

BLENDED LIFELONG LEARNING DELIVERY: LESSONS LEARNED FROM A PILOT STUDY

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Accessing learning opportunities while continuing to work full-time is a significant challenge for construction professionals. Many educational institutions are endeavouring to address the continuing learning needs of construction professionals in a more flexible manner. Integrating technology in the delivery of learning programmes focused on the needs of managers in the construction industry presents a new set of challenges both for individual instructors and for educational institutions. To bridge the gap between industry and academia each must embrace new and challenging roles. An Irish programme has attempted to integrate various technologies in the delivery of new programme focused the delivery of learning opportunities focused on full-time construction professionals. Some key lessons learned from this pilot blended learning programme in Ireland are outlined. How this will be integrated in an initiative which involves a number of partner institutions in Europe is presented.

Keywords: blended learning, e-learning, motivation, technology.

INTRODUCTION

It is well established that there is a need for continuing professional development (CPD) and lifelong learning opportunities aimed at construction professionals. However lifelong learning programmes aimed at construction managers in the workplace must be flexible enough to address their particular needs. The challenge remains for all in developing a suitable framework that addresses the concerns of work and personal commitments of construction professionals and issues those new technologies present, in terms of pedagogical, technical and financial challenges to both management and staff in educational institutions. Technology integrated with online and distance learning is often termed “blended learning” and can play a significant role in the delivery of CPD. Some key issues that continue to pose challenges for educational providers and developers of learning include: (i) how does one build a blend, (ii) how can a blended approach be delivered, (iii) how are the roles of educators and participants changed in a blended environment and (iv) how to evaluate the blend?

In a construction industry that continues to experience a variety of challenges and changes, more sophisticated and demanding clients, new construction procurement routes and a more global industry, keeping up to date and current with trends and issues remains a challenge that educational institutions can address, using a blended learning approach. With the changes that are taking place in all aspects of construction, there is a need to continue to provide knowledge to people in new technologies, products and services.

The Horizon Report (2007) acknowledged that one of the key challenges emerging that is likely to have a significant impact on education in the interim future is the rapidly changing environment of higher education. Costs continue to rise, budgets are typically shrinking while demand for new services are growing. This is one of the drivers for an increasing need for distance education with pressure coming not only from non-traditional students seeking flexible options but also from administrative directives to cut costs.

The key aspects of this research, illustrated in Figure 1, are to endeavour to strike a balance between traditional and totally online delivery and thus postulate a framework to bridge the gap between the industry (learners) and education (learning providers).

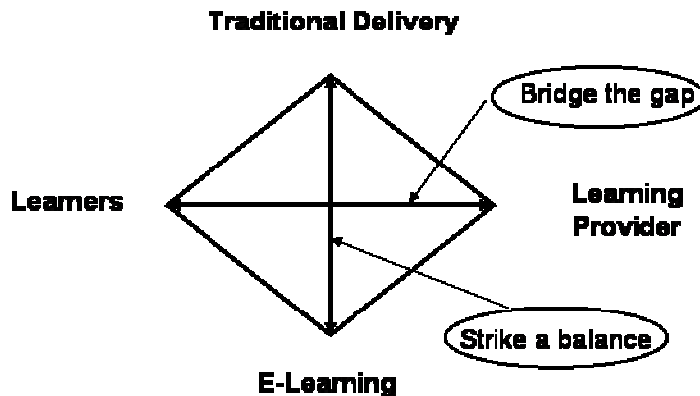


Figure 1 Framework of Key Research Parameters

Key to the formulation of this framework and deploying any modules as part of CPD in the construction industry is to recognize that:

- A “one size fits all” approach does not work
- Interactivity and multiple instructional methodologies allow participants to develop a deeper understanding of material been learned
- While issues around the technology will always need to be considered, it is important to bear in mind that technology is only a tool by which the learning will be delivered
- One of the most important prerequisites for successful implementation of e-learning is the need for consideration of the underlining pedagogy or how learning takes place.

Learning how to integrate new technologies in an instructional setting, when to use it and why it should be used always lags the introduction of the technology itself (Kilby, 2001). It is therefore difficult to say that there is one correct model for deploying blended learning that is most effective. However, it can be postulated that there may be an optimum level that can be struck between traditional and e-learning as represented in Figure 2.

