Does the Integration of the Concept of Rapid Instructional Design in Project Management Approaches Support the Efficient Realisation of E-learning Projects?

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Abstract— **The development and implementation of interactive e-learning courses is highly time-consuming and expensive. A question, therefore, arises whether it is possible to develop an e-learning program at a high level without incurring significant financial resources and the need to create a project team consisting of a wide range of specialists. In this respect, Rapid Instructional Design (RID) might have a useful role to play in that it focuses on a reduction of the cost and time involved in developing e-learning courses, while ensuring a reasonable level of quality. The purpose of this article is to present an adaptation of the concept of RID for proposing and verifying a practical approach to the implementation of e-learning. The article starts with an analysis of the problem of how to create an e-learning course with limited time, financial and human resources. Then, the article continues with a critical analysis of the RID concept. The third section of the article outlines an approach to the management of e-learning projects based on RID, taking into consideration the problems faced when developing e-learning courses. The fourth and fifth sections present the methodology and verification results of the developed approach which answer the question considered during the research - does the integration of the concept of Rapid Instructional Design support the efficient realization of e-learning projects? The last section of the article contains a critical discussion of the possible applications of the adapted concept of RID in various types of projects, based on the research of its implementation in two e-learning projects.**

Keywords- rapid instructional design; e-learning; higher education; project management; course development; quality management.

I. INTRODUCTION

Despite the significant development of distance learning in the past few years, e-learning (network learning) and m-learning (mobile learning), which are the newest forms of d-learning (distance learning), are still under-utilized [22]. This, in turn, limits the adaptation of distance learning on a large scale. The use of even more innovative Web 2.0 e-learning tools does not change the conclusion that it is the teaching material that still plays the key role. The challenges of modern academic teaching and the training market in conjunction with the rapid development of Information and Communication Technologies (ICT) have led to more demanding quality requirements regarding e-learning [15]. An important indicator of the attractiveness of an e-learning course, in addition to the content, it is also the quality of the presentation of the educational material, often associated with the level of interactivity and multimediality [16]. In this regard, it is important to develop and integrate components, such as: illustrations, interactive graphic, movies, animations and simulations [24]. These cannot be simply "art for art's sake", but must serve the key objective regarding the multimedia content and interactivity of e-learning courses, that is to improve the efficiency of learning [21]. This can be achieved when the multimedia objects involved in e-learning courses support a faster acquisition of knowledge and skill development [20]. The interactivity of e-learning material can also help to maintain a high level of commitment from the participants of e-learning courses.

The professional production of e-learning materials consistent with the assumptions outlined above is extremely time-consuming and expensive [25]. In order for the financial resources incurred in converting static teaching material into multimedia and interactive versions to be spent effectively, it is necessary to create a project team including a range of professionals [1], as indicated in Table 1. In addition, as shown in Figure 1a, the preparation and implementation of high quality e-learning courses requires the management of many parallel processes. This requires a commitment from project managers with relevant experience in e-learning initiatives [6]. Therefore, universities and training companies often have difficulty in preparing e-learning programs of high quality or on an appropriately large scale.

Therefore, it is particularly relevant to seek approaches which may enable universities and companies to implement e-learning, but within the strict financial and time constraints faced by many organizations. These objectives are considered to be key in terms of the RID. Referencing RID to other alternative models for the development of distance learning, such as the Classroom Oriented Model [3], Product Oriented Model [2] or the System Oriented Model [10], it focuses more widely on practical aspects. The RID concept has been touched upon by only a few authors, so remains under-studied.

Outlined in the current point of the article premises are the basis for the formulation of two hypotheses:

1. The adaptation of RID in approaches to the project management of e-learning course development supports the creation of e-learning courses at an acceptable level

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of quality while significantly reducing the time and cost of project realization relative to traditional approaches.
2. The use of RID is a useful alternative in the development of e-learning courses, compared to preparing a simple e-learning programme based on static documents or expensive multimedia and interactive e-learning materials.

The verification results of the stated hypotheses will answer the question posed in the title of the article – does the integration of the concept of Rapid Instructional Design in project management approaches support the efficient realization of e-learning projects?

