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ORGANISATION OF LEVEL-BASED DIFFERENTIATED INSTRUCTION FOR HETEROGENEOUS GROUPS IN MOODLE

Abstract. Nowadays adaptation of the learning process to students' needs is one of most frequently addressed topics in pedagogical research. Different aspects of this topic are studied both by Ukrainian and foreign scientists. The paper deals with one of the questions in the field - knowledge level diversity within an academic group in higher education institutions. The difference in knowledge level influences not only the ability to achieve learning outcomes but also the motivation to study. Thus, providing students with possibilities to study at their own level and learning paths might increase their interest in the discipline and improve their results. Differentiated instruction is considered as a way to meet the needs of multi-level groups. Moodle is addressed as a means of level based differentiated instruction as many higher education institutions use learning management systems to support the learning process. The results of the teachers survey at Borys Grinchenko Kyiv University are used as a background for differentiated e-learning course design planning. The main requirements to a differentiated e-learning course design are defined: opportunities to define students' levels and knowledge gaps, easy navigation for students in the diversity of tasks and materials, ability for teachers to combine various levels tasks in the same activities, suitability for flexible groupings, moderate time consumption for design and maintenance of the e-learning course. The model of e-learning course design for level based differentiated instruction is offered which includes testing, adapting learning materials to the students' needs, groups and grouping settings, formative assessment, summative assessment and feedback. Utilisation of Moodle activities and resources for implementation of all the model components is described. The role of groups and groupings in the implementation of differentiated instruction is underlined and their usage in Moodle is described.

Keywords: differentiated instruction; Moodle; knowledge level; e-learning course; students' needs

Introduction. Diversity of students' knowledge level within an academic group has always been a challenge for a teacher as it includes several problems to solve. There might be knowledge gaps which could be a stumbling block in acquisition of new knowledge provided by a course. In general, the level of some students' knowledge might be insufficient to be able to deal with the materials of the discipline. On the contrary, other students might have knowledge and skills that surpass the requirements of the academic course working program and can easily be bored with the given materials and tasks (van Seters, 2011). Thus, one of the main tasks of a teacher while teaching a discipline is to maintain interest in learning of all students on the course considering their background. The students should be given an

opportunity to do their best up to their learning abilities. This leads us to the question of learning materials variety in the course to satisfy all the needs. At the same time, we must understand that providing individual materials to each student in a group or a course is hardly feasible as it requires a huge amount of time from the side of a teacher, and a result might not be comparable with the effort made. Considering all above mentioned, differentiated instruction (DI) is seen by the authors as a possible solution to the problem of diversity of students in the same course.

An important factor in organising knowledge delivery in a diverse classroom is how the material is delivered to students. Surely, simultaneous work and direct contact with a teacher plays an important role in the perception of knowledge. However, the way a student gets tasks, supportive and additional information should not be underestimated as well. Many higher education institutions use learning management systems (LMS) to serve the purpose. Moodle is one of the most popular LMSs among educational institutions as it is open-source and has a lot of options to be adapted to the needs of an institution. Moodle is used at Borys Grinchenko Kyiv University to arrange e-learning, that is why it is considered as an environment to organise DI. The authors explore the system capabilities for DI based on the level diversity as it is one of the most frequent challenges teachers face. However, the same functions can be helpful to cover other types of diversity as well. The aim of the paper is to discover and describe the means of LMS Moodle which can be used to provide level-based differentiation in an e-learning course.
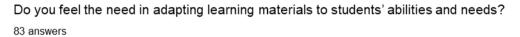
Literature review. Differentiated instruction has been in the focus of attention of scientists and researchers for about 20 years. The meaning of differentiation in education is very broad and varies from the field of use, the level of education, concepts applied, disciplines (Ingunn Eikeland, 2022, pp. 157-170). According to C. A. Tomlinson (Tomlinson, 2005) differentiated instruction (DI) is a way to arrange the learning process for students with different abilities in the same academic unit so that every student gets the best learning experience. It does not include arranging individual sets of tasks and materials of each student. Yet, due to the diversity of tasks, forms of work, changing groupings, students can be challenged according to their level, readiness, learning styles, etc. Janneke van Seters et al. (van Seters, 2011) see DI as a means of overcoming the difference in the level of knowledge of students in the same discipline and shorten the gap between the students with no experience and those with prior experience in the studied field by the end of the discipline completion. They address e-learning and adaptive digital learning materials as the way to accomplish differentiation. Esra Meşe and Enisa Mede (Esra Meşe, 2022) also explore the impact of DI on students' achievements. The authors discuss the shift to online learning during the Covid pandemic and the perspectives of DI under these conditions. They outline the role of information and communication technologies (ICT) in DI arrangement. In particular, use of an LMS is mentioned as a basis for implementation of the experiment described in the study. Applying ICT to implementation of DI is also discussed in the work by Zoi Karatza (Zoi Karatza, 2019, pp. 8-15). The research reveals teachers' view on utilisation of digital technologies to provide DI.