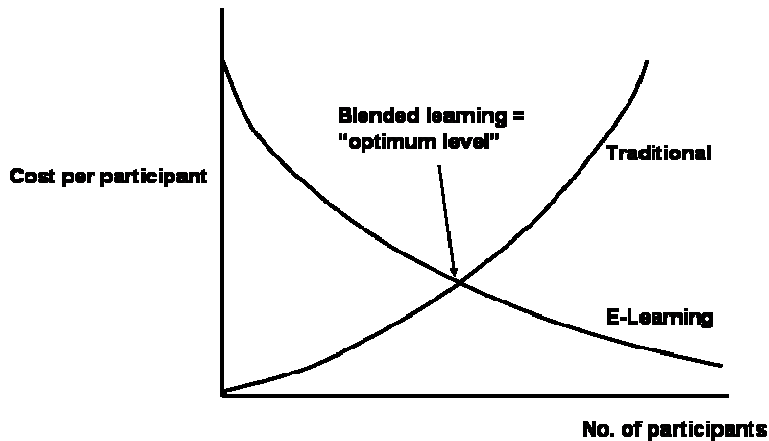


Figure 2 Striking a Balance between traditional and e-learning

While it may never be possible to put exact figures on what the “optimum level” will be as illustrated in Figure 2, from a strategic perspective the key challenge that this ongoing research is attempting to address is a recognition that there can be a balance struck both from a financial and a pedagogical perspective that can result in a successful programme being deployed.

E-LEARNING IN HIGHER EDUCATION

Chan and Welebir (2003) used the Michael Porter 5 forces model to analyse the forces, illustrated in Figure 3, that exist in the educational industry with the advent of e-learning.

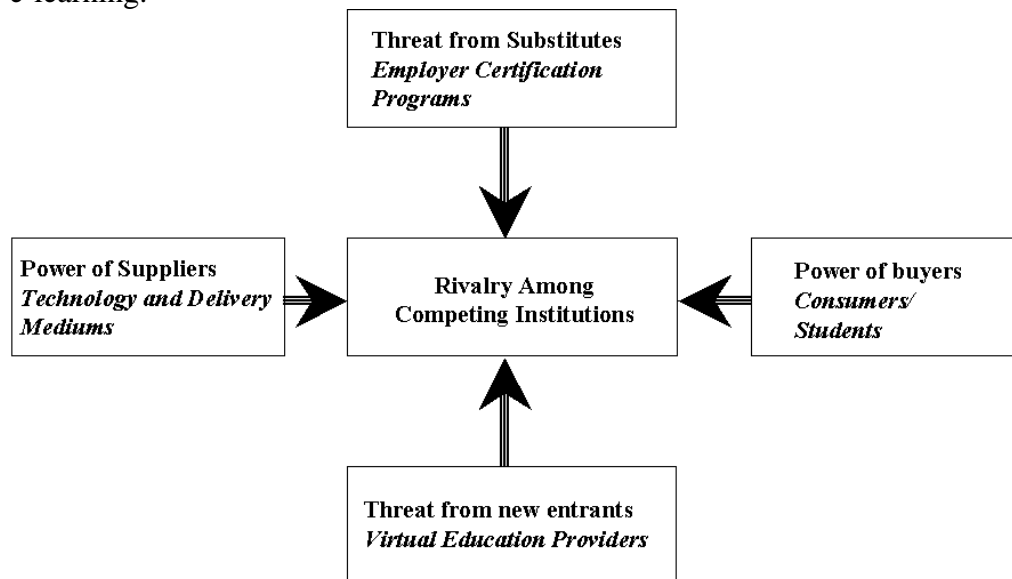


Figure 3: Porters 5 Forces Model of Industry Analysis for Traditional Higher Level Institutes
Source: Adopted from Chan and Welebir (2003)

Chan and Welebir (2003) highlight that e-learning creates new opportunities, but also introduces new obstacles for the traditional higher level institution. Traditional higher-level institutes are facing competition from corporate universities (Nixon and Helms, 2002). These institutions are not confined to a particular type of organization. For example in the USA it has been estimated that the number of corporate universities was almost 1,800 at the end of the year 2000 (El-Tannir, 2002), while in the UK they cover a diverse range of organizations such as B&Q (a home improvement store), the National Health Service (NHSU) and the Royal Bank of

Scotland (Homan and Macpherson, 2005). There is evidence that e-learning is increasingly being used by these corporate universities organizations in the delivery of learning (El-Tannir, 2002; Nixon and Helms, 2002: Homan and Macpherson, 2005).