The second section of the article contains a review of relevant literature and critical analysis of the concept of RID. The third section of the paper presents a proposed solution - an approach to the project management of e-learning course development that integrates the concept of RID to significantly reduce the time and cost of implementing e-learning. The validation methodology of the proposed approach is outlined in the fourth section of the paper. The fifth section of the paper presents the validation results of the proposed solution that answer the research question - Does the integration of the concept of Rapid Instructional Design in project management approaches support the efficient realization of e-learning projects? The paper finishes with a discussion and conclusion.

II. BACKGROUND AND RELATED RESEARCH

According to Clark [7], a key step in the preparation of an e-learning course is its design. An approach that can be used in a number of e-learning initiatives, in order to speed up the process, is the concept of Rapid Instructional Design. The direct meaning of the word 'rapid' does not fully reflect the specifics of RID. This concept, analogous to extreme software engineering methodologies, aims at shortening the development time and reducing the role of documentation. The RID concept was introduced by Thiagarajan [23], who devised the key objectives of RID to replace the traditional model of e-learning design - instructional design system (ISD) - with: the consistent creation of training packages, an acceleration of the design process, and use of appropriate shortcuts, borrowings and omissions from the ISD model. The consistent creation of training packages is based on 'just-in-time' method, for the daily delivery of learning packages, unlike the conventional ISD model that assumes the sequential realization of these processes. In this respect [23] identified 10 strategies with 20 directives, among which the most important are: the use of existing learning resources, utilization of templates, integration of tools for the acceleration of ISD processes as well as a better and wider use of human resources.

The RID concept was extended in [20]. Accordingly, projects based on RID, reductions in the duration and cost of developing an e-learning programme are achieved by simplifying, wherever possible, the standard activities that make up the design process like: analysis of the material, choosing methods of adaptation, preparation of instructional scripts, as well as the production and integration of the developed components of e-learning courses [19]. In particular, the instructional design should be limited in scope. Instructional design by [9] is a systematic approach to the design of teaching instructions as attractive learning scenarios, according to the customers' needs and with the possibility for adaptation as a multimedia e-learning course.

Despite its name, RID implies the accelerated execution of all processes, not just design. This is achieved by carrying out specific steps, while often omitting certain tasks. Support from RID in this area takes the form of a series of best practices, with the most significant being [23]:

- a needs analysis based on the materials immediately available or soon to be, such as existing documents, instead of conducting interviews, for example;
- the production of ready-made templates to facilitate the preparation of multimedia objects and activities;
- the use of a reviewing system of the e-learning course specifications by a team of professionals with assigned roles to enable the faster execution of the evaluation;
- assessment and review of the e-learning course based on representative testing, or a pilot, allowing the verification of the e-learning course quality by some of the participants before running it.

The above list [13] may be expanded by adding the training of the authors in the application of technologies that enable the independent and rapid production of selected types of multimedia objects. Certain RID practices do not consider the important role that e-learning and ICT can play in facilitating the preparation of e-learning courses. Their potential caught the attention of [18] and [14] who distinguished a number of principles among which the most important ones are:

- the use of dedicated software to support the acceleration of the process of design and production of e-learning course components;
- the use of templates for: multimedia objects, activities, and other elements, wherever possible;
- the use of Reusable Learning Objects (RLO) and components;
- the use of ready-made commercially available e-learning courses or teaching material;
- the use of existing solutions purchased from external suppliers;
- the use of tools to facilitate the needs analysis process;
- the use of Training Management Systems (TMS) to facilitate the preparation of e-learning courses with integrated tools.

It should be noted that RID takes the form of a series of best practice recommendations rather than a precise methodology and is not based on a specific approach to project management. This allows the principles of RID to be adapted according to different models and methodologies of e-learning project management.

