and produced by the graphic designer, to visually communicate a message through the media, is looked upon as a problem-solving, design activity” (p.45). Also, Newark (2002) describes a graphic designer as “someone who is always making sense of her material, and mediating it through the forms and codes of visual language” (p.14).

Other than possessing proficiency in technology and software, graphic designers need to possess a range of generic skills that allow them to succeed in their job. This is reflected by Heller and Fernandes (2002) “The techniques of graphic design can be learned, but the instinct for making art needs to be nurtured over time” (p.12). While the less structured role of graphic design makes it difficult to develop a clear hierarchy of importance generic skills, three main skills that are frequently mentioned include: the ability to accept criticism, to be creative, and to keep an open mind to the environment.

It seems obvious that designers need to be able to take criticism (Fishel, 2003, p.73). Working in a creative field will attract diverse opinion, as not everyone will share the other person’s opinion, since there is no accounting for taste. Newark (2002) remarks “Since the artist is not exactly sure of where she wants to get to, the artistic process is experimental, speculative, and it must often fail” (p.11). The concept of creativity is integral to most definitions of graphic design (Monster, 2006).

Designers must keep up with the newest technology, creative developments and trends (U.S. Department of Labor, 2006). Designers must keep an open mind to the environment and react to clients’ needs that might consistently change over time.

Programmer / Developer

Most employment advertisements about programming tend focus on the required 'hard' skills needed by the applicants. For example online programming job adverts shown at *ProSoft Technology, Resolvit Resources, Roytman Information Services* tend to focus on software development skills like Flash and Java programming. Based on the companies that did mention required generic skills, the key skills emerged. There included the ability to be analytical, and the ability to be patient in order to carry out their work. Problem solving also emerged as a key skill.

Lenton (2006) emphasizes "If you become a programmer you are committing yourself to a lifetime of reading and learning new methods and languages." Programmers can often sit behind their computers for endless amounts of time. They can completely immerse themselves into the problem at hand with complete concentration.

Solving problems effectively requires the programmer to efficiently organize and plan their time. This capability is not only used to write and manage code but also to communicate with the team. Dispensa (2004) compares this to "the ability to make order out of chaos." This basically means to figure out a problem and then organize it so that it can be solved. The aforementioned programmers have to be very analytical (*Roytman Information Services*, 2006b) in order to look at often-vast amounts of problems and to then figure out a concept of how to solve it. Employers regard troubleshooting as very important when it comes to hiring new programming staff (*ProSoft Technology, Resolvit Resources, Roytman Information Services*).

Instructional Designer

Lui, Gibby, Quiros & Demps (2002) have likened the work of an instructional designer to that of a movie director or musical conductor, in that the instructional designer must combine elements of audience, objective, ability to compromise, imagination, new technological possibilities and talent constraints into a cohesive engaging and educative experience. To be effective, instructional designers need more than technical skills. Skills such as being able to accept criticism, being creative, and able to keep an open mind emerge as important traits in this field.

An instructional designer should possess a certain degree of creativity in terms of "formulating, developing, and expressing new ideas and original thoughts as ways of solving problems" (Kemp, 1985, p.18). In order to be creative the instructional designer must be open to new ideas, situations be open to constructive feedback (Seels & Glasgow, 1990, p.18). They must not be defensive about their ideas, be willing to learn from others and put them into practise when appropriate (Kemp, 1985).

Also, instructional designers need to be aware of gender and cultural differences (Cronbach, 1971; Liu et al. 2002 & Snow, 1997). Designing from a individual point of view can offend different genders and cultures.

A Self-Assessment Instrument for Multimedia Development

Table 1 summarises the generic skills needed in a multimedia development team. Important generic skills are listed and are rated according to how important they are for each role: the higher the number, the greater the importance.

A questionnaire has been developed (Appendix 1) with a series of statements attached to 13 dimensions. These dimensions allow for comparison based on the matrix shown in Table 1. So, depending on how students answer, they will receive different feedback based on the Likert scale. If students score highly in the dimensions of *Accepting Criticism*, *Creativity* and *Open Mindedness*, the traits required for a graphic designer, their feedback might read:

> *"You scored highly in the areas of accepting criticism, creativity and open mindedness. Your scores suggest you would be suited to the role of Graphic Designer."*

If a student scored high in most of the dimensions associated with project management *(Communication, Planning/Organising, Tolerance, Leadership and Negotiation*), but scored low for *Teamwork*, the feedback might read:

"You scored highly in the areas of communication, planning / organising, tolerance, leadership and negotiation. Your scores suggest that you would be suited to the role of Project Manager. However you need to work on your ability to participate as part of a team."

If the student did not score highly in any areas, their feedback might read:

"You scored poorly in most areas. You scores indicate that you may need to spend some time choosing a team role and developing your skills."

So each student would receive customised feedback based on the roles within the team they are suited to, and also on which skills they need to work on. This feedback then prompts the learner to reflect on an appropriate team role within the multimedia project team.

