

Implementing a project-led problem-based approach to teaching and learning in graphic design: Some perspectives from the Caribbean

Jade Achoy

Department of Creative and Festival Arts, The University of the West Indies, St Augustine, Trinidad and Tobago

As graphic design continues to develop in the Caribbean, design educators need to reflect on what the best practices for teaching and learning might be in regards to professional practice. This paper focuses on project-led problem-based learning and addresses the best practices in graphic design education. The paper examines the theoretical underpinnings that support the method as a strategic pedagogical tool conducive for meaningful educational experiences. This research recognises the links between project-led problem-based learning and the development of the three domains of knowledge. The project-led problem-based approach bridges theory and practice and provides a useful vehicle to enhance and direct learning in theory and inquiry, as it involves practical skills in situations similar to the “real world” application. This paper proposes eight phases and organisational principles as a framework for implementing the project-led problem based method of teaching and learning in the classroom. Using a case study of a graphic design course at a Caribbean university, the paper addresses considerations in the planning and implementation process of the project-led problem-based approach.

Key words: problem-based approach, technical skills, contextual studies, constructivism, design education

Introduction

Graphic design is a complex and multidisciplinary practice that requires the student to meet specific demands of the profession—such as production processes, schedules and product-oriented results. The need for graphic design education to address the capabilities of graphic design theory and practice has led to the adaptation and development of projects and problem-based learning. The term “project-led problem-based learning” was derived from Hanney (2013, p.53) as a pedagogic paradigm to mirror professional practice within the curriculum. This paper focuses on the project-led problem-based approach to teaching and learning through the analysis of a case study of a graphic design course at a Caribbean university. Graphic design is one of the disciplines within the field of design. It is an emerging area of study in the Caribbean as some of the English-speaking Caribbean countries only began formal education in visual arts within the past 50 years.

The term “graphic design” was first coined in 1922 by William Addison Dwiggins to identify with his personal practice which encompassed typography, book design, calligraphy and type design (Livingston & Livingston, 2012). From Dwiggins’s pivotal definition, graphic design has continued to evolve as a form

of visual communication. From a plethora of magazines and books, packaging and logos, movie credits and TV ads to the user-interfaces on the computer and mobile device screens, graphic design has become an immersive part of our habitual living. It is exciting to note that the field continues to expand due to the leaps and bounds in the development of technology. Nevertheless, the importance of graphic design with its many facets of practice, education and research, encounters an unfortunate perception, both internationally and in the Caribbean, of only pertaining to the superficial. The challenge for some audiences is to discern graphic design not only as attractive aesthetics or mere decoration (Rand, 1949) but to perceive the discipline as a meaningful process that engages unified thinking, creativity and the generation of ideas. The American Institute of Graphic Arts (AIGA) describes graphic design as “a creative process that combines art and technology to communicate ideas” (AIGA, 1993, para. 3) which “informs, persuades, organizes, stimulates, locates, identifies, attracts attention and provides pleasure” (para. 2).

Furthermore, graphic design can be considered a business tool due to its relationship with the corporate world as a valid response to users’ needs. The graphic designer analyses, interprets, translates, unifies, simplifies, and abstracts the material through association and analogy (Heller, 1997) to form symbolism and to create meaningful representations or codes which govern the relationship between the concepts and language systems of a society and its culture (Hall, 1997; Harland, 2011).

At the heart of a graphic design practice is the need to develop designs that represent the ideas the client wants to communicate. The designer is the middle person between the client and audience. In order to create a wide range of designs and develop work to best meet the client’s needs, graphic designers collaboratively work with market researchers, illustrators, photographers, typesetters, printers and other production specialists to create the desired final design product (AIGA, 1993). However, due to the small size and the lack of design industry resources in the Caribbean, local graphic designers have to extend their skills and knowledge to adopt various roles—from market researcher to designer to print expert—in order to compete in the Caribbean market. Some advertising agencies, organisations and employers even request expertise in web design and other media production competencies. In addition, in the author’s teaching context, students have limited time to learn graphic design as currently, there are only two courses available in the visual arts programme and these are scheduled within the same semester. Therefore, with such a short time constraint, the lecturer and student have the challenge of addressing a broad range of subjects and preparing for professional practice. With this in mind, graphic design education in the Caribbean can benefit from learning through the experience of real world projects.

