Reconciling ADDIE and Agile instructional design models—case study

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Abstract

Using the model of analysis, design, development, implementation and evaluation (ADDIE) with regards to instructional design has become a prevalent practise among e-learning designers and developers. This model assumes assigning specific roles to project team members and their linear cooperation. However, in case of working in a dynamic and complex environment, the ADDIE model may evolve into more adaptive and people-oriented Agile instructional models. This article analyses a hybrid approach to the process of creating the e-learning course introduction to cultural awareness in specific situational context, which involves a small size of a project team and geographically dispersed project contributors. The case study reveals that a successful accomplishment of multinational projects, conducted in specific environments may require a hybrid approach; moreover, in such atypical projects good communication skills and personal qualities are crucial for goals' achievement. The results of qualitative analysis may open further discussions on this topic.

Keywords: ADDIE model, Agile model, e-learning course, instructional design.

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1. Introduction

The concept of instructional design (ID) appeared in educational technology literature in the later part of 1950. It is a process by which instruction is improved upon through the analysis of learning needs and systematic development of learning materials (Battou, Baz & Mammass, 2017). It involves the use of specific models, which make the work of an instructional designer more systematic.

The aim of this article is to reconcile rigid ID model with an Agile approach (**A**lign, **G**et set, **I**terate and implement, **L**everage and **E**valuate) and prove that while creating an e-learning course in specific circumstances, the combination of analysis, design, development, implementation and evaluation (ADDIE) and Agile brings positive results. The author assumes that despite the fact that they are both defined as opposite models, the Agile approach may function with the rigid framework of ADDIE and supports tasks' performance. The analysis of a case study of creating an e-learning course *Introduction to Cultural Awareness* (ICA) has to prove that both ID models can co-exist and complement each other. Worth noticing is the fact that in literature models of ID are constantly modified and improved upon; for instance, ADDIE model can incorporate practises taken from IT software development models and be transformed into ADDIE+ (Shor, 2012). However, there is tiny number of researches based on combining two ID models. Therefore, an insight into another practise may contribute to research on ID process. Moreover, this attempt can facilitate the emergence of new approaches to ID process.

2. Instructional design models—an overview

The most recognised model of ID is a cascade or waterfall model—ADDIE (the abbreviation stands for Analysis, Design, Development, Implementation, and Evaluation). Its popularity was proven by the analysis of 113 papers on ID models published from 1999 to 2014 in 44 SSCI and SCI journals. The data revealed that the most frequently researched/reported model was ADDIE (n = 20, 22.47%), then ARCS Model of Motivational Design—Attention, Relevance, Confidence, Satisfaction (n = 10, 11.24%), Gagne and Briggs (n = 9, 10.11%) and 4C-ID (n = 9, 10.11%) (Goksu, Ozcan, Cakir & Goktas, 2017). Worth noticing is the fact that after 2014, ADDIE remains the most popular ID model (Allen, 2017; Brown & Green 2015). Despite its popularity, there are still voices which stress that present-day ID models do not provide much insight into design processes for creating e-learning instructional solutions (Adnan & Rizhaupt, 2018). Seeking for proposals to enhance ID models, there are suggestions that software engineering design principles should be adapted to such models (Adnan & Rizhaupt, 2018). Rooted in the history of software engineering, Agile methods can be implemented through ID processes (Abbas, Gravell & Wills, 2008). Agile methods are defined as very lightweight processes that employ short iteration cycles; they actively require users to establish, prioritise, and verify requirements; and rely on tacit knowledge within a team as opposed to documentation (Boehm & Turner, 2003). Rapid feedback and willingness to change, as major features of Agile methods, may enhance the process of ID.