Trait	Project Manager	Graphic Designer	Programmer	Instructional Designer
Communication	6	4	4	4
Creativity	2	6	4	6
Leadership	6	2	1	3
Team Work	6	5	4	5
Planning / Organisation	4	2	2	3
Open Mindedness	2	4	2	4
Flexibility	4	3	2	3
Tolerance	4	3	1	3
Problem Solving	1	3	4	3
Being Analytical	1	4	4	3
Accepting Criticism	3	4	3	4
Negotiation	4	2	1	2
Patience	3	2	4	2

Table 1: Ranking of generic skills required in team roles

Conclusion

There is a strong impetus in higher education for graduates who are 'industry ready'. For this to happen they must have an understanding of their own skills so they can determine which career path to choose, and be able to make correct choices in their chosen field. Self-reflection allows students to make appropriate decisions in choosing roles that suit them, and gives valuable knowledge about skill deficiencies, and areas in which they need to develop.

The online tool JAMTART implemented at Edith Cowan University is a generic tool that can be used for any discipline. It contains a self-assessment component that provides feedback back to students based on dimensions that act as prompts for reflective thinking. In this paper a survey instrument has been developed (Appendix 1) that helps students select team roles within an interactive media development team. Students use the feedback from the tool to assign roles, set up a team operational plan and monitor their performance throughout the semester. It is hoped that students will carry on self-reflective practice after they graduate to help them refine and develop their professional skills.

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Appendix 1 – Self-Assessment Questionnaire

For each of statement below, please indicate the extent of your agreement or disagreement by ticking the respective column

Generic Skill	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree
Communication					
I have excellent communication skills	1	2	3	4	5
I can talk to anyone easily	1	2	3	4	5
I always listen carefully to my interlocutor	1	2	3	4	5
I can present my ideas effectively to others	1	2	3	4	5
I am good with both verbal and non-verbal ways of expression	1	2	3	4	5
It is not a problem for me to express myself and my opinions	1	2	3	4	5
Creativity					
I enjoy doing things in an unconventional way	1	2	3	4	5
I love creating, building, and making new things	1	2	3	4	5
I enjoy breaking things into bits and pieces when working on a project	1	2	3	4	5
I have a good ability to handle criticism	1	2	3	4	5
I am a self-reflective person	1	2	3	4	5
I am a highly emotional person	1	2	3	4	5
Leadership					
I would call myself a disciplined type of worker	1	2	3	4	5
I find it an interesting and enjoyable challenge to bond people together and make them feel as a whole	1	2	3	4	5
For me it is not a problem to value somebody's opinion even though I might not agree with it	1	2	3	4	5
It is not a problem for me to adapt to new people and environments	1	2	3	4	5
Having to take risks every once in a while seems a normal way of dealing with issues for me	1	2	3	4	5
I am a very stable person	1	2	3	4	5
Team Work					
Building relationships comes naturally to me	1	2	3	4	5
When a problem arises I focus on the facts rather than trying to find the person responsible	1	2	3	4	5
I am highly motivated to participate in a group	1	2	3	4	5
I like the idea of contributing my skills and experience to a group	1	2	3	4	5
It is natural to me that I respect everybody the way I want to be respected	1	2	3	4	5
I am willing to take in suggestions from other people at any time	1	2	3	4	5
Planning / Organising					
I can easily coordinate many different tasks at once	1	2	3	4	5
I always organize my work	1	2	3	4	5
I always stick to the set deadlines	1	2	3	4	5
I can set priorities	1	2	3	4	5
Open Mindedness					
I enjoy continuous learning throughout life	1	2	3	4	5
I can adapt easily to new situations	1	2	3	4	5
I am open to new ideas	1	2	3	4	5
I am open to new situations	1	2	3	4	5

Flexibility					
I am able to work on multiple tasks	1	2	3	4	5
I am able to switch between different roles within a project	1	2	3	4	5
I am can easily adapt to all kinds of different situations	1	2	3	4	5
I do not have to cling to a specific plan and am able to change it if necessary	1	2	3	4	5
Tolerance					
I am a very tolerant person	1	2	3	4	5
I am interested in different cultures	1	2	3	4	5
I am interested in different ideas and beliefs of people	1	2	3	4	5
I find it interesting to consider one thing from many different points of views	1	2	3	4	5
Problem Solving					
Problem solving is an interesting and challenging task for me that I enjoy	1	2	3	4	5
I enjoy analysing issues	1	2	3	4	5
I enjoy solving complex problems	1	2	3	4	5
I enjoy troubleshooting	1	2	3	4	5
Being Analytical					
I am an analytical person	1	2	3	4	5
I am a logical person	1	2	3	4	5
I can keep both the overall goal as well as the details of a project in mind when working	1	2	3	4	5
For big projects I enjoy breaking things into bits and pieces	1	2	3	4	5
Negotiation					
I do not get easily intimidated by other people	1	2	3	4	5
When discussing I stick strictly to facts and not people	1	2	3	4	5
I know how to bargain	1	2	3	4	5
I can easily sell my ideas to other people	1	2	3	4	5
Accepting Criticism					
I enjoy receiving constructive feedback	1	2	3	4	5
Taking criticism is not a difficult task for me	1	2	3	4	5
I anticipate failure as well as success when I start working on a project	1	2	3	4	5
I do not take criticism to my work very personally	1	2	3	4	5
Patience					
I am a patient person	1	2	3	4	5
I can explain things over and over again if someone does not understand me	1	2	3	4	5
I possess stamina with my work	1	2	3	4	5
I often find myself working until late at night because I get caught up in finding a solution to a problem	1	2	3	4	5