The project-led problem-based approach

In education, there are three identified domains of knowledge that applicably contribute to a well-rounded, educated graphic designer (Ryle, 1949; Scheffler,

1965): understanding of content or theoretical principles (knowing that); technical skills or performance (knowing how), and contextual studies that relate the material to the diverse learner's cultural, ethical and social realities (knowing with). Problem-based learning through projects is one possible solution to develop these three criteria of knowledge in a learner. Educational philosopher John Dewey (1938) advocated that beyond traditional schooling, students learn by doing and that education should reflect the world outside of school. Dewey (1938, p.89) elucidates that "education in order to accomplish its ends both for the individual learner and for society must be based upon experience- which is always the actual life-experience of some individual". The term "project-led problem-based learning" was developed by Hanney (2013) and advocates the use of a live brief as a form of practice-based learning that moves between work-based and campus-centred learning, providing a situated experience within which novice practitioners can operate. Live briefs mirror the way in which professionals learn through their own practice and rise from the position of novice to expert. Hanney explains that within the live brief framework there is ample room for students to employ personal strategies of creativity, innovation and expression that are valued outcomes by students, staff clients and employers.

Shaping educative experiences through a project involves investigations of problems facilitated by the process of inquiry, research and development of a solution. A project involves the learner in a hands-on or practice-based approach which usually has time constraints, tasks and other parameters that should be guided by the teacher. Whether it is executed in groups or individually, this systematic teaching method introduces the learning of knowledge and skills that culminates in a carefully designed product or form that is a representation of the learning effect. Piaget (1970) theorises that the most efficient way individuals learn is through the construction of an artefact that can be judged and shared with others, for example, posters or packaging design. However, if a project is to be considered as more than just a way of administrating student activity, educators need an informed understanding of the way in which learning occurs within a project. Since it is crucial for learning activities to be personally meaningful to encourage the likelihood of student engagement with learning (Moursund, 1998) to focus merely on the end result of a project ignores much of the thoughts, feelings and tendencies that students experience during the process of a project.

Project-led problem-based learning actively involves the learner in experiencing the subject and material through problem-solving tasks and independent learning. Thus, through conducting investigations, discussions or activities, an individual learns by constructing new knowledge based on their prior knowledge (Perkins, 1991). The role of the educator takes on a constructivist slant, as a coach or mentor, to facilitate learning and engender personal development in students. This pedagogical model fosters other hidden curricula necessities by allowing students to coordinate their own learning. In other words, through the use of a project-led problem-based approach the learning becomes learner-centred.

Graphic designers need to have a proficient level of craftsmanship which includes the capability to manipulate technology, equipment and other tools to produce designs. Within a project-led problem-based approach, the student is involved in understanding the subject matter which requires information access and the application of knowledge as a logical guide to prototyping and creative form-making (Poggenpohl, 2012). The use of appropriately planned project-led problem-based activities in the classroom addresses the two types of knowledge espoused by Ryle (1949): understanding subject matter or theory (knowing that) and performing technical tasks and applying theories (knowing how). Boud and Costley (2007) further explicate that practice drives the use of theory and Dewey (1944, p.137) points out that “the doing requires observation, the acquisition of information and the use of constructive imagination ...the doing is of such a nature as to demand thinking, or the intentional noting of connections; learning naturally results”.

Designers also need to capably apply and adapt to diverse and at times complex tasks and situations – deadlines, budgets and logistical concerns, as well as product-oriented and client-imposed restrictions can influence the design process (Resnick, 2003) and are important factors in an active graphic design profession. If learning is to be context dependent and applied then the learner should adopt the role of a professional and demonstrate the exact range of skills necessary. This requires self-starting, self-managed, skill-full individuals (Markham, 2011), solving real tasks, and demonstrating team work and leadership, and can be achieved through a project-led problem-based activity designed to reflect the real world context. Favourably, this learning method can enrich learning experiences as students are exposed and engaged in connecting knowledge, skills, processes, professional attitude and ethics. Ergo, the learner can develop and experience ethical standards necessary to solve real-world tasks that satisfies Scheffler’s (1965) “knowing with” domain of knowledge.