Other challenges higher-level institutes face, include the continued growth of Internet use, decline in governmental support for education and the emergence of a new student population (Folkers, 2005). Typically large employers represent this source as organizations integrate certification into programmes as part of their training and development of employees (Chan and Welebir, 2003).

TECHNOLOGY IN EDUCATIONAL INSTITUTIONS

According to Zemsky and Massy (2004) the adoption of e-learning follows the classic S-curve for technology adoption illustrated in Figure 4. On account of the overlapping of innovations' adoption cycles, this results in a complex situation that is difficult to analyse and predict what is happening in third level institutions (Zemsky and Massy, 2004).

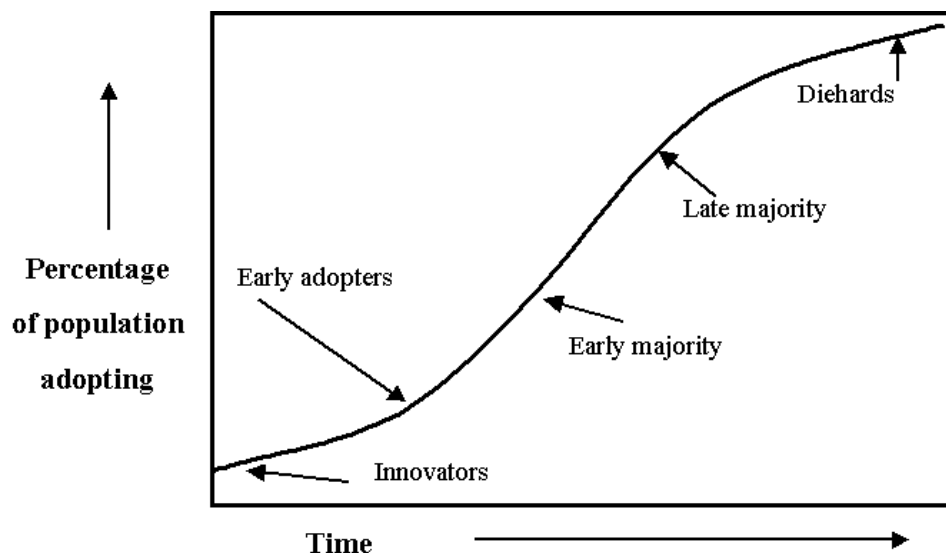


Figure 4: Stages of Technology Adoption

Typical examples of the uses of technology for each of these stages of adoption are illustrated in Table 1.

Table 1: Cycles of Adoption and uses of Technology

| Adoption Cycle Stage | Examples |
|--|---|
| Enhancements to traditional course configuration | Use of e-mail Students access information on the Internet Use of off the shelf software PowerPoint presentations |
| Course Management Systems | WebCT Blackboard |
| Imported course objects | Compressed video presentation Complex simulations |
| New course configurations | Focus on active learning Combine face-to-face virtual, synchronous and asynchronous interaction in novel ways |

Source: Adopted from Zemsky and Massy (2004)

Given the complexity of learning and the various technological phases that educational institutions typically pass through in the development of distance learning

initiatives, blended learning can play a strategically important role in addressing the lifelong learning needs in the construction industry.

THE ROLE OF BLENDED LEARNING

To promote the use of e-learning the emphasis needs to be less on the technology and more on the “experience”, “engagement” and other high level contexts (Hamid, 2002). Blended learning may bring about major changes in the way educational material is designed, developed and delivered to people who want to access learning but have other constraints that affect the process of learning (Pailing, 2002).

Howell *et al.* (2004) suggest seven strategies to be adopted and applied in facilitating the delivery of distance learning using technology. These are:

- Enable higher-level institutes and departments to accept more responsibility for distance education activities
- Provide faculty with more information about distance education programs and activities
- Encourage faculty to incorporate technology into their traditional classrooms
- Provide strong incentives for faculty to participate in distance education
- Improve training and instructional support for distance education faculty
- Build a stronger education faculty community
- Encourage more distance scholarship and research.