2.1. ADDIE model

This waterfall model is used both in traditional and e-learning trainings and it involves five key stages of operation: analysis, design, development, implementation and evaluation. The first stage, Analysis, includes a detailed analysis of the elements of the didactic process. It has to answers to key questions on specific needs of the training group, learning objectives, form of communication, time of training, expenditures for the project implementation, infrastructure and expected training results. At this stage, a popular SWOT analysis can be performed to recognise the opportunities, weaknesses, limitations and obstacles concerning the implementation of the project. A complete diagnosis builds foundations for the second stage—Design. For this stage, it is important to clarify learning objectives, choose an instructional approach, develop instructional strategy, materials and plan the lessons and assessment instruments. In the third stage, the programmers develop or integrate technologies,

instructional designers create scenario, which should be discussed with subject matter experts (SMEs), teachers (e-teachers), as well as multimedia specialists. This phase also involves testing of materials and procedures. Implementation phase involves evaluation of the design, improvement of the script; it develops procedures for training facilitators and learners. The last stage—Evaluation applies to the course participants and the entire teaching system, IT solutions and even group educators/mentors. The evaluation mainly involves a comparison of the pre-project and post-project status. It consists of two stages: (1) *formative evaluation*, which concerns each stage of the ADDIE process and (2) *summative evaluation*, which focuses on the outcome of a course and provides opportunities for feedback from the users (Battou et al., 2017). The ADDIE model is a recursive model—after the fifth phase, there is the first phase. This model is sometimes criticised for its excessive linearity and lack of flexibility. However, its supporters rate it as a universal model that can be modified and used according to the needs of instructional designers or user-experience specialists. For instance, Nichols Hess and Greer (2016) described how a team of librarians used the ADDIE ID model to incorporate best practises in teaching and learning into an online, four-credit information literacy course (Nichols Hess & Greer, 2016). In other cases, ADDIE model was used either to design learning materials for apps (Yang & Chang, 2017) or to design a prototype of Online Collaborative Project based on Collaborative Learning model (Nadiyah & Faaizah, 2015). ADDIE can also be perceived as a simplification of complex processes (Adnan & Ritzhaupt, 2018).

2.2. Selected Agile-like models

ID models should meet the needs of a dynamic working environment. Therefore, Agile principles become more and more popular and they are incorporated into ID process (Arimoto, Barbosa & Barroca, 2015; Battou, 2017; Rocha, Valle, Maldonado, Bittencourt & Isotani, 2017). Contrary to ADDIE model, Agile models are described as more adaptive regarding the process of course design and development. Such models provide an iterative, active learning cycle to parts of a project, with emphasis on stakeholders over processes, working software over wieldy specifications and documentation, collaboration of a team, responsiveness to change versus adherence to detailed plans (Czeropski & Pembrook, 2017; Tiger & Hess, 2012). It is useful in case of emerging parameters, which should appear in the course impromptu. The Agile model has its roots in software industry and its principles can be directly transferrable into ID.

A modification of the traditional Agile technique to support ID and development projects is LLAMA. Similarly to ADDIE model, it begins with analysis phase then moves to iterative cycles of design development, implementation and evaluation, which repeat until the most viable solution is achieved (Czeropski & Pembrook, 2017). Another Agile-alike model is successive approximation model (Allen, 2012). This cyclical model of repeated small steps, starts with preparation phase, then involves design and development phases. The model emphasises collaboration, efficiency and iteration or repetition (Czeropski & Pembrook, 2017). It is highly adaptive as it allows for exchanging ideas, more frequent evaluation of a prototype, and sufficient number of tests.

