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BALANCED SCORECARD FOR IT COMPANY AS A TOOL OF THE LEARNING ANALYTICS

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Abstract. *The article considers the concept of learning analytics, to which there is a growing interest due to the expansion of technological capabilities for collecting and processing large amounts of data, in particular relating to the learning process. The possibilities of using a balanced scorecard for more effective strategic management decisions with special attention to learning metrics and alignment of learning goals with other goals of the company are considered. A modified system with two additional perspectives (Projects and Innovations) and variants of measures that would be appropriate to include, taking into account the specifics of the IT-sphere, is proposed. Considered several alternative software that can be used to implement the balanced scorecard at the company, such as BSC Designer, Corporater, Quick Score, ClearPoint.*

Keywords: *learning analytics, employees learning, balanced scorecard, balanced scorecard software, IT company.*

Problem statement. At the present stage, highly qualified personnel are becoming one of the main factors of a company's success in the market. This is especially true for such a dynamic sphere as IT. The need for employees retraining, mastering of new technological solutions by them, adaptation to changes in work mode is constantly growing. All this leads to an increased interest in personnel learning, which becomes one of the main strategic priorities since its irregularity and lack of clear coordination with other strategic initiatives can lead to a significant decrease in the company's development pace. At the same time, it is impossible to achieve the expected results from training activities without the introduction of learning analytics in the company, which allows monitoring the effectiveness of the process, proving its connection with other metrics of other departments, and identifying problem areas for further improvement. The management wants to see the impact of learning on the achievement of strategic business goals, in addition, investing significant budgets into the process, they want to be convinced of its effectiveness and that the resources invested will not be wasted. This is why this issue has been gaining more and more interest lately. It is also undoubtedly influenced by the growing amount of information and the emergence of new opportunities for its collection and analysis.

Analysis of recent research and publications. The study of learning analytics has become especially widespread over the past decade. Most of them have focused on the

distinction between learning analytics, data mining, and educational analytics, as well as on its practical application in educational institutions. In particular, these issues have been explored by foreign researchers such as A. Wan Barneveld, A. Pardo, D. Gasevic, G. Siemens, H. Drachler, J. Campbell, K. Arnold, L. Malfadyen, P. Long, P. J. Goldstein, R. Baker, S. Dawson. Among domestic scientists, research in this area was carried out by L. F. Panchenko, M. H. Koliada, N. M. Boliubash, S. V. Petrenko, Yu. O.Kovalchuk.

Analysis of the role of learning analytics in companies is in its infancy, in particular, these issues are considered by such researchers as A. Ruiz-Calleja, A. Littlejohn, A. Margaryan, B. Berendt, B. Schreurs, P. Maarten, L. Prieto, M. Rodriguez-Triane, R. Vuriokari, R. Sie, S. Bieke, T. Ley, T. Elias. However, all these studies are not systematic and a significant number of issues remain uncovered, in particular regarding the tools that can help implement such analytics into the business practices of the company and ensure its use in strategic decision-making.

Setting objectives. The aim of the article is to reveal the essence of learning analytics and provide practical recommendations for the use of tools for its implementation at the IT company. To achieve which the following **methods** were used in the study: analysis, synthesis, and theoretical search to disclose the nature of the concept of learning analytics and modification of a balanced scorecard for IT company; analytical method and method of comparative analysis to form recommendations for the use of special software to shape and implement a balanced scorecard.

Presentation of the basic material of the research. A common definition of learning analytics is the one proposed in the First International Conference on Learning Analytics: “Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for the purposes of understanding and optimizing learning and the environments in which it occurs” [10, p. 1382].

The main purpose of its implementation is to improve the effectiveness of personnel learning based on its analysis to identify existing problems and obstacles. Campbell and Oblinger describe in their work the process of learning analytics, which consists of five stages (Figure 1).

1. Capture	2. Report	3. Predict	4. Act	5. Refine
<ul style="list-style-type: none"> • Data collection from various sources and their organization 	<ul style="list-style-type: none"> • Generalization and visualization of information in reports 	<ul style="list-style-type: none"> • Identification of deviations, analysis of dynamics, construction of forecasts 	<ul style="list-style-type: none"> • Actions to correct deviations and solve problems 	<ul style="list-style-type: none"> • Improvement of existing analysis models, change of metrics

Figure 1. The steps of learning analytics [7, p. 3-8]

There are several different types of learning analytics. 1. Descriptive analytics. It aims to describe the existing state of learning in the current and previous periods. 2. Predictive analytics. It aims to identify the characteristics of employees' behavior based on available data to predict the results and events in the future. 3. Prescriptive analytics. It is designed to help with determining the best course of action in complex situations for resolution [1, p. 160]. To get the maximum effect from the adoption of learning analytics in the company, each of the above types should be implemented and used in business practices.

