Pertanika J. Soc. Sci. & Hum. 24 (S): 269 – 282 (2016)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

The Assessment and Application of Student Competency in 'Land Survey, Building and Measured Drawing' Course

Johar, S.[1,2]*, Nik Ibrahim, N. L.[1,2] and Che Ani, A. I.[1,2,3]

[1]Centre for Engineering Education Research, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia
[2]Department of Architecture, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia
[3]Citra University Centre, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

ABSTRACT

Competency is a set of related knowledge, skills and abilities required to successfully perform work or tasks in a defined work setting. Besides having good grades, a graduate must be able to respond well, be a visionary and be a contributor in building a noble society. By exercising soft skills as part of teaching and learning, students are expected to effectively develop and apply competencies. This paper documents generally one teaching and learning approach used in design courses to train students in soft skills, the training of which is also one of the course's learning outcomes. A project management team is formed, dividing students into different segments and tasks, monitored by an advisor and assisted by a project manager who is made liable for task completeness. Students must be able to perform well in communication skills, teamwork, critical thinking skills and professional ethics, among others, the assessment of which contributes to the total course marks. A self-rated assessment by the students at the end collected as a measure for this study shows some positives improvements in their competencies as a result of the approach applied here.

Keywords: Competency, soft skills, measured drawing

ARTICLE INFO

Article history:
Received: 09 October 2015
Accepted: 31 March 2016

E-mail addresses:
suhana@ukm.edu.my, suhana1102@gmail.com (Johar, S.),
lukman@ukm.edu.my (Nik Ibrahim, N. L.),
adiirfan@ukm.edu.my (Che Ani, A. I.)
* Corresponding author

ISSN: 0128-7702

INTRODUCTION

This paper describes and documents a teaching and learning approach used in a design course in architecture run by UKM. As one of the elective subjects offered by the programme, the course is generally aimed at equipping students with basic construction

knowledge in building design, as well as to introduce them to relevant research methods in built environment studies. Implementing generic skills as a teaching approach seems to give a positive impact on students' development throughout their studies in university, making them highly employable at the same time. Besides being a means of content delivery through course work and case studies, this approach also hones students' soft skills as they are trained to practise critical thinking, communication, teamwork and planning, creativity and innovation and ethics in conflict management throughout the course. The course does not merely aim to produce students with good grades and academic results, but also to equip them with the basic skills required by industry; a benefit of this is that students' career path in the future will be enhanced.

Competency is viewed as a set of abilities, knowledge and skills necessary for completing an action. It is a set of related knowledge, skills and abilities required to successfully perform work or tasks in a defined work setting. According to Sampson and Fytros (2008), assessing competencies depends on different application fields, their goals and the approach employed by the organisation. Competency is an important component in evaluating employee workability.

A major challenge for educational institutions is to produce graduates who are able and capable of meeting market needs. Rather than merely producing good grades, university graduates must also be able to support and contribute to nation building in all its aspects. Graduate employability is widely discussed locally and throughout the world, and it has become an urgent goal of universities to produce graduates who will be good enough for the job market. According to David Rae (2007), employability is a set of skills, knowledge and personal attributes that make an individual more likely to secure employment and be successful in their chosen occupation to the benefit of themselves, the workforce, the community and the economy. Among the common causes was the development of students' self-skills, specifically, those that are typically enhanced by continuous exposure. Soft skills have a high impact on employability (Shafie, 2010). Graduates need to be more proactive and be able to solve problems in a creative way, and this is what employers are looking for when recruiting new employees (Zehrer & Mossenlechner, 2009). According to Bagshaw (1996), generally, employers are hiring individuals with good communication skills, empathy, motivation, decision-making skills, good planning ability and ability to improve situations and solve problems. Employers are not looking only for good academic results; they are more interested in how potential employees envision themselves and their abilities and potential during job interviews (Che Ani, 2013).

Based on these demands, several approaches have been taken to enhance the employability of architecture graduates. One is to emphasise soft skills in the

course's learning outcomes. UKM's Architecture Department adapts project management as a learning strategy to improve students' skills. This is an early marketing strategy to enhance their employability in order to help them with job hunting.