Moreover, project-led problem-based learning affords the teacher the benefit of educating, observing, and assessing the growth of real world skills. According to Dale’s (1969) Cone of Experience, which indicates the effectiveness of certain learning techniques in relation to memory, individuals generally remember a great deal of what they do through the learning activities of a simulation, model or a lesson designed for real world application. As the project-led problem-based approach engages the knowledge of theory and encourages practice-based learning which reflects real world situations, it “encompasses courses and learning activities which are linked to formal work placements, those which require the application of course ideas in a work setting and those which build on experience gained in a work setting” (Fenton-O’Creevy, 2005, p. 2). Hence, the three domains of knowledge outlined by Ryle (1949) and Scheffler (1965) can be facilitated through project-led problem-based learning. However, in order for this approach to work it must well-designed and constructed with meaningful learning outcomes that are relevant to the educational goals and the curriculum of the respective institution.

Organisational principles for designing a project-led problem-based activity

When employing the project-led problem-based approach, it is important to recognise that the role of the teacher is to serve as a facilitator who guides the learner to utilise a range of resources. Through group or individual projects, the learner can design an assignment from scratch and tap into their creative abilities (Stix & Hrbek, 2006). However, projects should not be the sole activity for learning as students can get frustrated in self-directed learning without sufficient guidance. Therefore, lectures, demonstrations, flipped classroom and other strategies should complement this activity whilst allowing the student's own questions to be the driving force for learning. In addition, Dewey (1938, pp.38-39) elucidates that "judging the value of an experience should factor in what the experience moves towards and into. The educator has a responsibility to evaluate the direction a learning experience is heading. He or she must be able to judge what attitudes are conducive to continuing growth".

However, to receive satisfying results and assure quality learning, the project-led problem-based approach requires a careful and well-planned process and specific tools (Markham, 2011). Dewey (1938) describes this method as "construction through instruction" where a learning activity requires intended goals and outcomes to assure positive results and "intelligent activity is distinguished from aimless activity by the fact that it involves the selection of means-analysis of the variety of conditions that are present, and their arrangement-synthesis to reach an intended aim or purpose" (p.84). Therefore, the teacher must guide a project with intention. This is imperative, as Dewey warns that all education, like all living, is a process of experiencing; however, not all experiences are equal or authentically creative.

Generally, the implementation of a project-led problem-based activity can be dissected into eight progressive phases (Zafirov, 2013). However this method should be adapted to suit the task and the students. In the classroom, the teacher has the challenge to correlate this method with content, materials and activities to ensure quality education and meaningful experiences. Holistically, the organisational principles of a project allow the students to work to their best ability and also address the key standards in a curriculum (Markham, 2011).

These eight phases (Zafirov, 2013) and organisational principles (Markham, 2011) are as follows:

1. *Identify the challenge:* In the first phase, the teacher sets the stage for the students with a review of the outlined learning outcomes and the real world samples of the challenge they will be facing. The challenge must be carefully defined and aligned with the objectives of the course to culminate as a project brief.

2. *Enrol and engage*: Students adopt the role of professional designers. A real world condition or a field-tested set of best practices assist the teacher to engage the students in the project from the beginning through a forum of display or competition. Setting the right stage is the key to success which includes incorporating student voice and choice into the project, organising a project schedule, and having clear benchmarks. Project-led problem-based learning is an on-going, reflective process that should lead to further questions and investigations.
3. *Build the assessment*: The teacher and students negotiate the criteria for evaluating the projects. The result is evaluated by using the specific criteria established at the beginning of the project and defined in an assessment plan.
4. *Gathering research*: Students discuss and accumulate the research or the background information needed for their designs. This allows concept engagement to take place early on in the project.
5. *Preparation*: Students accumulate the materials necessary for the project.
6. *Application*: The mantra of a design project-led problem-based learning activity is to *create* and *deliver*. After appropriate research and preparation, students create their projects using and applying the knowledge they acquired. This phase embodies problem-solving by exercising craftsmanship, manipulating, designing, experimenting and prototyping.
7. *Refinement and presentation*: Students prepare to present their projects. Graphic design involves an iterative process to strive for the best solution. Teachers need to coach students in skills such as collaboration, presentation and teamwork as this is important in the professional practice of graphic design.
8. *Reflection*: At the end, debriefing is a good exercise for the students and the teacher to reflect on their individual perspectives of the process and accomplishments and also to evaluate the project against the established criteria.