III. SOLUTION PROPOSAL

A concept regarding the practical implementation of the principles of RID was developed for projects such as CTF

[4] and Case Simulator [5], carried out in 2012-2014. According to the principles set out primarily by Thiagarajan [23] and Piskurich [18] [19], their approach for the project management of e-learning (Figure 1b) includes:

1. A modification of the processes existing in the classical model of an e-learning project. The basic model is considered to be the ADDIE (Analyze, Design, Develop, Implement, Evaluate), which is very general in character. The author used developed model (Figure 1a), which is compatible with the ADDIE model, and expanded it with popular approaches in relevant books and articles [11] [8] [17].
2. The wide use of software to support the acceleration of design and production processes.
3. Process support via the use of already available templates of components.
4. The omission of a range of activities during processes carried out at the conceptual and executive stages.

The general model for adopting the concept of RID for project preparation and implementation of e-learning offer compared to a traditional approach is shown in Figure 1.

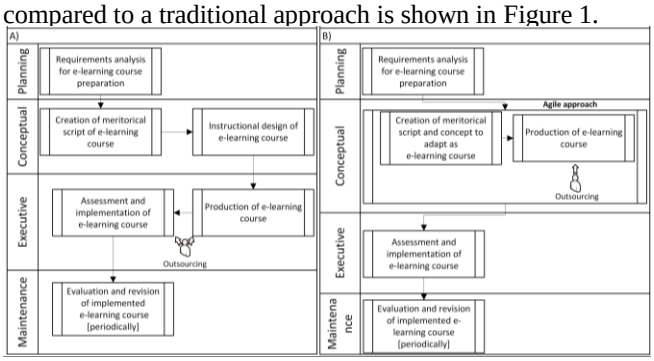

Figure 1. Traditional approach of e-learning project management (a), The approach to e-learning project management based on the RID concept (b).

As shown in Figure 1, the modification of the traditional model of e-learning course development, in order to bring in the concept of RID, primarily concerned the design and production processes, which are combined in a single process. Thus, the main processes to be shortened and simplified are the design and production processes of e-learning course development (Table 1). These are by far the most time consuming and cost intensive processes [12]. Other processes are carried out without any significant changes (Figure 1). In the developed model, the following elements of RID were adapted:

- a requirement analysis based on the materials immediately or quickly available instead of, for example, conducting interviews;
- a system of reusable components, through the preparation and implementation of e-learning in accordance with Sharable Content Object Reference Model (SCORM) standard and the production of similar multimedia objects based on templates;
- the direct design of the e-learning course structure with the use of authoring tools;
- the production of multimedia materials using tools supporting rapid animations and interactions generation based on preliminary concepts, to reduce the amount of multimedia objects' specification.

A list of the differences between the traditional approach and adaptation of the RID concept is shown in Table 1.

TABLE I. COMPARISON OF TRADITIONAL AND RID BASED APPROACHES FOR E-LEARNING COURSES DEVELOPMENT

Process	Implementation (according to approach)		Executor	
	Traditional	***RID***	***Traditional***	***RID***
Requirements Analysis	Detailed analysis of the environment and training needs along with the target group.	Basic analysis of the environment and training needs along with the target group.	Instructional designer, author, expert	Author
Script creation	Preparation of a script along with evaluation elements as well as an initial material adaptation concept.	Preparation of a script along with evaluation elements as well as a material adaptation concept.	Author, instructional designer, reviewer	Author, designer
Design	Preparation of comprehensive specifications of multimedia objects as well as training structure.	One process for creating e-learning course. Direct design in authoring tool and other auxiliaries of the e-learning structure as well as multimedia objects based on their concept. Simplification of multimedia objects. Preparation of implementation packages.	Instructional designer	Designer
Production	Production of multimedia items. Validation and integration of components. Preparation of implementation packages.		Instructional designer, Multimedia team (graphic designer, audio-video specialist and others).	
Assessment and implementation	Final evaluation of the e-learning course and implementation of updates.	Same as in the traditional approach.	Author, instructional designer, tutor, multimedia team, platform administrator	Author, designer, tutor.
Evaluation and revision	Evaluation of the e-learning course content and attractiveness and proper changes.	Same as in the traditional approach.	Author, instructional designer, tutor, multimedia team.	Author, designer, tutor.