The challenge that faces educational institutions is that in a situation where learning is recognized as complex set of interrelated cognitive processes and the evolution of ICT continues unabated developing a framework incorporate blended learning to address the lifelong learning needs of construction managers is a complex undertaking. The continuous changes in communications and IT infrastructure present higher-level institutions with new opportunities and challenges (Ma and Runyon, 2004). Blended learning is one approach that may be used to address these challenges.

BLENDED LEARNING PROGRAMME IN WATERFORD INSTITUTE OF TECHNOLOGY

In Waterford Institute of Technology, a programme has been developed which embraces these challenges in developing and deploying a new blended learning CPD programme. The structure of the new programme is unique to construction related post-graduate education in Ireland in that it involves a mixture of ‘distance learning’ and ‘traditional learning’ techniques in the completion of the various subject modules. This post-graduate program has been designed to facilitate professionals in the Irish construction industry (including engineers, construction managers, quantity surveyors and architects) who wish to enhance their education and gain an additional qualification. Through the use of both classroom and distance learning modes as part of the blended learning approach to delivering lifelong learning in the construction industry in Waterford Institute of Technology, it was anticipated that a high level of commitment would be maintained and the sense of isolation that participants can often experience would be removed.

In order to ensure that students were meeting deadlines and remained motivated, computer-mediated communication was used by lecturers to post notes, discussion items and online material on the learning management system (LMS) WebCT. Figure 5 illustrates schematically the typical approach used in the delivery of each of the modules.

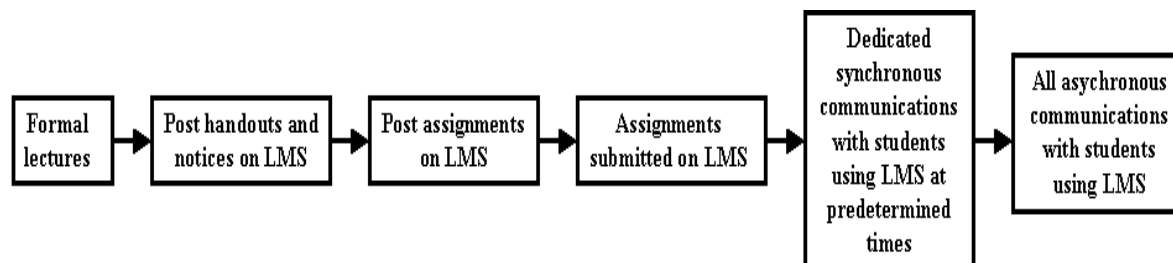


Figure 5: Schematic of Operational Delivery of a module

The programme is broken down into two years with two semesters of 15 weeks each in each of the years. Participants undertake traditional instruction 3 times in each of the 2 semesters (i.e. S1 through to S6). These sessions are typically spaced approximately 6 weeks apart for 3 days at a time. This decision in the design of the programme was deliberate. It was anticipated that this structure would facilitate continued motivation of the participants on the programme. It would also help militate against participants experiencing a sense of isolation that can be experienced on totally online or distant learning programmes. Table 2 outlines the modules in each of the 2 years, with the number of hours of classroom delivery of the modules at each of the traditional instructional sessions (i.e. S1 to S6).

Table 2: Structure of the Traditional Programme Delivery

| | Semester 1 | | | Semester 2 | | |
|------------------------------------|------------|-----------|-----------|------------|-----------|-----------|
| Modules Year 1 | S1 | S2 | S3 | S4 | S5 | S6 |
| Management of Projects 1 | 5 | 5 | 5 | 5 | 5 | 5 |
| Economics | 3 | 2 | 3 | 2 | 3 | 2 |
| Finance | 2 | 3 | 2 | 3 | 2 | 3 |
| Management of ICT | 5 | 5 | 5 | 5 | 5 | 5 |
| Construction Law | 5 | 5 | 5 | 5 | 5 | 5 |
| Research Methodology | 3 | 2 | 3 | 3 | 2 | 2 |
| Total | 23 | 22 | 23 | 23 | 22 | 22 |
| | | | | | | |
| Modules Year 2 | S1 | S2 | S3 | S4 | S5 | S6 |
| Management of Projects 2 | 5 | 5 | 5 | 5 | 5 | 5 |
| Strategic Management | 5 | 5 | 5 | 5 | 5 | 5 |
| Human Resource Management | 2 | 3 | 3 | 2 | 3 | 2 |
| Procurement and Marketing | 5 | 5 | 5 | 5 | 5 | 5 |
| Dissertation or Industrial Project | 1 | 2 | 2 | | | |
| Total | 18 | 20 | 20 | 17 | 18 | 17 |