3. The introduction to cultural awareness e-course case study—ideological approach and practical solutions

3.1. Situational context

The ICA course was created at the National Defense University in Warsaw (present-day War Studies University) in 2012 as a response to challenges related to operating in international environments. The topic of the course was tasked by Individual Training and Education Developments NATO Training Group (ITED NTG), Spring—77th Meeting, and the course leitmotif, which was organising a fictional international conference, was developed during Advanced Distributed Learning Working Group Meeting 2011, Tbilisi, Georgia. The planned time for studying the content amounted to 12 didactic hours. The Analysis phase began with international consultations on key topics explored in the course;

they included greetings and farewells, courtesy talks, social norms, religion, gender, nonverbal communication in both military and civil contexts. Starting from year 2012, the Design, Development and Implementation phases were conducted. Core works were distributed between a chief SME and an instructional designer. A tiny number of works from these three phases were supported by a multimedia specialist (e.g., video recording, creation of interactive map of gestures). The Evaluation phase was performed by a number of domestic and international experts from civilian and military environments (project contributors). The key evaluation process took place during meeting of the NATO Training Group Task Group on Individual Training and Education Developments (NTGTG ITED) in Warsaw, Poland in April, 2012.

3.2. The ICA course description

On the basis of the agreements in Tibilisi, it was assumed that the scenario will take the form of a decision game and will consist of scenes, hypothetical situations on *what you will do when* ..., during which the learner will choose the most common way of behaving in a given situation. According to the game scenario, the person undertaking the course is included in the organisation of the conference, during which he will have a number of tasks to perform; every day at every hour meets with different situations that are related to the ability to behave in a multicultural environment. Each time an answer is given to a question, it generates a feedback response, the aim of which is to bring the issue to the forefront—regardless of whether the answer was correct or incorrect. The answer to the answer is an explanation of the given behaviour. A busy week in a multicultural environment runs from Monday to Saturday. The tasks were based on a calendar of a week (in total 6 days, in each from 8.00 to 15.00 learners met different situations). The total number of tasks was 48. After completing this part of the course, you are redirected to a compendium of knowledge, in which the topic-sorted content can be re-explored in order to repeat and prepare for the knowledge test. The final test consisted of 20 questions (multiple choice, gap filling, matching and interactive map). The scenario was subjected to consultation with the key SME. The most work was devoted to design and implementation of the game-based tasks in which a learner could choose one or more correct answers.

The course has been launched onto academic e-learning platform and partner organizations' platforms gained recognition and great popularity in the NATO environment, in further steps was translated into French. Regarding the domestic platform (ILIAS, War Studies University), according to data provided by a platform administrator, since 2012 till September 2018, the course was used in 143 online teaching programs and was taken by 3,243 learners.

3.3. The roles and tasks of the e-learning project team—an ideal approach and practical solutions

3.3.1. An idealistic approach
It was assumed that ADDIE model will be used in the process of course creation. A basic project team for e-learning course working with the ADDIE framework consists of a project manager, a SME, a multimedia specialist, media didactics and a text editor. In this structure, each team member has tasks assigned according to the scope of responsibility; for example, the project manager supervises the implementation of the entire project, communicates with other team members and cares about the right way to accomplish tasks. SMEs work together with instructional designer in order to refine the content, add appropriate media. The media teacher cooperates additionally with a multimedia specialist who presents content in the course in a creative way. After the content implementation, the editor starts evaluating the prototype, corrects any grammatical and stylistic errors. The editor consults with an SME and instructional designer the relevance of specific information in the course. In the final stage, a group of evaluators indicate possible technical or methodological shortcomings. The ready course is used by an e-teacher who sometimes supplements its content with other learning objects or provides synchronous (chat, conversation using the camera and virtual board) and asynchronous (e-mail and discussion) means of communication. In an ideal approach, the number of

personnel is specified, their roles and tasks are clear. Also, the time for particular tasks and the cost of work and infrastructure are assumed. This model of work, where the project framework and model of ID are clearly established, is likely to bring predictable results. Furthermore, it makes the work environment stable and eliminates crucial risks concerning achievement of milestones.

3.3.2. Practical solutions—elements of Agile models

In the project of ICA e-learning course, the tasks of team members could not be specified. In this particular case, the analysis phase began in 2011 and it lasted 1 year. It included specifying the needs of the international organisations from the civilian and military environments, topics specification and outlining the content. This phase included discussions and surveys. It was agreed that the course will be created in SCORM Editor, which makes this learning object transferable for all interested groups. The obtained data were provided by two project managers for consultations with a SME and instructional designer.