The researchers comprehend the role of differentiated instruction not only in improving students' learning outcomes but also in boosting their motivation and soft skills. B.S. Wong, K.L. Chue, R.B. Ali et al. (Wong, 2023, pp.139-151) study the differentiated instruction experience of students with high and low levels of readiness. The research shows that despite the initial level students show the increase in motivation and the level of competence and the difference in the impact is insufficient when comparing students of different levels of readiness. Robyn Moallemi (Moallemi, 2023) also marks an increase in the level of motivation and engagement in the classroom in connection with differentiated instruction implementation.

The ways of personalising a learning path in Moodle is also getting attention from researchers. In particular, Osadcha K., Osadchyi V., Spirin O., Kruglyk V. (Osadcha, 2021, pp. 38-43) describe the ways of individualization and personalisation of learning using LMS

Moodle. A modular structure, activities and resources as well as settings that help to personalise learning experience are overviewed. N. Morze, L. Varchenko-Trotsenko, T. Terletska and E. Smyrnova-Trybulska (Morze, 2021) explore the ways of implementing adaptive content, sequence and assessment by means of Moodle to meet students' learning needs. In spite of a good number of research both on utilisation of LMS Moodle for personalised learning and on differentiated instruction, there is a lack of studies covering implementation of DI in Moodle specifically. This topic requires further research.

Theoretical background. Heterogeneous academic groups are a frequent challenge in education and for higher education teachers in particular. USA-based research has shown that more than 90% of teachers face difficulties when working with students with diverse knowledge levels in the same group (Tomlinson, 2014). In addition, neglecting differences in needs and learning styles can lead to decrease of academic motivation and students' learning outcomes (Ormrod, 2014). This is also confirmed by the results of teachers survey at Borys Grinchenko Kyiv University where 98,8% of 83 respondents from different faculties answered that they face a need to adjust materials to students' needs at least sometimes (53% answered "sometimes" and 45,8% answered "often" (fig.1)).
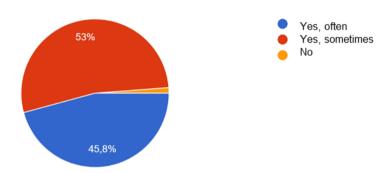

Fig.1. The results of teachers survey at Borys Grinchenko Kyiv University about the need to adapt educational materials

Taking into consideration the transfer to different forms of education including distance learning, it is vivid that the problem of students' knowledge level diversity influences e-learning as well. Such differences might be a stumbling block for teachers in preparing and conducting lessons and at the same time might have a negative impact on students' self-esteem and desire to learn. A. Furnham, J. Moutafi and J. Crump concluded that the difference in knowledge is one of the reasons for learning motivation to decrease and lower learning outcomes (Furnham, 2003, pp. 577-584). It is important to note that homogenous learning groups are beneficial for overall learning outcomes (Wyman, 2020, pp. 356-363). Thus, division into smaller same-level subgroups can be used to improve students' learning experience within a heterogenous academic group.

Level based differentiated instruction is one of the types of differentiated instruction that covers distribution of students according to their abilities and academic success. Students get tasks of diverse difficulty level and master the discipline up to their cognitive abilities or/and initial level of knowledge within the same working program. There are different ways to overcome a challenge of students' cognitive diversity at the same educational level. The main question that allows us to define various solutions is "what is differentiated?". The answer leads us to two main approaches - organisational (student) differentiation and pedagogical (teaching) differentiation (Ingunn Eikelan, 2022, pp. 157-170). Organisational differentiation suggests