One of the key challenges in these initiatives is striking an appropriate balance between online and traditional instruction in the context of the challenging environment that educational institutions face. A detailed analysis of the programme is currently being undertaken which is looking at many aspects of the programme including; (i) participants attitude to CPD, (ii) technical competency, (iii) role of instructor as part of a blended learning programme, (iv) the support infrastructure and (v) a detailed evaluation of all aspects of the delivery of the programme. One key

aspect of the analysis questioned participants with respect to their interaction with various online elements of the programme. Some findings from the research are presented in the following section.

ANALYSIS OF PROGRAMME

There were 8 participants on the programme ranging from 25 to 50 years of age. The working background of these participants included architecture, quantity surveying and construction management. When questioned about their interaction with online resources participants indicated that almost 60% of their interactions took place while at home with just over 40% of the time engaging online with the programme as outlined in Figure 6.

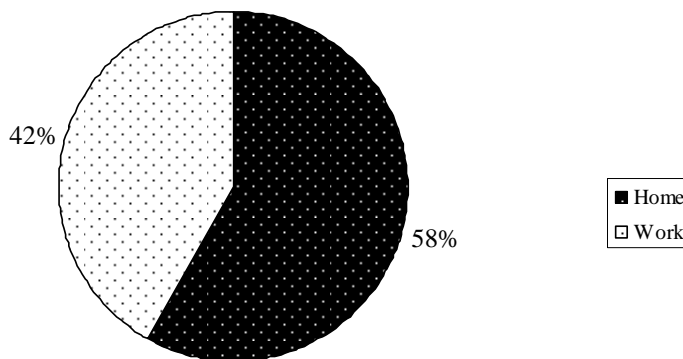


Figure 6: Breakdown of participant interaction with online resources

When questioned about their level of engagement with the resources on average 37.5% of participants engaged with online technologies for over 16 hours a week as part of learning. The remaining participants spent on a weekly basis at least 6 hours (37.5%) or between 11 and 15 hours per week (12.5%) engaged with online learning. When this is taken in conjunction with the breakdown of location for interaction with online learning it would suggest that people strive to manage their time as efficiently as possible to ensure that they remain engaged with the programme. Figure 7 gives the details of the weekly breakdown of engagement with online resources.

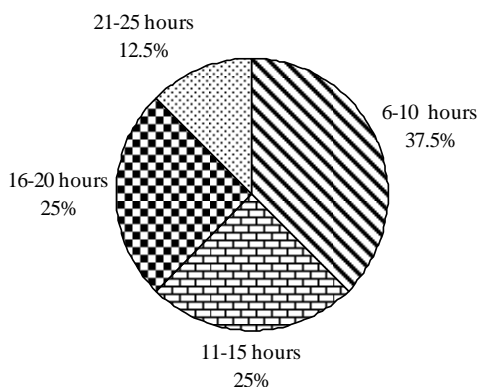


Figure 7: Breakdown of participant interaction with online resources

A challenge that educational institutions now face is how to engage staff members in using online technologies. The online resources consisted primarily of notes and presentations slides, web-links, web pages and online discussions hosted within the WebCT environment, all created by individual instructors. However, as technology plays a more pervasive role in all our lives some of the technologies that can be

availed of by staff are commonly used as part of the daily working life of construction professionals. Participants were asked for feedback on staffs' use of online resources as part of the delivery of the programme. Figure 8 highlights the feedback on this element of the programme.

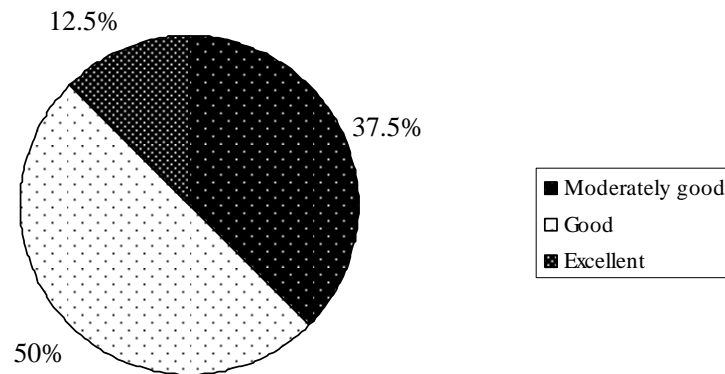


Figure 8: Staff use of online learning resources

The results indicate that over 62% found the resources either good or excellent. The challenge remains for all programmes in motivating and enabling staff to continue to build on these types of initiatives so as to continuously improve the online resources element of the programme.