Research aims

This study investigates the planning and implementation of a project-led problem-based method in graphic design education at a Caribbean university. Through a case study approach, the research aims to identify, understand, connect and elucidate the theoretical underpinnings that support the project-led problem-based approach to teaching and learning and to outline a framework for designing and implementing the projects premised on the eight key phases (Zafirov, 2013) and organisational principles (Markham, 2011). In doing so, the study asks whether the project-led problem-based approach and framework for implementation was found to be effective and attractive to students and whether it was able to impart theory, develop technical competencies, involve the learner in professional methodologies, increase their skills in self-management, solve real world tasks and help them become self-directed autonomous learners.

Methodology

The topic and proposed framework were explored in the context of an introductory level graphic design course in a visual arts degree at the Caribbean university under study. In this instance, the implementation of the project-led problem-based method in graphic design education was aimed at developing a range of knowledge, skills and abilities in students. Through their projects, ten students tackled problems in topics such as logo and corporate identity and grid systems for publication. The projects were sequentially arranged to build foundational knowledge, skills and attitudes to advance towards more complicated and demanding projects which were fashioned with work-related and client identified parameters and guided by a framework consisting of the eight phases and organisational principles.

Using a constructivist approach, the initial projects of the course began with simple and basic exercises to lay down the foundational theory and skills. However, as the course progressed, the projects grew more complex and advanced as it relied upon the application of the knowledge and skills gained from the previous projects. The case study focussed on a major project: “Logo redesign and Publication”, hereinafter called “Project 3”, on the topic of logo and branding redesign which was situated in a real world context and based upon experiential data from the students of the course. This introductory graphic design course was a visual arts major requirement at the university which allowed students to learn the basics necessary to complete the projects regardless of their background or major.

The study population was the class of the graphic design course, which comprised ten students. Nine students were visual arts undergraduates and one student was a film undergraduate. A questionnaire was distributed at the end of the course to acquire students’ feedback, gauge benefits and to facilitate reflection on the projects and teaching methods of the course. The questionnaire featured 15 questions using a blend of Likert-scale and open-ended questions informed through the criteria of the three domains of knowledge (Ryle, 1949; Scheffler, 1965). The course ran for ten weeks and this study focuses on the project-led problem-based component that ran from week 6 to week 10. Table 1 illustrates how Project 3 was conducted through the eight phases and organisational principles.

Table 1. The implementation of phases and organisational principles in Project 3

	Week									
	1	2	3	4	5	6	7	8	9	10
1. Identify the challenge										
2. Enrol and engage										
3. Build the assessment										
4. Gathering research										
5. Preparation										
6. Application										
7. Refinement and presentation										
8. Reflection										

Project analysis

In the first phase, the lecturer set the stage with a discussion on the importance of logos and branding identity, the design relationship with the corporate world and graphic design as a strategic business tool. This was followed by an in-class exercise that critiqued various real world logos and discussed why some were effective and meaningful. The lecturer provided a project brief that outlined all the required components of the project. There were four broad parts to this project: (i) research into real world companies with logos from their surroundings; (ii) develop a logo for a selected real world company with identified 'client' parameters and restrictions; (iii) construct a basic graphic standard manual (GSM) and; (iv) provide an example of an appropriately applied logo in a poster, flyer or other application. The learning objectives were to develop skills in composition, information design, concept development and making meaningful symbols. Another technical objective was to exercise further application and practice in Adobe Illustrator and InDesign. Similar to a set of rules in a game, the project had standard objectives and parameters which were the criteria to be completed by all students. The content and requirements of this project were framed to mirror a real world redesign job performed by professional graphic designers.