According to Table 1, the omission and simplification of a range of activities is related to the processes of requirement analysis, design and production of the e-learning course. This reduces the time and costs of the last two processes mainly. At the same time, the approach assumes an expansion of the design process where the author creates the main script and the concept to adapt it as an e-learning course with multimedia objects. Significantly, Table 1 reveals a significant reduction in the number of members required for a project team, as selected activities are delegated to:

- the author – conducting the requirement analysis and preparing the concept for the adaptation of material for e-learning course. These tasks are traditionally done by instructional designer.
- the instructional designer - the production of multimedia objects, integrating the components that comprise an e-learning course. These activities in classical approaches are carried out by the multimedia team.

The project team was limited in members, in particular by the omission of contractors responsible for the production of multimedia. This is possible thanks to the decision not to make any technical specifications for the multimedia

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materials and to reduce their complexity. In this way, the media production tasks are assigned solely to the designer.

Unlike the concept of RID, the developed approach to the project management of e-learning course development did not include the training of authors in terms of utilizing tools for the self-production of selected types of multimedia objects. This was due to the specific nature of the CTF and the CaseSimulator projects. E-learning courses were developed as small solutions, based on 20-30 pages of script written by several authors for each e-learning course. A considerable amount of time would be necessary to conduct training for the authors. Moreover, the time spent on training the authors would be longer than the time required to produce the e-learning courses. Accordingly, operations were carried out exclusively by instructional designers.

Entrusting the production of e-learning courses entirely to the designers would not be possible without the use of appropriate technology for the production of courses and pre-built templates previously prepared by professionals, such as web-masters, graphic designers and SCORM programmers. In this regard, a sophisticated authoring tool, supporting basic and intermediate animations and interactions creation, was chosen to offer ample opportunities to produce multimedia materials. Mechanisms for specifying transformations provided by the application enabled the immediate development of basic animations for multimedia objects. This eliminated the need to use graphic designers and programmers for the multimedia production and simplified the development process of e-learning materials, helping to reduce the associated costs. The financial resources required were also reduced by excluding the preparation of special graphics made by graphic designers by using alternatives available online for free or by buying a repository license.

IV. RESEARCH METHODOLOGY

The approach developed based on the concept of RID was used during the CTF project, in the years 2012-2013. Twelve specialized e-learning courses were prepared and offered in the area of economics, particularly in entrepreneurship. Courses were available to employees of small and medium-sized enterprises on the catching.ug.edu.pl platform. Over 600 employees participated in the courses. This project management approach was also carried out during the CaseSimulator project. In 2013-2014, 3 e-learning programs were prepared and offered to students, presenting the use of an information system for simulating the running of a business.

The factors that were used to validate the project management approach based on the concept of RID were as follows: the time and cost incurred for developing e-learning courses and the quality of the e-learning courses. The analysis of the time and costs of the developed approach was carried out in comparison with traditional solutions. Traditional verification approaches were made in 2008-2011 during the project "The Implementation of Modern Education in the University of Gdansk", when 6 fully interactive multimedia and e-learning courses for students and academic staff were devised. Time and cost monitoring for the RID-integrated project management approach was performed during the CTF and Case Simulator projects, realized in 2012-2014.

The quality of e-learning courses prepared according to traditional and RID-integrated project management approaches was assessed with the use questionnaires and interviews with authors (20) and participants (943). The results were compared with the assessment of e-learning courses developed with the use of a traditional project management approach.

V. RESEARCH RESULTS

E-learning courses prepared according to a traditional approach were developed on the basis of 170 pages of material on average, as opposed to an average of 20 pages in the case of the RID- integrated approach. Therefore, Table 2 shows data for the elaboration and implementation of 8.5 RID-based e-learning courses. The cost calculations do not include hardware, software or office supplies.