The Land, Building Survey and Measured Drawing course (KKSB 2223) is generally a combination of the engineering and architecture courses. The course covers survey in planning, design and implementation of engineering projects, such as the use of basic surveying equipment, leveling, traverse, mapping, contour, staking and setting. In a particular week, students are introduced to research methodology and documentation of various information about national heritage buildings either through measured drawings, interviews, visual, library research or discoveries etc. Incorporating field studies, the course exposes students to actual problems and obstruction, which enables them to generate critical thinking skills and other interpersonal skills. The course begins with a series of lectures for three weeks and follows up with students' projects till the end of the semester. In their final week, students are required to prepare a final report as part of the outcomes of this course.

One of the course outcomes is to use and apply soft skills as part of the learning process (refer to Appendix A2). Adapting project management helps students to practise communication skills, teamwork, critical thinking and much more. Generally, there are no specific learning sessions where students are taught these skills; students are expected to explore and acquire these soft skills through self-directed learning. The teacher's role only as a facilitator and to supervise. The approach emphasises on managerial and team work, and this provides space for students to be outstanding in management skills. This provides a challenge for students that they may not otherwise meet in university, diversifying their learning experience.

METHODOLOGY

The approach is similar to Contract Learning, which exercises soft skills as part of students' learning experience. Contract Learning, generally, is a set of written items provided by the teacher that students consent to before the course begins; one item under this contract or agreement between the teacher and the students is that students agree to complete tasks within a given timeframe (McCabe, 2008). This method is a bridge between theory and practical work as it requires the demonstration of knowledge transferred to practice (Rolfe, 1996). Generally, it is compulsory for students to engage in project work demonstrate the application of theory.

The structure of the 14-week course starts with a briefing on the course content. Students must know what is required of them and what will be assessed. This allows them to plan and strategise a route for success in the course early on in the course. The second, third and fourth weeks provide

course content through lectures while the remaining weeks are allocated for project work. Divided into several groups, the students carry out their project work; each group member takes on a different task within the group and each group is given a specific task as a division to complete the project. Together, the divisions form an organisational structure that plans and executes the project. The group structure or the designed organisation is shown in Figure 1.

During project implementation, the teacher is to advised and responsible for assisting students when problems crop up. In this study, the master or project leader was chosen from among the students and was assisted by the group leader of each division. The project leader reported to the advisor and monitored all the given tasks in addition to providing support to group members according to the project planning. This organizational structure enabled students to exercise managerial and coordination skills in completing tasks. Group leaders are tested on coordination, leadership skills and negotiation, among others. Students are expected to make competent use of diplomacy skills and coordination strategies and to formulate a working plan and to deliver workload and other instructions to all group members. Students were expected to play their role as a team, understand orders, deliver tasks by giving assistance, provide input and thoughts and be capable of providing positive interaction with the team. Good communication skills were among the competencies needed to achieve successful project delivery. Effective communication between team leaders formed good practice in conveying information. This included sufficiently interlinked communication between divisions. This can be explained through Figure 2.

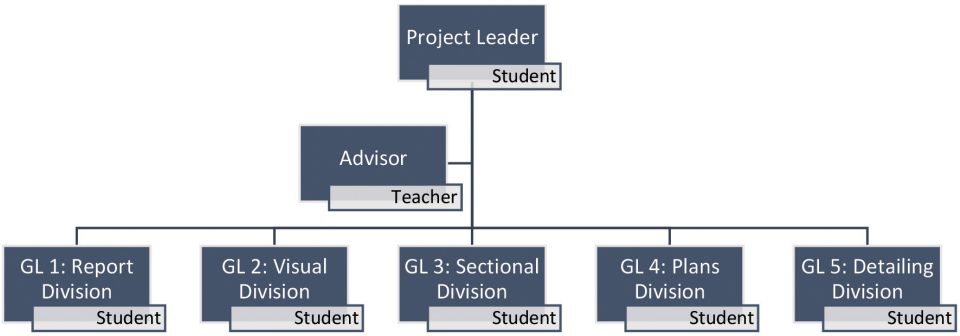

Figure 1. The organisational setting for KKSB 2223.