Six dimensions should be considered for the effective implementation of the learning analytics: 1) Stakeholders. It is necessary to find out who is interested in the analytics and who will be affected by it. 2) Objectives. It is necessary to define clearly the purpose for which it is carried out, and what results are desired. 3) Data. It is necessary to determine which data should be collected and from which sources. 4) Tools. Specific tools and technologies that will be used need to be selected. 5) External limitations. Possible limitations should be identified, including ethical, legal, and organizational/managerial ones. 6) Internal limitations. It is necessary to make sure that workers have the necessary skills and competencies to carry out analytics within the company and its acceptance by all other employees to reduce the level of resistance and to collect reliable data [4, p. 43].

In addition, in the process of implementing learning analytics, special attention should be paid to several possible obstacles. First of all, there are problems with data collection and, therefore, an insufficient amount of it for analysis. Secondly, not all processes of analysis can be automated, so some must be done manually, which increases the duration of work. Thirdly, not all analysis results can be used in decision-making. Lastly, there is difficulty in interpreting the results of the analysis [9].

One of the tools of strategic management, which allows not only to present the process of strategy realization in an understandable form, to monitor the progress in achieving strategic goals but also to establish clear relationships between them, is the balanced scorecard, first proposed in 1992 by D. Kaplan and Norton [6, p.151]. This tool to a large extent satisfies the need for the application of learning analytics and aligning its goals with other strategic priorities. It allows tracking certain metrics, visualizing information, cascading the strategic objectives to different divisions of the company, respectively provides the creation of a hierarchy of measures, which enables faster searching of problem areas that increasing the speed of correcting deviations, and proves the importance of learning in achieving the main strategic goals to argue the effectiveness of investment in training initiatives.

The classically balanced scorecard contains the following four perspectives: finance, internal business processes, customers, learning and development. It should be noted that this method already takes into account the impact of learning on the strategic development of the company by including the last perspective, which reflects the need to continuously maintain the ability to change and improve its activities. In addition, this tool allows tracking its influence on other strategic objectives of the company and creating conditions for their mutual strengthening. The choice of this tool is also determined by the fact that medium-sized companies are usually not ready to implement a separate system for the strategic management of personnel learning and the establishment of full analytics of this process, so the introduction of a comprehensive tool that designed to address the company needs as a whole, not just in a particular area or department, is more attractive to the company's management.

However, taking into account the specifics of modern IT companies is reasonable to modify the classical balanced scorecard and include two additional perspectives. The first of the proposed ones is projects. Because the majority of IT companies use a project approach in their activities. In addition, more and more of them abandon traditional methodologies and apply agile project management technologies, one of the main advantages of which is getting fast feedback, which allows delivering a product that fully meets and satisfies consumers' needs. Another perspective offered is innovation. As for high-tech companies, the ability to quickly generate and implement new ideas and find new technological solutions is one of the main conditions for surviving and operating successfully in the market.

For each of the perspectives an example of a strategic objective and three measures that are designed to assess it was given (Table 1). For these measures can be set: minimum, initial, actual, target, maximum value, and the unit of measurement. Based on the comparison of the initial, actual, and target values, progress is determined. Therefore, this tool is quite effective for tracking the impact of changes on the key performance indicators of the company.

At the moment there is a significant amount of software, that is adapted or created for the implementation of a balanced scorecard in the business practice of the companies. In most cases, it is one of the modules of Business Intelligence Software, but there are some separate software packages that do not require the installation of more complex systems. One of them is BSC Designer. Its significant advantage is the existence of a free version, designed for a small number of projects, which can significantly reduce the cost of testing the adoption of such a system. Such software allows building a strategic map, which allows you to visualize the strategic objectives and progress on certain measures. A strategy map is an effective tool for monitoring the execution of the strategy and engaging the company's employees because it is available at any time. In addition, it can show cause-and-effect relationships between business goals.