Students were first asked to search, observe, collect and identify logos that they considered unsuccessful or which were responded to negatively. The students then stated why they were considered unsuccessful and identified the problems. In this way, the students participated in the design of their own project and adopted the role of a professional graphic designer. Also, in this phase, the lecturers and students reviewed the time span, planned benchmarks and organised the schedule to determine, for example, when a grid should be made and the deadlines for the final redesign, the mock-up manual and the presentation date.

The lecturer discussed the four parts of the project and outlined a rubric based on concept/innovation, craftsmanship, use of principles, presentation and marketing considerations, and research. The students set the assessment by

identifying the problem and outlining what they hoped to accomplish supported by research into the company. As each company and student's redesign was unique, the assessment was anchored by a project proposal. This document stated the student's aims and objectives, the company's mission, background and competitors; thereby setting the project in a business context. This allowed students to take charge, engage in concepts and construct a project proposal based on the outlined rubric and the quality of their redesign.

Students conducted individual investigations and research into the company. For example, one student chose a restaurant company logo and brand identity to redesign. This student investigated this by dining in the restaurant and observing the discrepancies and weaknesses that affected her experience as a client and noted the improvements that could be made. In addition, the class collected logos that were considered to be effective, impactful and inspirational. From gathering this initial research, a concept engagement and idea-generation session ensued. Spider diagrams and other visualisation and brainstorming techniques were utilised to produce a range of ideas. Through the use of the project proposal, the class presented their ideas to their peers for critique and narrowed their list to a handful of ideas.

The lecturer recommended the programmes, technology, equipment and tools that were necessary to complete the project. For most of the students, this was the first time they were making their own book or manual. Books, video tutorials and samples were recommended to help students learn about some bookbinding options. Also, the lecturers provided guidance on services such as printers and bookbinders. Building upon skills from the previous two assignments, students learned some techniques and processes of the programmes. Furthermore, the lecturers provided demonstrations of essential techniques throughout the project.

During the delivery of the project, lecturers stepped back and encouraged the students to adopt self-management and organisation skills. The intention was for students to assume responsibility for their project while the lecturers facilitated and guided the process. Project reviews were provided weekly to identify the strengths and weaknesses of the work in progress, through consultations on ideas, assistance in technical problems and the evaluation of the work against the project brief. As each company and student was different, each project generated its own set of unique problems that required the student to produce solutions through the use of the available resources. A common problem was creativity and how to apply the ideas for the logo to meet the client identified parameters. Other challenges encountered by students were management and planning, decision-making and logistical issues that required students to develop competencies in communication, leadership and work ethics. Also, some students lagged behind the stipulated schedule due to absenteeism and procrastination which affected their project-based learning curve.

As the project deadline approached, the lecturers offered feedback and advice to each student by reviewing the rough edits of their mock-ups, the logo and the GSM. On the deadline, each student presented a finished logo and GSM,

and pitched their design to peers. At the end of the presentation, the lecturers and students discussed the exercise focussing on the content and the benefits gained by a simulated real world project. This reflection also included a mix of creative, logistical and management issues and the requirements that are typical in professional practice to meet the client-identified parameters.

Questionnaire analysis

The questionnaire focused on the following areas: lecturer's performance, learning of content and technical skills and the project-led problem-based approach ability to support the goals and learning outcomes.

Lecturer's performance

The role of the lecturer in the course was to facilitate or guide student learning. The feedback developed through the questionnaire indicates that the delivery of the course and the lecturer's performance were effective as the majority of the students found that the course goals, learning objectives, format of the course, instruction delivery and the way in which the course was facilitated helped in the completion of the project and the acquisition of graphic design knowledge and skills. Details of the results are provided in the Table 2.