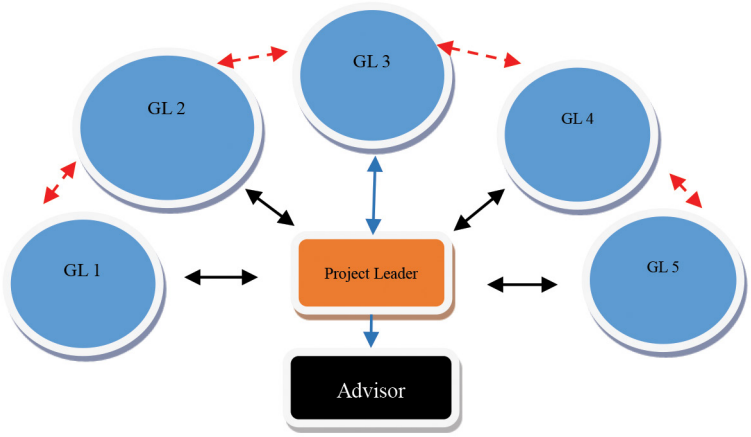

Figure 2. The instructions, information and communication delivered among the teams.

Group formation allowed each member to participate and play his/her respective role. Group leaders monitored their team on completing specific tasks within the given time. Other than delegating tasks, the project leader was also the main editor of the report that would be prepared by the group and was involved entirely in the implementation of the final stage of the project. Also the liaison between the students and the lecturer, he had to report to the advisor, seeking help and advice when needed, and monitoring each segment completely to ensure each group completed its task. The project started in the fourth week of the semester and ended in the 14th week or until the product was delivered. Each student or team member was required to be responsive and to completely deliver the assigned task to enable assessment of individual skill. Lack of commitment could seriously affect the quality of the output.

Each group member was assigned to a different segment. Generally, the objective of this course is to provide an understanding of architectural heritage. Students are required to measure, record and make a small-scale model as the final output, which eventually increases their understanding of building technology and construction of a building. They were required to collect, record all relevant information on the selected building, identify the significance of its architectural heritage, observe interaction patterns and understand the construction in terms of its surroundings, as well as to appreciate the uniqueness of historical evidence. The methodology was observation of a selected building (observing it as a whole of the site, including the building and its surroundings, and various perspectives, including the details of special construction), through photographs as evidence (photos focussing on special characteristics of the building), data collection (gathering information by keeping records and making detailed measurement of each building element),

interview sessions (to discover historical perspective and information, background and details of ownership, including renovation details), desk study of previous reports and documentation (grants, archival information and interviews with identified communities).

A report was produced in which students had to be able to write and use proper language. This required them to be able to use MS word processing as well as design software such as AutoCAD and Sketch-Up in completing the task. They had to be able to understand and make use of whatever technology that was available. A guideline for the report was provided by the teacher in table-of-content form. The teacher helped to monitor work, troubleshoot problems, especially during task delegation, and supervise the final content. Group leaders, who were also responsible for editing the report, had to eliminate redundancy in the report. This was to encourage good communication and information delivery as well as to ensure that the final output clearly met the objectives outlined earlier.

Apart from writing the report, students are required to make an architectural drawing of the project, as stated earlier in the course objectives. Taking the actual measurement during the site survey enables students to sketch, re-draw and transfer the measurements into 2D and 3D drawings. The drawing includes building plans, two sections (section X and Y), left and right elevations, detailing and special construction detailing and perspective drawings. The appendices contain an example of the report guidelines, while the project work plan can be referred to in Table 1.