TABLE II. COMPARISON OF THE TIME AND COST OF E-LEARNING COURSE DEVELOPMENT DEPENDING ON THE APPROACH

Process	Time (working days)		Cost (USD)	
	Traditional	***RID***	***Traditional***	***RID***
Requirements analysis	Omitted			
Script preparation	Omitted			
Design	88	10.5	7330	1700
Production	66		7500	
Assessment and implementation	15	3	1139	558
Evaluation and revision	Omitted			
Total	169	13.5	15969	2258

Table 2 clearly indicates a much shorter time and lower costs for e-learning courses developed with a RID-based project management approach compared with traditional methods. The time and cost of the requirements analysis process and the creation of the script are not dependent on the approach, were not relevant to the comparison and were therefore omitted. The difference in the duration and cost of the assessment and implementation of e-learning exists due to the time spent on course verification, improvements or updates. E-learning courses prepared in accordance with the developed approach were characterized by a simplification of the concept, and therefore of the multimedia objects. The preparation of an e-learning course by an instructional designer rather than a multimedia team. Therefore, as a result of these simplifications, the multimedia materials experienced significantly fewer bugs, with less time and money for fixing. The duration and cost of the course implementation was the same regardless of used approach.

For a precise comparison of the time and costs required to prepare and implement e-learning courses according to the approach, these values were calculated for the script page as a main comparison unit, and are presented in Table 3. When calculating the cost of e-learning projects depending on the approach, costs that are similar regardless of the use or non-use of RID were disregarded: requirement analysis and the creation of the script, as well as hardware and software.

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TABLE III. COMPARING THE TIME AND COSTS FOR E-LEARNING COURSE DEVELOPMENT BETWEEN A TRADITIONAL AND AN RID-BASED PROJECT MANAGEMENT APPROACH

Factor	Traditional	RID	Relation (%)
Time (days/page)	1	0.075	7,5
Costs (USD/page)	93.95	13.28	14

According to Table 3, the adaptation and implementation of a page of script as the webpage of an e-learning course, using an approach based on the concept of RID was 13.33 times faster and 7.14 times cheaper than the traditional method. This indicates that the use of a methodology based on RID can enable the development of e-learning courses with significantly limited time and financial resources. Thus, the utilization of the developed approach gives important opportunities to universities and companies in terms of the adaptation of traditional materials for e-learning courses, and thus the preparation of a wide e-learning programme.

The key factor in the assessment of the developed model is the verification of the quality of e-learning courses developed with the use of this approach compared with e-learning courses produced and implemented by traditional methods. Analysis showed that e-learning courses developed with the use of a traditional approach and those which are RID-integrated have a similar visual quality. A more important issue is the reception of e-learning courses by the script authors and participants. In this regard, a verification of traditional approaches was made in 2008-2011 during the project "The Implementation of Modern Education at the University of Gdansk". The validation of the approach developed to integrate the concept of RID was carried out for the previously mentioned CaseSimulator and CTF projects. A summary of the quality assessment - resulting from questionnaires and interviews - for the respective project management approach is shown in Table 4.

TABLE IV. ASSESSMENT OF THE QUALITY OF E-LEARNING COURSES PREPARED ACCORDING TO TRADITIONAL AND RID-INTEGRATED APPROACHES

	Traditional (6 e-learning courses)		***RID (15 e-learning courses)***	
	Amount	*Evaluation score*	*Amount*	*Evaluation score*
Authors	8	High evaluation score for the quality of the e-learning courses. A quantitive analysis revealed that 12,75% of multimedia items contained significant errors compared with 78,5% of items with few or no errors.	12	No reservations regarding the quality of the e-learning courses. Acceptation of the quality of educational and visual content as well as the functionality of the e-learning courses – only quality research with interviews.
Participants	183	Very high evaluation score for the quality of the e-learning courses. A quantitive survey was carried out (102 answers received) in which the attractiveness of the presentation of materials was scored highly or very highly (86,5%) compared with the 0% of students who rated the materials as unattractive.	760	No reservations regarding the quality of the e-learning programme. Acceptance of quality of the educational and visual content as well as the functionality of the e-learning courses - quality research with interviews. No quantitive surveys.

Table 4 indicates the quality of e-learning courses prepared using a traditional approach compared with one integrating the concept of RID. E-learning courses prepared using a conventional approach were given a higher rating.