The Design, Development, Implementation stages were realised throughout 3 months and two persons: SME (Americanist, multicultural researcher, academic teacher and PhD student) and instructional designer (graduate of adult pedagogy, English didactics, English translations and PhD student with digital skills) were working to accomplish the project goal. The video production and interactive map (course components) was in responsibility of multimedia designer. The final Evaluation stage involved international military and civilian experts, those who primarily specified the needs and the course topics and their value and then, at the end of the project, they focused on technical and teaching content errors or mistakes (Table 1).

Table 1. Qualitative analysis grid of ADDIE model actions and Agile-like model actions

ADDIE model—typical actions	Agile-like model actions
Analysis Determining audience, time for learning, key issues, desired behavioral outcomes, delivery options, timeline for project completion.	The analysis phase questions were A wide group of international and domestic experts (two Project Managers initiate research and are responsible for obtained data). Discussions and uncategorised interviews with international and domestic experts (about 1 year, blurred in time, 2011–2012). Specified the tool, scope of the course, audience, delivery options.
Design Design a sketch of a scenario, multimedia choice. Specifying learning objectives, selection of media and template of the course.	Two team members: instructional designer, key SME discuss the project idea on the basis of delivered data from analyses. Writing a script and course rapid prototyping on ILIAS platform.
Development Content is written. Creation the content	Two team members: instructional designer, key SME discuss the scope of topics/lessons. There is an ad hoc decision on creating video with a SME on cultural awareness; an instructional designer deals with legal aspects regarding image publishing. Video preparation performed by multimedia designer. Still rapid prototyping—several substantive issues have been added by an instructional designer due to the specifics of research interests. Evaluation of the added content by SME. Game-based tasks are created by the instructional designer.
Implementation All course materials are uploaded to one place.	Instructional designer searchers and chooses multimedia for the course (Dreamstime, Wikimedia Commons sites, university's archives browsing). Rapid prototyping. An electronic version of a script is created. An SME joins the work of instructional designer and composes game-based tasks. An SME tests interactions and control questions. The course is delivered to Project Managers to submit it for evaluation.

Evaluation Setting specialist measures how well the project achieved its goals (formative and summative evaluation).	A wide group of international and domestic experts. The presentation of the course prototype and its evaluation took place during NTGTG in Warsaw (April 2012). Other domestic and international groups provided feedback to instructional designer and key SME. The course content (text) and interactions are corrected, edited, till the course final release at the end of 2012.

It can be noticed that the assumed ADDIE model evolved towards Agile process. This process was carried through sometimes unplanned subsequent activities. Regarding time, team roles and scope of tasks, those elements can be perceived as blurred in this case study. The closest to ADDIE model were two phases: Analysis and Evaluation, but the three remaining phases were completely different: they were more like rapid prototyping within sprints, especially in cases when SME and instructional designer had to re-discuss the content, change topics and design the specific game-based tasks. Regarding the three phases, there is the question why they were accomplished successfully. It seems that it is connected with the background of the two team members and their good communication skills and personal qualities (creativity, critical thinking, responsibility for tasks, accuracy in tasks performance, decisiveness and time-management ability). It must be noted that some tasks were performed interchangeably. The instructional designer created some new content. Conversely, the SME overtook the work of the instructional designer and created a set of game-based tasks which were, in turn, implemented by instructional designer onto the platform. This solution allowed for accomplishment sprints in the Design and Development phases. The remarks from feedback received in Evaluation phase was successfully implemented and checked again by other experts. In this Agile-like model, the key roles played instructional designer and the key SME. On one hand in brought a lot of flexibility and independency to those team members, but on the other hand, the working environment was perceived by them as unstable and chaotic.