Table 1
Course Planning and Soft Skill Matrix

Weeks	Items	Soft Skill					
		Leadership & Teamwork	Communication	Critical Thinking	Social Skills	Ethics & Professionalism	Creativity & Innovation
1	Project Introduction -Briefing on building restoration, general course content -Theory of the usage of measuring tools		x				
2	Group formation	x	x		x		
3	Group formation and working plan	x	x	x	x		
4	Site survey (historical, site measurement)	x	x	x	x		x
5	Site survey (historical, site measurement)	x	x	x	x		x

TABLE 1 (continue)

Weeks	Items	Soft Skill					
		Leadership & Teamwork	Communication	Critical Thinking	Social Skills	Ethics & Professionalism	Creativity & Innovation
6	Site survey (historical, site measurement)	x	x	x	x		x
7	Site survey (historical, site measurement)	x	x	x	x		x
8	Studio work (2D, 3D, Report writing)	x	x	x		x	x
9	Studio work (2D, 3D, Report writing)	x	x	x		x	x
10	Studio work (2D, 3D, Report writing)	x	x	x		x	x
11	Studio work (2D, 3D, Report writing)	x	x	x		x	x
12	Preparing presentation (Review)	x	x	x		x	x
13	Preparing presentation (Review)	x	x	x		x	x
14	Presentation and Final product	x	x			x	x

RESULTS AND DISCUSSION

At the end of the semester, apart from submitting the report, students' soft skills were assessed; this contributed to the overall assessment. According to the project plan, the assessment was done during the project execution and the main contribution was field work. The rest of the assessment constituted of continuous observation, with no specific date and time and the teacher usually observed students' performance based on how they contributed, responsiveness and work as a team. In their final presentation, the question and answer session helped the teacher to determine the final marks of the assessment. Students who had not contributed much or at all to the project would usually have a hard time during this session.

The presentation is deliberately arranged to present their final work and is also a session for students to perform verbal communication skills and critical thinking. It is a platform for them to train and enhance their self-confidence before the next phase of their studies. Table 2 shows the content and details of what was assessed in the coursework. In this course, the assessments were based on percentage divided into three sections (a) Fieldwork (30%), (b) Presentation (20%), and (c) Report Write-up (50%). This is shown in Table 2.

Table 2
Weightage of Assessment for KKSB 2223

	DESCRIPTION	Percentage
A	**FIELD WORK (30%)**	
	Group (20%)	
	Problem solving	5%
	Information and data collection	10%
	Teamwork	5%
	Individual / Student competency (10%)	
	Teamwork/Social & Responsibility/Communication	5%
	Problem solving/Creativity/Ethics & Professionalism	5%
B	**PRESENTATION (20%)**	
	Content	10%
	Delivery creativity & Time management	5%
	Q&A session	5%
C	**REPORTING (50%)**	
	Delivery (language, format, creativity)	5%
	Content (historical and building)	20%
	Building drawings	20%
	Teamwork & Punctuality	5%

The main contribution of soft skills assessment was done during fieldwork. Students should be able to demonstrate problem-solving, delivering information and communication as well as be able to commit to every task challenge. The teacher observed and did a formal assessment on how the students responded, demonstrated and performed as described in Appendix A3. Using 1 as the scale for 'very unlikely' and 5 for 'very likely', the total score of each soft skill is then converted to 10% (5% for Social and Communication category and another 5% for Skills and Knowledge category). For the reporting section, a small allocation for soft skills served as top-up marks, coming as it did from group assessment. This provided overall efficiency on how they managed and sorted a lot of information. Appendix A2 shows the course learning outcomes and their relation to soft skills while Appendix A3 is mainly about assessment content based on students' competencies used as a basic guideline for the course learning outcomes. Students' self-learning skills were developed, and this was a way for them to make use of whatever knowledge they had to complete the task. This had to be monitored by the teacher so that students could be guided in their learning.

At the end of the semester, other than the course's assessment, students assessed themselves through a quick survey, rating them performance before and after the project. The assessment, however, was only for internal purposes and did not contribute to the overall marks as the information it provided was for course improvement for subsequent cohorts. The quick survey using the Likert Scale (1 for low score and 5 for high score) is a student evaluation to help identify enhancement of their soft skills. Most of them gave positive rates for their skills based on the given description. An average score from 2.9 to 3.3 was recorded for 'Before' and 4.2 to 4.4 for 'After'. Refer to Appendix A4 for the abstract from the assessment content. Figure 3 shows the student's assessment of their soft skills.