Another key aspect in the delivery of learning programmes using blended learning is the hosting platform or framework that can be deployed for managing and supporting the learning experience. This is typically facilitated by the use of a learning management system. The LMS used as part of the programme was WebCT. When participants were asked to indicate the usefulness of the LMS, 62% indicated that it was good, with a further 12.5% indicating it was excellent. One of the most ubiquitous technologies used in the workplace and that can be used, as part of the delivery of learning is email. Participants indicated that the usefulness of email was excellent with over 60% indicating that it is an excellent resource with a further 38% indicating that it is very good.

Table 3: Effectiveness of Online Technologies

| Aspect of technology | Moderately Important | Good | Excellent |
|--------------------------------|----------------------|------|-----------|
| Usefulness of Email | - | 38.5 | 62.5 |
| Usefulness of LMS | 25 | 62.5 | 12.5 |
| Usefulness of online material | - | 87.5 | 12.5 |
| Usefulness of Audio, video/DVD | - | 75 | 25 |

On some modules video and DVD presentations were used in the delivery of the traditional instruction and integrated into the learning experience through the use of online discussions. When questioned on this 75% of participants indicated that these were a good use of resources with the remaining 25% stating it was an excellent resource.

DISCUSSION

Implementing a blended programme is a challenge on a number of levels. While integrating technology is a challenge, research on this pilot programme indicates that with an open approach and the appropriate infrastructure (i.e. LMS) there are readily available technologies that can be used on the deployment of these programmes. Email, the use of video / DVDs and the uploading of notes and other material that

individual staff members develop are very effective pedagogical resources. Staff posting of notes, web-links, etc. help in the deployment of these types of initiatives but to increase the effectiveness in the delivery of these resources, management must make a strategic decision to resource these appropriately. Given that educational institutions can be at different stages in the adoption of technology into the delivery of distance learning, it is not necessarily a daunting or insurmountable challenge to efficiently deploy a blended learning programme. Through the use of a LMS, encouraging and enabling staff of use various technologies and resources, it is possible to develop very effective pedagogical approaches and resources.

NEXT PHASE

Nottingham Trent University, Hochschule Karlsruhe, Multimedia Instructional Design in Ireland and Istanbul Technical University in Turkey are collaborating with Waterford Institute of Technology in formulating a framework for deploying blended CPD aimed at the construction industry. The rationale behind this project is to create an innovative international learning resource that will be widely accessible to construction management professionals thereby facilitating improved knowledge and skills within the industry. This network is focused on the management of the learning experience, through implementing well-established pedagogical practices when integrating technology as part of the delivery of learning. One key innovation for the future of this network is to develop modules on-line to offer a “blended solution” to construction management teaching and learning. The lessons learned from this pilot study in WIT will be further tested and evaluated as part of this research.

This framework is using an open source LMS, Moodle, and the partners have established a dedicated website www.cpd-construction.com to host the learning resources. The plan is to build upon the experiences that have been learned from the pilot programme as part of the deployment and evaluation of the resources. Pilot modules on scope, project planning and risk management have been developed. The next phase involves the evaluation of these resources.

CONCLUSIONS

Online learning presents a further set of challenges for participants, educators and educational institutions in integrating technology to facilitate motivation, progress monitoring and achievement. As funding mechanisms continue to change and rapid advances in ICT continue to transform the way education is delivered, developing a framework to deploy learning to address the diverse lifelong learning needs of construction professionals presents a challenge. The key question of this research addresses the way educational institutions can configure the various technologies to bridge the gap and address the CPD needs of construction professionals. The blended learning framework proposed may be both formal and informal, technology or people based and either independent or convivial. The balance will ultimately be defined by the preferred learning style of the individual participants and the interaction of the instructor and the participants.

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