Table 2. Student review of lecturer's performance

	SA	A	AV	D	SD
Expectations were clearly communicated	8	1	1	-	-
Format of the course was adequate	7	2	1	-	-
Presentations/demonstrations were done in an appropriate manner	6	3	-	-	1
Ample time for discussions and comments	6	1	3	-	-
Course sessions were aptly facilitated	6	2	1	1	-

Note: SA (Strongly Agree), A (Agree), AV(Average), D (Disagree), SD (Strongly Disagree)

Learning of content and technical skills

The questions in this section were included to determine if the domain of understanding ('knowing that') was successful in the course, and whether the project-led problem-based method, along with the demonstrations, lectures and presentations aided in learning the theory and subject matter. The results (see Table 3) show that nine out of ten students responded positively to the methods of instruction for symbols and logos, typography, concept development and design principles. These responses indicate that the project-led problem-based method can help students to learn and apply theoretical knowledge.

Table 3. Student review of course’s ability to develop their understanding of specific fields

	SA	A	AV	D	SD
Symbols and logos	6	2	1	1	-
Typography	2	5	2	1	-
Information design	4	4	2	-	-
Concept development	6	3	-	-	1
Design theory	5	4	0	1	-

Note: SA (Strongly Agree), A (Agree), AV(Average), D (Disagree), SD (Strongly Disagree)

At the beginning of the course, the students indicated that they possessed low skill levels and experience in using some of the Adobe software. Feedback showed that seven out of ten students had little or no experience in manipulating the programmes. However, at the end of the course, the results revealed that the students’ technical skills improved as all ten students benefited in differing degrees from using the project-led problem-based method to learn and improve their technical competencies in Adobe Illustrator and Adobe InDesign (see Table 4).

Table 4. Student evaluation of improvement in software skills

<i>*improvement in skills</i>	GR	G	AD	L	N
Adobe Illustrator	1	5	3	-	-
Adobe InDesign	1	2	4	3	-

Note: GR (Great), G (Good), AD (Adequate), L (Little), N (None)

The data show that all of the students felt the projects enhanced their understanding of the various subjects. This experiential data indicate that the project-led problem-based pedagogy is an effective tool to further ‘knowing that’, and “knowing how” (Ryle, 1949) and that the application of knowledge and technical skills supported worked as a tool for “knowing with” (Scheffler, 1965).

Supporting goals and learning outcomes

Using the project-led problem-based approach with a focus on real world situations or “knowing with” (Scheffler, 1965), provided a dynamic experience that cultivated attractive work skills. The feedback drew on a variety of core aspects of the course and helped cultivate an understanding of the client and the importance of target audience, time management, research, process development, presentation and context. Also, one student reported that their experience on the course helped to build their confidence. This indicates that work ethic and self-management

skills can be acquired through this type of experience and practice. Therefore, project-led problem-based learning can be an effective tool to prepare students for a professional practice.

A well-planned project-led problem-based learning activity framed by the eight phases (Zafirov, 2013) and organisational principles (Markham, 2011) can lead to an enjoyable and educative experience that is student-centred as indicated in the students' comments:

[I] totally enjoyed learning through the exercises as well as all the help the instructor gave. Instructions were always clear and the instructor gave many useful, helpful examples to expand our ideas.

[T]hank you for the many feedback, they all helped.

[L]ecturers were extremely knowledgeable and they consistently assisted students with any additional questions raised by the projects. The project based format was very effective in helping to achieve an understanding of the theory work presented.

Conclusion

This paper proposed eight phases and organisational principles as a framework for best practices in Design Education. In this case study, a project-led problem-based approach and framework for implementation was found to be effective and attractive to students as it successfully imparted theory, developed technical competencies, involved the learner in professional methodologies, increased skills in self-management, and solved real world tasks as students took charge of their own learning and became self-directed autonomous learners. At heart, this approach aims to develop a range of abilities in the learner that will enhance their immediate marketability, prepare for future employability and nurture sustainable growth which are crucial for a professional position in the field of graphic design. The research was able to identify specific points for consideration, in relation to the eight phase model, in utilising a project-led problem-based approach:

1. Identifying the challenge: Lecturers should ensure that students select challenges that are appealing and which would sustain interest for the duration of the project.
2. Enrol and engage: Lecturers and students should try to use a range of methods of communication such as discussions, peer-critiquing, and private discussions and also engage in the use of technology.
3. Build the assessment: Lecturers should conduct periodic reviews of projects to ensure quality and effectiveness.
4. Gathering research: Students should have the necessary access to information resources for individual or group research to build their own perspectives and answers to the driving question stipulated in the project-led problem-based activity.
5. Preparation: Lecturers should provide guidance and recommendations for the necessary materials and tools needed to succeed in the project.