dividing learners into groups according to their level of knowledge, aptitudes for learning and other similarities. This type of differentiation can be used both for the whole period of study at a definite educational level and for separate disciplines or short periods to achieve expected learning outcomes. Application of organisational differentiation showed good results from the experience of Nordic countries secondary education. However, this type of differentiation might be not applicable for higher education institutions' academic programs with a small number of students. One more question that arises with implementation of such an approach is equal possibilities for all students and the quality of education gained by those in weaker groups. Pedagogical differentiation focuses on the diversity of teaching methods and learning materials that are used in heterogeneous groups. This means flexibility in teaching approaches to organising educational process for students with different abilities, knowledge levels and interests within the same group. However, differentiated instruction does not include individualised tasks and materials, but rather several different alternatives to meet diverse needs (Tomlinson, 2017). The relationship between types of differentiation and learning outcomes was studied by T. Domina, A. McEachin, P. Hanselman, P. Agarwal, N. Hwang and R. W. Lewis (Domina, 2019, pp. 293-322). They compare three types of differentiation: grouping according to the students' abilities, subgroups in the classroom according to the students' abilities and application of different learning programs and methods in a heterogeneous classroom. The research has shown that diversity of programs and methods might have more positive influence on learning outcomes than division into groups or subgroups by levels. The efficiency of various approaches to teaching and learning for mixed-ability classrooms was also studied by I. Magableh and A. Abdullah (Magableh, 2021, pp. 255-272). Flexible groupings, individual tasks and utilisation of digital technologies contributed to better student outcomes. The positive effects of flexible grouping are admitted by C. Tomlinson (Tomlinson, 2017), who suggests using work with a variety of peers not only to rely on students' strengths, but also to provide support in weak areas.

Teachers of Borys Grinchenko Kyiv University admitted that they provide additional materials for students with advanced and insufficient levels of knowledge and give a list of recommended references to study (Fig.2).
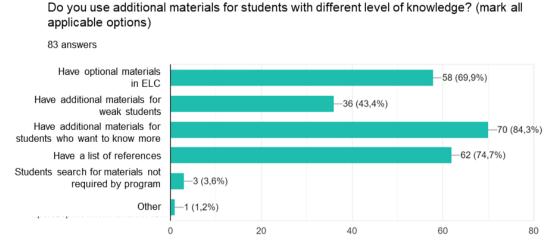

Fig.2. Using additional materials for students with different levels of knowledge (survey results)

83,1% of surveyed teachers marked multi-level tasks as one of efficient ways of differentiated instruction implementation. 68,7% of respondents chose also using a variety of materials (texts, video, audio, etc.) and 67,5% - organising materials in the way to create individual learning paths for students (Fig.3).

What approaches do you consider effective for implementation of differentiated instruction in ELC?
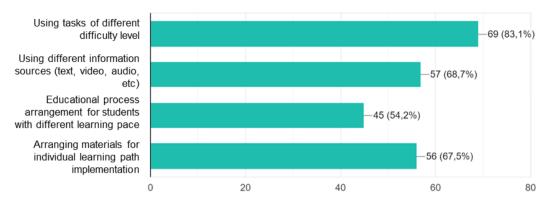
83 answers

Fig. 3. Effective approaches to differentiated instruction in ELC (survey results)

At the same time, the biggest obstacle faced by a teacher in the process of implementing differentiated instruction was named increasing time for course development (Fig. 4).

What difficulties do you think a teacher faces while implementing differentiated instruction in ELC?
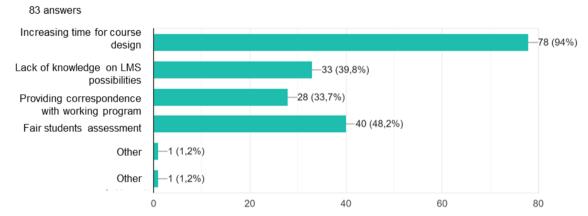
83 answers

Fig.4. Difficulties faced by the teacher for the development of differentiated instruction

Taking into account above mentioned information, it could be summarised what features a differentiated e-learning course should have to meet the needs both teachers and students:
- Does not require much more time than a standard ELC to develop and to maintain.
- Gives opportunities to define students' levels and knowledge gaps.
- Provides easy navigation (to find materials that corresponds to students' needs).
- Allows teachers to create diverse tasks or variety of materials within the same activity.
- Is suitable for flexible groupings.

The authors came up with a model to describe ELC design for level based differentiated instruction (Fig. 5).