4. Findings and discussion

An analysis of ID actions reveals that the ADDIE model, interspersed with Agile techniques can bring positive results. However, it must be noted that this hybrid approach to ID, which may be associated both with flexibility and instability, may be realised in a team members with good communication skills and specific personal qualities (so-called human factor). Those factors that allow the whole ID process to adjust to a specific situation, in which breaking a linear sequence of actions is necessary. Also, in this case study, the role of technical knowledge and skills of an instructional designer (in ID and in the ILIAS SCORM Editor) as well as flexibility of the key SME should not be neglected. The knowledge on the process of creating and implementation, overtaking some tasks of instructional designer by the key SME, significantly improved the work of the entire project team.

The limitation of the study is that the findings cannot be extended to wider populations as they concern a particular case study. However, they support views of other researchers who stress that instructional designers must have a solid foundation in ID and learning theory, possess soft skills and technical skills, and have a willingness to learn on the job (Ritzhaupt & Kumar, 2015). Moreover, project team members, specifically educational technologists (or instructional designers) should possess social competencies (act cooperatively in group works and to work together with different experts and other shareholders), educational competencies (knowledge on psychology in learning in different age groups, ID, consulting, technology integration) and technological competencies (technology, hardware, software and virtual environments) (Izmirli & Kurt, 2009).

Thus, it can be recapitulated that either soft skills or technical knowledge are necessary to achieve success in this types of work.

5. Conclusion and recommendations

The main conclusion of this study is that ID process can rely on the reconciled opposite models, which complements each other. This is related to a specific situational context: the size of a project team (two, sometimes three real working team members) and cooperation with geographically dispersed SMEs from civil and military environments required a flexible approach to an ID process. Good communication skills and specific personal qualities, as well as technical competencies, willingness to learn are key factors which enhance project works based on a hybrid ID model. It is recommended in order to explore the role of soft skills, personal qualities in the field of ID, especially when the whole process is performed in specific situational contexts. This study stresses how complex and the interdisciplinary nature of ID process can become crucial for researchers, professionals dealing with the ID process as well as decision-makers from e-learning industry. In the era of transferring educational activities to the virtual space, increasing the importance of the Internet and the intranet, eliminating space-time barriers, striving towards the individualization of education (Uhomoibhi et al., 2010), learning in virtual spaces becomes a crucial trend in education. Therefore, soft skill, such as flexibility in performing tasks, mutual understanding, openness, task-orientation, willingness to learn become crucial elements to accomplish any e-learning projects. Instructional designers, especially novice instructional designers, should be trained in specific communication and even project management skills (York & Ertmer, 2016; Kim, 2012). Education and training provide them with knowledge and skills on how to operate effectively in specific situational contexts.

References

Abbas, N., Gravell, A. M. & Wills, G. B. (2008, June). *Historical roots of agile methods: Where did "Agile thinking" come from?* In International Conference on Agile Processes and Extreme Programming in Software Engineering, Springer, Berlin, Heidelberg, pp. 94–103. doi: 10.1007/978-3-540-68255-4_10

Adnan, N. H. & Ritzhaupt, A. D. (2018). Software engineering design principles applied to instructional design: what can we learn from our sister discipline? *TechTrends*, *62*(1), 77–94. doi: 10.1007/s11528-017-0238-5

Allen, M. (2017). Designing online asynchronous information literacy instruction using the ADDIE model. *Distributed Learning*, 69–91. doi: 10.1016/B978-0-08-100598-9.00004-0

Allen, M. (2012). *Leaving ADDIE for SAM.* Alexandria, VA: ASTD Press.

Arimoto, M. M., Barbosa, E. F. & Barroca, L. (2015, October). *An agile learning design method for open educational resources*. In Frontiers in Education Conference (FIE), 2015 IEEE, pp. 1–9), IEEE. doi: 10.1109/FIE.2015.7344334

Battou, A., Baz, O. & Mammass, D. (2017). *Toward a framework for designing adaptive educational hypermedia system based on agile learning design approach*. In Europe and MENA Cooperation Advances in Information and Communication Technologies, Springer, Cham, pp. 113–123.