6. Application: Lecturers should manage the workflow throughout the project and assist students to create their best work. Students should have easy access to the physical facilities, technology and amenities required to create quality work.
7. Refinement and presentation: Lecturers should set up a formal presentation to prepare students in the communication skills needed for the world of work. All refinements should be made before the final presentation which should be conducted in a professional manner.
8. Reflection: The students' input is important for this process. Some key helpful enquiries which can be used to assess and review the project are:
 - Are students improving on skills and knowledge?
 - Have the students met the intended standards of the curriculum?
 - What do students and the teacher observe as the strengths and weaknesses of the project?
 - For future reference, how can the shortcomings of the project be improved?

Graphic design is an activity that can serve as a strategy to strengthen the economies of developing countries, such as those in the Caribbean, amidst growing globalisation. However, graphic design is a small and emerging industry in the Caribbean and the availability of academic and vocational training is limited. Today, the graphic designer needs to have specialised insight, technical skills and craftsmanship to manipulate technology, equipment and other tools as well as ethical and contextual understanding to adapt to various tasks and complex circumstances. As a solution, the project-led problem-based approach can facilitate learning in the three domains of knowledge: understanding, technical skills or performance and contextual studies.

References

- AIGA. (1993). *What is graphic design?* Retrieved from <http://www.aiga.org/guide-whatisgraphicdesign/>
- Dale, E. (1969). *Audiovisual Methods in Teaching*, 3rd Edition. New York: Dryden Press.
- Dewey, J. (1944). *Democracy and education*. New York: Free Press.
- Dewey, J. (1938). *Experience and education*. New York: Free Press.
- Fenton-O'Creevy, M. (2005). Is practice-based learning only for professional and vocational subjects? *Open University Online*. Retrieved from <http://www.open.ac.uk/opencetl/print/book/export/html/434>
- Hall, S. (1997). *Representation: Cultural representations and signifying practices*. Milton Keynes: The Open University Press.
- Hanney, R. (2013). Towards a situated media practice: Reflections on the implementation of project-led problem-based learning. *Journal of Media Practice*, 14(1), 43–59.
- Harland, R. (2011). The dimensions of graphic design and its spheres of influence. *Design Issues*, 27(1), 21–34.
- Heller, S. (1997). Thoughts on Rand. *Print*, 51(3), 106.
- Livingston, A., & Livingston, I. (2012). *The Thames & Hudson dictionary of graphic design and designers* (3rd edition). London: Thames & Hudson.

- Markham, T. (2011). Project based learning: A bridge just far enough. *Teacher Librarian*, 39, 38–42.
- Moursund, D. (2002). *Project-based learning: Using information technology* (2nd edition). Eugene, OR: International Society for Technology in Education.
- Perkins, D. N. (1991). What constructivism demands of the learner. *Educ. Technol.*, XXXI(9), 19–21.
- Piaget, J. (1970). *Science of education and the psychology of the child*. New York: Viking Press.
- Poggenpohl, S. (2012). Envisioning a future design education: An introduction. *Visible Language*, 46(1/2), 8–19.
- Resnick, E. (2003). *Design for communication: Conceptual graphic design basics*. New Jersey: John Wiley and Sons.
- Ryle, G. (1949). *The concept of mind*. New York: Barnes and Noble.
- Scheffler, I. (1965). *Conditions of knowledge: An introduction to epistemology and education*. Chicago: Scott, Foresman, and Company.
- Stix, A., & Hrbek, F. (2006). *Teachers as classroom coaches*. Alexandria VA: Association for Supervision and Curriculum Development.
- Zafirov, C. (2013). New challenges for the project based learning in the digital age. *Trakia Journal of Sciences*, 3, 298–302.