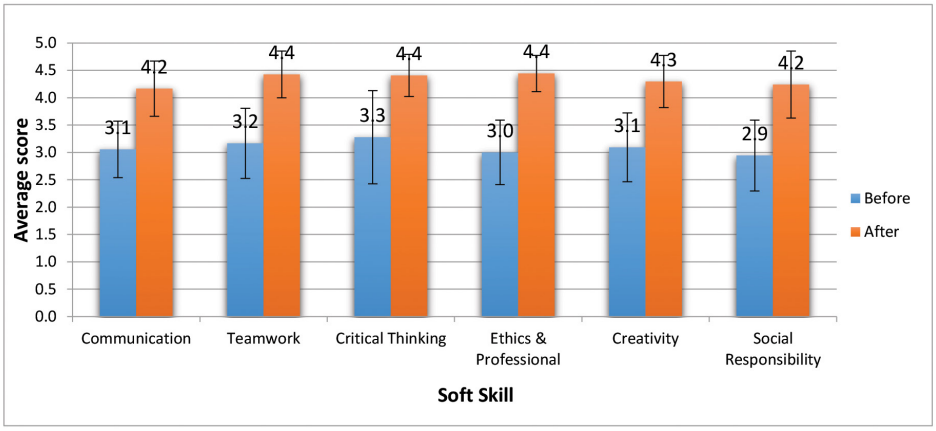

Figure 3. Students' Self Assessment on Soft Skills.

CONCLUSION

In developing countries, skilful and knowledgeable human capital remains the most important resource for developing the nation. This, however, is a challenge for higher educational institutions to produce competent graduates who meet industry needs. The employability of graduates emphasises soft skills and how competent graduates are in completing tasks. By exercising soft skills as part of teaching and learning through project management, it is hoped that students can enhance their generic skills. Soft skills are part of the overall course outcomes and the students are expected to be able to communicate well, show an increase in confidence level, be competent to work in a team as well as be able to unleash their inner expertise. In the project management approach, the student learns much through self-learning but must be assisted by the teacher, who provides minimum input while the student puts in effort to learn and improve. This implementation hopes to stimulate and improve students' generic skills, which will equip them for employment.

ACKNOWLEDGEMENT

The authors would like to thank P3K for their support. This research was funded by UKM under grant PTS-2014-081.

REFERENCES

Bagshaw, N. (1996). Creating employability: How can training and development square the circle between individual and corporate interest? *Industrial and Commercial Training*, *28*(1), 16–18.

Carraciao, C., & Englander, R. (2004). *Understanding competency-based education*. London: Routledge Inc.

Che-Ani, A. I., Tawil, N. M., Razak, M. Z. A., Ahmad, A., & Ismail, K. (2013). Kontrak pembelajaran: Refleksi pelajar UKM. Understanding our architecture and share built heritage 2013. In *Proceedings of the International Conference on Architecture and shared built Heritage (ASBC 2013)* (pp. 231-246). Bali, Indonesia.

McCabe, P. P. (2008). How learning contracts motivate students. *Middle School Journal, 39*(5), 13-22.

Mohammed Sani, I., Saedah, S., & Hadiyanto. (2012). *Pembangunan kompetensi utama pelajar-pelajar di universiti: Satu kajian perbandingan antara universiti nasional di Malaysia dan Indonesia*. Retrieved online: *http://umexpert.um.edu.my/file/publication/00011739_87867.pdf.*

Pusat Citra UKM. (2013). *Modul aktiviti kursus kompetensi: Sesi Akademik 2014-2015* (unpublished). Pusat Citra Universiti, Universiti Kebangsaan Malaysia.

Rae, D. (2007). Connecting enteprise and graduate employability. *Emerald, Education and Training*, *49*(8/9), 605-619.

Rolfe, G. (1996). *Closing the theory-practice gap*. Oxford, Butterworth-Heinemann.

Sampson, D., & Fytros, D. (2008). Competence models in technology-enhanced competence-based learning. In H. H. Adelsberger, P. Kinshuk, J. M. Pawlowski & D. G. Sampson (Eds.), *International handbook on information technologies for education and training (2nd ed.)* (pp. 155-177). Berlin: Springer.

Shafie, L. A. (2010, August). Employability awareness among Malaysian undergraduates. *International Journal of Business and Management*, *5*(8), 119-123.