Table 1

An example of a balanced scorecard for an IT company*

Perspectives	Objectives	Measures
Finance	Achieve financial efficiency of operations	1.Return on Equity (ROE) – a measure indicating how efficiently capital is used, which means how much profit was generated for each unit of money invested. 2.The financial stability coefficient is a measure of the company's ability to remain financially solvent over the long term. 3.Current Ratio - shows the ratio of current assets to current liabilities.
Customers	Provide our customers with the best products to increase their level of satisfaction	1.The share of orders completed on time. This measure shows the quality of services provided. On-time order fulfillment is a factor in increasing the level of customer satisfaction. 2.The total cost of attracting a new customer. The assessment is performed by analysing the dynamics of marketing costs, which the company should strive to optimize. The processes of attracting a new customer should be as well developed as possible. 3.Percentage of returning customers. Regular customers bring the main part of the profit. Therefore, it is very important to create the most attractive conditions for them and ensure their maximum retention.
Internal business processes	Ensure maximum efficiency of internal business processes	1.Average time for making decisions. The peculiarity of this measure is to monitor the time required to make a management decision, the main purpose is to reduce the waiting time. 2.Keeping the knowledge base up to date. Useful knowledge and information must be accumulated and stored effectively to ensure the maximum efficiency of the company's operations. However, since they quickly become obsolete, it is necessary to update them constantly. 3.The number of formal procedures for making a decision. Provides an assessment of the necessary documentation, approvals, and other formal procedures required to make a management decision. It applies to both project managers and line managers.

Perspectives	Objectives	Measures
Learning and development	Create attractive working conditions for personnel and ensure their continuous learning and development	<ol style="list-style-type: none"> 1.Satisfaction of the personnel. Can play the role of a signal measure, demonstrating the emergence of the problem and the need to search for the causes of its occurrence. 2.Average time of overwork. Overtime can be an indicator of the efficiency of employees' use of their working time, the adequacy of determining the workload of employees, and the conformity of their skills to the assigned tasks. 3.Percentage of absorption of learning programs. Indicates the effectiveness of assimilation of knowledge by employees in the course of a variety of training activities, which is realized through tests after their completion. It can also be measured by conducting surveys on the use of knowledge obtained during the learning in practice a few months after the training.
Projects	Increase the percentage of successfully completed projects	<ol style="list-style-type: none"> 1.The success rate of projects. Demonstrates the number of successfully completed projects in the total number of them. 2.The level of satisfaction of project customers. Allows you to track the dynamics of the compliance of the results of work with the requirements of the project customer, which in turn can affect the number of returning customers. 3.Team members' productivity. Changes in project management methodology directly affect the productivity of project teams. Therefore, this measure can help identify what and how management changes have affected the project team.
Innovation	Create an environment beneficial to the emergence and implementation of innovative ideas	<ol style="list-style-type: none"> 1.Percentage of stakeholder involvement in the idea generation process. Sometimes the engagement of people not directly employed at the company is effective for the emergence of new ideas, as they can find unconventional solutions in seemingly obvious situations. An example is conducting specialized customer surveys. 2.Percentage of successfully implemented know-how, inventions, rationalization proposals, new technological solutions. Not all ideas are implemented and bring economic effect, so it is necessary to strive to increase the value of this measure. 3.The percentage of research and development costs in the total cost structure. The dynamic of research and development costs demonstrates how much the company is willing to invest in the growth of the company and tries to remain competitive.

**Source: Developed by the author*

Also with the help of this software, you can get a variety of reports that can be generated for a certain period, as well as choose their type (content): performance, progress, with the largest increase/loss, and so on. The most popular is the HTML report. It helps to share Balanced Scorecard information with employees, or export data to MS Excel file with all formulas. In addition, this system allows you to be alerted of important changes with a stop signal or e-mail. This allows you to react quickly and take the necessary actions to improve the situation [5].

There are also a few other software tools that can be considered analog for BSC Designer. Their comparative characteristics are given below (Table 2).

Of course, some issues should be solved when implementing learning analytics and balanced scorecard, in particular, organizing data collection and ensuring its quality and reliability, learning of employees who will be able to perform analytics and interpret its results, training employees to work with such software, overcoming resistance to change, etc. However, initial preparation can solve these problems and ensure a smoother implementation process.