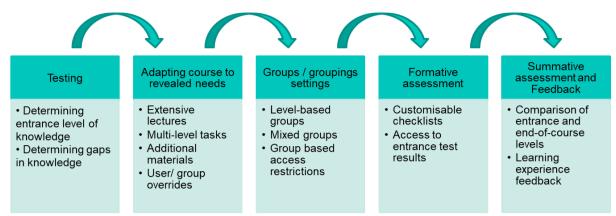| Testing	Adapting course to revealed needs	Groups / groupings settings	Formative assessment	Summative assessment and Feedback
• Determining entrance level of knowledge • Determining gaps in knowledge	• Extensive lectures • Multi-level tasks • Additional materials • User/ group overrides	• Level-based groups • Mixed groups • Group based access restrictions	• Customisable checklists • Access to entrance test results	• Comparison of entrance and end-of-course levels • Learning experience feedback

Fig. 5. Model of ELC design for level based differentiated instruction

The aim of *testing* is to determine both overall knowledge level and gaps in knowledge. This would help a teacher to divide students into groups and groupings for various tasks. At the same time students get information on their strengths and weaknesses in the subject and can use the test results as a starting point to build their individual learning path in an e-learning course.

In the stage of *adapting learning materials to current students' needs* a teacher adjusts lessons, assignments, forums, workshops, quizzes and other ELC activities to the results of testing and expected learning outcomes. They also upload additional materials if needed. The main idea behind this stage is that it is not required to design a completely new course for students of every new academic year, but to make necessary changes to fit current demand and curriculum. Such approach decreases time on ELC design and allows updating a course. Previous experience can also be included to get the best efficiency of the ELC. One of the options that can be personalised is setting terms of submission of an assignment for different groups or individual users.

Groups and groupings can be used to provide the course with required flexibility. Students can be organised according to different approaches to grouping in a heterogeneous environment. Firstly, some tasks may require splitting students into groups up to their similarities, for example, basic level, intermediate level and advanced level groups. Such grouping strategy is used to reduce pressure on the students with lower knowledge level and provide motivation and ability to show high performance for those with advanced skills. Secondly, there might be mixed groups relying on students' strengths and weaknesses so that they complement each other. For instance, one student is good at grammar but struggling with essay structure, another one is excellent at composing a writing but has some gaps in applying grammar. Working together on a written task they both will benefit.

One of the forms of *formative assessment* that can be useful in the process of differentiated instruction implementation is self-control on the basis of the testing results. Feedback activity is one of the choices to provide self-check altered to the needs of a student, as participants can be allowed to create their own control points and tick them afterwards when information on a knowledge gap is mastered.

Summative assessment and feedback are typical elements of an ELC. However, in the case of differentiated instruction it is important not only to assess learning outcomes but also to evaluate the progress considering the initial level of students and their learning experience. This will help to define weaknesses of the ELC and improve it for further usage.

The results and discussion. E-learning courses in Moodle have got various activities and settings to organise level based differentiated instruction. In the paper we will consider several options to serve the purpose such as Quiz, Forum, Lesson, Checklist, Feedback activities and resources to manage the content and learning paths for students with different knowledge levels.

The possibilities of group and grouping settings for differentiated instruction implementation will also be addressed.

The *Quiz* activity can be used both for entrance testing to define the knowledge level and for summative assessment. In the framework of the research, we are most interested in settings that are going to give students the opportunity to build an own learning path within a course to fill in the knowledge gaps and have the best learning experience. When editing a question, the fields "General feedback" or "Combined feedback" can be used to provide a link on the material connected to the question. General feedback does not depend on the answer given by a student and will be available both in case of correct or incorrect answers. In Combined feedback the message is bound to the correctness of the answer. The authors suggest using general feedback to give links to the materials on the topic (Fig. 6) so that it was available also in case when a student gave a correct answer but wanted to refine the knowledge on the topic or was not sure (guessed) in the answer.
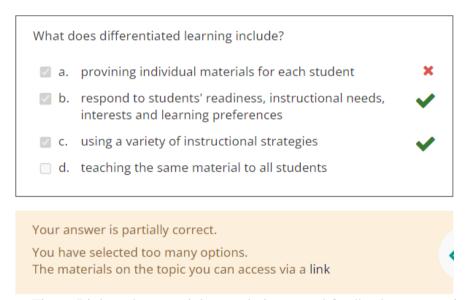

Fig. 6. Link to the material to study in general feedback to a question

As the results of the entrance testing might be required by students any time during the course completion, it is important to provide access to them after the quiz is completed or closed if there are timing restrictions in the quiz. For this purpose, in the review options of the quiz editing settings correspondent permissions must be ticked.

Another setting in quizzes that can be used to specify students' level after completing the entrance test is Overall feedback. Grade boundaries allow a teacher to divide students into groups according to the grade they scored by setting up frames in percentages or points and providing feedback for each level.

The results of the entrance testing can be used not only by a teacher to assign students specific tasks or groups, but also by students to make a list of topics to study. The authors suggest using *Checklist* to make a personalised ELC guide. A teacher can add there a list of tasks and materials that are obligatory to study. The option "User can add their own items" allows students to customise their lists according to the discovered gaps in their knowledge and own preferences.