Zehrer, A., & Mossenlechner, C. (2009). Key competencies of tourism graduates: The employers' point of view. *Journal of Teaching in Travel & Tourism, 9*(3-4), 266–287.

APPENDICES

Appendix A1

The Report Outline

Table of Content		
Acknowledgement		
Abstract		
Research Methodology		
List of Figures, Photos, Tables		
Chapter 1: Introduction	Chapter 2: Research Introduction	Chapter 3: History and Background of Subject
Background subject (Site studies) Geographical, climate, history of the selected site, customs & religion	Traditional Malay house architecture Traditional Malay house architecture – Site studies Differences in criteria	History and background of construction House ownership & family background Customs/Religious background
Chapter 4: Architectural Study of Subject	Bab 5: Architectural Analysis of Subject	Chapter 6 : Working Drawings
Construction methods, measurement concepts, building materials, external description, internal description, building details, renovations and adaptation, home maintenance		Plan Views Sections Details and specification Axonometric
Chapter 7: Summary	References	

Appendix A2

Learning Outcomes and Soft Skills Matrix

No	Learning outcomes for KKSB 2223 Course	Soft skill					
		Leadership & Teamwork	Communication	Critical Thinking	Social Skills	Ethics & Professionalism	Creativity & Innovation
1	Ability to obtain data and analyse information from a variety of maps	x	x	x			
2	Ability to perform detailed mapping as required in engineering design	x		x			x
3	Ability to accurately perform plot and setting	x	x	x			x
4	Ability to work in a team to conduct a large survey	x	x	x			x
5	Ability to prepare reports and present the results of the engineering work	x	x	x	x	x	
6	Ability to recognise and understand the standards and construction symbols in building construction (construction drawings/ work), especially in the fields of architecture and other related industries such as standard structure symbols, standard mechanical symbols and standard electrical symbols			x		x	x
7	Ability to read/interpret simple working drawings		x				

Appendix A3

Examples of Students' Soft Skills Assessment (Modified from Mohammed Sani, 2012; Carraciao, C., 2004; Pusat Citra UKM, 2013)

Soft skills	Execution of work	Presentations/Reports
Effective communication	Ability to deliver and accept instructions clearly Ability to use language correctly	Ability to use language correctly Ability to present ideas clearly and answer questions in conformity with requirements
Leadership and Teamwork	Ability to act as leaders and followers (pass and accept instructions and lead a team to achieve goals) Ability to cooperate, respect and accept the opinions of other individuals (response to problems and referrals) Ability to involve self and contribute to planning and coordinate the results of the group's efforts	Ability to help team members (Apportioning of work, consensus on answers)
Critical thinking	Ability to convey ideas and suggestions in troubleshooting Ability to analyse and evaluate problems and solutions Ability to strategise effective plans	Ability to provide thoughtful responses in a short period of time and to justify responses
Social skills	Ability to interact with members of the group and external community/groups Ability to act responsibly in any undertaking	Ability to interact while being a team member and be responsible for the task entrusted
Ethics and Professionalism	Ability to act in a more rational way and resolve conflicts with prudence Ability to show integrity in any circumstances or when problems crop up	Ability to be responsible for the originality of presentation of information and tasks entrusted
Creativity and Innovation	Ability to produce a remarkable idea in problem solving Ability to renew and improve existing weaknesses and to show variation from the norm	Ability to generate ideas and creativity in information delivery

Appendix A4

Student' Self-Assessment

No.	Description
1.	Effective communication
	Information delivery, Accepting information, Correct use of language
2.	Teamwork
	Demonstrate and cooperate on any task, Give opinion and participate in discussion, Respect and accept other opinions
3.	Critical thinking
	Convey ideas and suggestions, Analyse and evaluate problems & solutions, Plan strategy for particular situations
4.	Ethics and Professionalism
	Act with rationality and tolerance, Integrity in any circumstances and in solving problems
5.	Creativity
	Able to produce remarkable ideas, Renew and improve existing weaknesses, Generate a variety of solutions/improvements
6.	Social responsibility
	Interact with group members and society, Respond to social matters/ demonstrate care and concern for solving community problems, Act responsibly in any undertaking