Taking into account the validation results of the approach developed according to the concept of RID, in terms of factors such as the time and cost of preparation as well as the quality assessment of the e-learning courses, the two stated hypotheses were confirmed:

1. The adaptation of RID in approaches to the project management of e-learning course development supports the creation of e-learning courses at an acceptable level of quality while significantly reducing the time and cost of project realization relative to traditional approaches.
2. The use of RID is a useful alternative in the development of e-learning courses, compared to preparing a simple e-learning programme based on static documents or expensive multimedia and interactive e-learning materials.

The confirmation of the two stated hypotheses positively answers the question posed in the title of the article - does the integration of the concept of Rapid Instructional Design in project management approaches support the efficient realization of e-learning projects?

VI. DISCUSSION

The use of the developed approach to e-learning project management, as well as the validation results of this approach, enable a critical evaluation of the RID concept. First and foremost, it is apparent that the RID-based solutions are usable when the multimedia materials to be produced will involve a low or moderate complexity of animations and interactions. In addition, in approaches to e-learning project management based on RID, it is desirable for the instructional designer to have basic skills in the field of graphics and animation programming.

The reason is that RID primarily concentrates on reducing expenditure on the design and production of multimedia objects, and thus the multimedia team. When the necessity arises to prepare complex animations with complicated interactions involving the use of audio and video, such as simulations, the concept of RID is highly difficult to apply. In such a situation it is of the utmost importance to develop a detailed instructional design specification for multimedia objects and create a multimedia team. However, even in such a scenario, the concept of RID can be partially applied, where the traditional production process will refer only to selected complex multimedia materials. This will continue to reduce the time and costs of projects for e-learning course development.

One of the principles of RID is to delegate tasks. In this regard, practical experience shows the possibility of offloading design tasks to the authors, and production to instructional designers. However, delegation per se does not reduce the cost and duration of the project. Moreover, in more complex projects, it may turn out that the authors and designers do not have sufficient skills and are less effective in their work than a multimedia team. It should be noted that in such a situation, the opposite effect is achieved in terms of reducing expenditure.

The key principle of RID assumes the simplification of the design and production processes of e-learning courses preparation, with an impact on the multimediality and interactivity of learning material. It is natural to believe that restrictions on the multimediality and interactivity of e-

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learning is not possible without a negative impact on their quality. In this regard, relevant research should be conducted. The result of such a study would define the point at which the simplification of the multimedia objects in e-learning courses leads to an unacceptable level of quality. It would also be desirable to conduct studies comparing the perceived attractiveness of e-learning courses prepared on the basis of the same material but with three different approaches: a traditional approach, one based on RID and one which does not adapt a script as multimedia and interactive e-learning material. The possibility to carry out appropriate research is significantly impeded, since it requires financial resources for the development of alternative versions of an e-learning course.

VII. CONCLUSION

The paper presents a project management approach with integrated Rapid Instructional Design for e-learning course development and implementation. The verification of its effectiveness also validates the very concept of RID.

Study carried out during two e-learning projects confirmed both research hypotheses. Namely, adapting the concept of RID in approaches for the project management of e-learning course development supports the creation of e-learning courses at an acceptable level of quality while significantly reducing the time and cost of project realization compared with traditional approaches. In addition, the use of RID is a useful alternative in the development of e-learning courses, compared with preparing a simple e-learning programme based on static documents or expensive multimedia and interactive e-learning materials.

The validation results revealed the benefits of the approach developed by integrating the concept of RID, in that it develops e-learning courses at an acceptable quality, at a fraction of the cost and time compared with traditional approaches. The proposed solution enables organizations such as universities and training companies to prepare a wider e-learning programme. Therefore, in conjunction with confirmed two stated hypotheses, there is a positive answer to the question posed in the title of the article - Does the integration of the concept of Rapid Instructional Design in project management approaches support the efficient realization of e-learning projects?

The use of the developed approach during the CaseSimulator and CTF projects, combined with its validation results, showed the limitations of RID concept. RID-based approaches may be applicable to the preparation of e-learning courses of low or moderate complexity. It is highly problematic to adapt RID for projects where it is necessary to produce high quality e-learning packages in terms of multimediality and interactivity. In this case, the design and production processes should follow a more traditional approach.

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