Battou, A. (2017). Designing an adaptive learning system based on a balanced combination of agile learner design and learner centered approach. *American Scientific Research Journal for Engineering, Technology, and Sciences (ASRJETS)*, *37*(1), 178–186.

Boehm, B. & Turner, R. (2003). *Balancing agility and discipline: a guide for the perplexed, portable documents*. Addison-Wesley Longman Publishing Co., Inc.

Brown, A. H. & Green, T. D. (2015). *The essentials of instructional design: connecting fundamental principles with process and practice*. New York, NY: Routledge.

Czeropski, S. & Pembrook, C. (2017). E-Learning ain't performance: reviving HPT in an era of agile and lean. *Performance Improvement*, *56*(8), 37–45. doi: 10.1002/pfi.21728

Goksu, I., Ozcan, K. V., Cakir, R. & Goktas, Y. (2017). Content analysis of research trends in instructional design models: 1999–2014. *Journal of Learning Design*, *10*(2), 85–109. Retrieved from https://files.eric.ed.gov/fulltext/EJ1134619.pdf

Izmirli, O. S. & Kurt, A. A. (2009). Basic competencies of instructional technologists. *Procedia-Social and Behavioral Sciences*, *1*(1), 998–1002. doi: 10.1016/j.sbspro.2009.01.178

Kim, Y. (2016). Development of e-competency framework for e-learning instructional designer. *Indian Journal of Science and Technology*, *9*(26). doi: 10.17485/ijst/2016/v9i26/97318

Nadiyah, R. S. & Faaizah, S. (2015). The development of online project based collaborative learning using ADDIE Model. *Procedia-Social and Behavioral Sciences*, *195*, 1803–1812. doi: 10.1016/j.sbspro.2015.06.392

Nichols Hess, A. & Greer, K. (2016). Designing for engagement: Using the ADDIE model to integrate high-impact practices into an online information literacy course. *Communications in Information Literacy*, *10*(2), 6. doi: 10.15760/comminfolit.2016.10.2.27

Ritzhaupt, A. D. & Kumar, S. (2015). Knowledge and skills needed by instructional designers in higher education. *Performance Improvement Quarterly*, *28*(3), 51–69. doi: 10.1002/piq.21196

Rocha, R. V., Valle, P. H., Maldonado, J. C., Bittencourt, I. I. & Isotani, S. (2017, July). *AIMED: agile, integrative and open method for open educational resources development*. In Advanced Learning Technologies (ICALT), 2017 IEEE 17th International Conference on IEEE, pp. 163–167. Retrieved from https://ieeexplore.ieee.org/document/8001747

Shor, R. M. (2012). ADDIE +: adopting proven practices from the IT industry. *T+D, 66*(5), 56.

Tiger, D. & Hess, G. (2012). *Agile approach to design leads to client and job satisfaction.* Association for Talent Development Website. Retrieved from https://www.td.org/Publications/Magazines/TD/TDArchive/2012/04/Agile-Approach-to-Design

Uhomoibhi, J. O., Palma, J., Alves, P., Elpebion, Y., Restivo, T. M., Piteira, M. R., . . . & Fernandez, C. (2010). E-learning development tendencies in higher education and future directions. *University Information Systems–Selected Problems*, 113–127. Retrieved from https://bibliotecadigital.ipb.pt/handle/10198/4918

Yang, H. C. & Chang, W. C. (2017). Ubiquitous smartphone platform for K-7 students learning geography in Taiwan. *Multimedia Tools and Applications*, *76*(9), 11651–11668. doi: 10.1007/s11042-016-3325-2

York, C. S. & Ertmer, P. A. (2016). Examining instructional design principles applied by experienced designers in practice. *Performance Improvement Quarterly*, *29*(2), 169–192. doi: 10.1002/piq.21220