Table 2

Balanced scorecard software comparison*

Features	Corporater	Quick Score	ClearPoint	BSC Designer
Strategy maps	+	+	+	+
Cascading of strategy and alignment	+	+	+	+
Data source integration	+	+	+	+
Interactive	+	+	+	+
Key performance indicators	+	+	+	+
Visual analytics	+	+	+	+
Progress tracking	+	+	+	+
Widgets	+	-	-	-
Підтримка різних мов	+	-	-	+
Mobile version	-	+	-	+
Meeting support	+	-	-	-
Collaboration	+	-	+	-
Reporting	+	+	+	+
Access control	+	+	+	+
Real-time data update	+	+	+	+
Free version	-	-	-	+
Price	Starting at 79\$ per month	Starting \$120 per year	Starting at \$250 per month	Starting at 59,95\$ per month

*Source: Compiled by the author on the basis of [2, 3, 5, 8, 11]

Conclusions and prospects for further research. Thus, the growing role of personnel as one of the main sources for the development of a company and ensuring its competitive advantages, especially in an area such as IT, leads to increased interest in the problem of providing quality learning to employees and assuring its effectiveness. However, solving this problem is impossible without implementing continuous learning analytics. Because it can help to monitor the situation constantly, identify problem areas and ineffective approaches, and find opportunities for further improvement of current business processes. In addition, by aligning and establishing relationships with other key indicators, you can track the impact of learning on the achievement of strategic goals of the company and identify the effectiveness of investment in personnel development.

The need to create a holistic system of measures and to reflect the mutual influence of different goals on each other led to the choice of such a tool for building learning analytics as a balanced scorecard. Since it can solve these problems. Given the specifics of the processes of IT companies, an example of system modification was given by adding two more perspectives (Projects and Innovations). In addition, several different software options for its construction have been considered, in particular, one of the best solutions is the use of BSC Designer, as it has the required functionality and a free version that can be used to conduct the early tests.

Further research into the possibilities of learning analytics is promising, due to the emergence of new opportunities for collecting and capturing data, for example, in different Learning Management Systems, as well as identifying the needed qualification and skills of employees in charge of performing it in the company and the features of their learning to carry out such functions.

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**ЗБАЛАНСОВАНА СИСТЕМА ПОКАЗНИКІВ ІТ КОМПАНІЇ ЯК
ІНСТРУМЕНТ АНАЛІТИКИ НАВЧАННЯ****Надія Павленко**

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Анотація. У статті розглянуто поняття аналітики навчання (Learning Analytics), до якого прослідковується зростаючий інтерес, у зв'язку з розширенням технологічних можливостей щодо збору та обробки великих масивів даних, зокрема тих, що стосуються процесу навчання персоналу, та інтересом з боку керівництва до ефективності інвестування в нього. Наведено стадії за якими вона здійснюється та висвітлено особливості її типів, що необхідно комплексно використовувати для отримання максимального результату. Також перелічено шість вимірів, що варто розглядати при впровадженні навчальної аналітики на підприємстві, до яких відносяться: зацікавлені сторони, завдання, дані, інструменти, зовнішні та внутрішні обмеження. Враховуючи потребу керівництва компаній у володінні інформацією не лише стосовно ефективності навчання персоналу, але й щодо його впливу на досягнення стратегічних цілей компанії було розглянуто як інструмент збалансовану систему показників. Окрім того запропоновано варіант впровадження її модифікації з включенням в неї додаткових перспектив («Проекти» та «Інновації»), що обумовлено

специфікою діяльності ІТ компаній, для ведення аналітики навчання, що дозволить не лише покращити сам процес, але й узгодити його зі стратегією компанії в цілому задля пришвидшеного її розвитку. Також було запропоновано перелік показників, що доцільно буде включити до кожної з перспектив для забезпечення цілісності та комплексності аналізу. Розглянуто кілька альтернативних програмних забезпечень, які можуть бути використанні для впровадження цієї системи на підприємстві, зокрема такі як: BSC Designer, Corporater, Quick Score, ClearPoint. Для кожної з них було виявлені функціональні можливості, характерні особливості та вартість. На особливу увагу заслуговує BSC Designer, зважаючи на можливість його безкоштовного використання для тестів впровадження такої системи.

Ключові слова: аналітика навчання, навчання персоналу, збалансована система показників, програмне забезпечення збалансованої системи показників, ІТ компанія.

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