Splitting students into groups according to their level is the easiest way to organise differentiated instruction in an ELC. Different group combinations can be used for different tasks. At the same time, students might be confused by the variety of materials in the e-learning course and get lost trying to separate tasks addressed to them. To avoid this situation a checklist might be helpful as well as setting restrictions on access to definite activities based on the group

membership (Fig. 7). The activity can be either hidden completely or displayed greyed-out for students who do not meet the requirements.

Fig.7. Access restriction in an activity based on group membership

Access restrictions can be applied to separate activities or to sections. The last might be a time saver in case when many tasks are addressed the same group of students as a teacher does not need to change settings in each activity of the section separately.

A grouping is a collection of groups within an ELC. Groupings can be used to combine groups for mixed-level activities. For example, in the course divided into three levels (basic, intermediate and advanced) some tasks might be addressed to adjacent levels (basic/intermediate or intermediate/advanced). Groupings can be used in access restrictions the same way as groups and using them will assign a task to all groups in the grouping at the same time.

Some activities in ELC have options to create separate topics or tasks based on the group membership in the same activity. *Forum* is one of such examples. Different topics for discussion can be created for different level groups (Fig. 8), when all other settings such as grading, availability, subscription, restriction, etc. are applied to the whole forum.

Fig. 8. Forum with topics assigned to separate groups (teacher's view)

It depends on the group mode whether students can see and participate in discussions created for other groups. In the mode "No groups" all participants can take part in any discussion in the activity. In the mode "Visible groups" members of different groups can see all discussions created in the forum, but participation is allowed only in topics created for all participants or for the group they belong to. In the mode "Separate groups" users can see and take part in discussions assigned to their group specifically. When working with groups, it is important to pay attention to group settings at the level of the course, as they are used as a default mode for all activities in the course and cannot be changed at the level of an activity except for "No groups" mode chosen at the level of the course.

Due to its functionality, Lesson is one of the most adaptive activities in a Moodle e-learning course. New content pages, question pages and clusters can be created and placed in any order, and there can be several jumps from the same page to make the study process adjusted to students' needs, knowledge levels and preferences. The material required by the working program of the course could be taken as a background for designing a differentiated lecture. Question pages can be used not only to check whether a student mastered the material in the previous part of the lecture, but also to check the knowledge on the next topic and allow students to omit it if it is already mastered. Additional pages can be created for students with insufficient background knowledge as well as for extra materials for those who want to know more (Fig. 9).
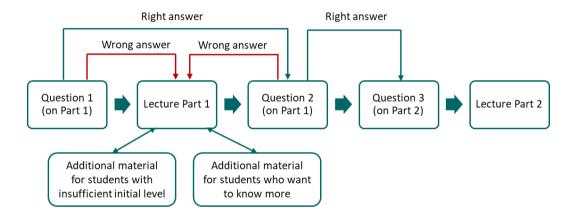

Fig.9. Lesson structure for a differentiated lecture

Feedback is of high importance for differentiated instruction e-learning courses as it allows teachers to use experience of previous groups to improve the learning process for future students. *Feedback* activity is suitable for this purpose for several reasons: different types of questions can be created there; it can be used with anonymity settings which prompt students to feel under less pressure when answering questions and give more honest answers; there is an analysis page which makes it easier to estimate the results.

Conclusions and further research perspectives. Dealing with academic groups of students with different levels of knowledge is a frequent challenge for higher education institutions teachers. Implementation of level based differentiated instruction can improve students' learning experience in a heterogenous group, increase their motivation and learning outcomes. Learning management systems, in particular Moodle, have various resources and settings to organise level based differentiated instruction. Such activities as Quiz and Feedback allow teachers to arrange entrance testing, provide formative and summative assessment, and collect feedback at the end of course. Using groups and groupings can help to customise students' learning paths according to their level and needs, and Checklist provides a possibility

to track their own progress. Lesson activity gives an opportunity to design lectures for multi-level groups by creating additional pages for different levels and checking understanding of the material using question pages.

However, the topic requires further research on ensuring compliance of the ELC with the discipline working program, fair assessment for students with different knowledge levels. Additional Moodle activities and resources might also be offered to ensure the diversity of tasks and materials in the e-learning course.

REFERENCES

van Seters, J., Ossevoort, M., Goedhart, M. & Tramper, J. (2011). Accommodating the difference in students' prior knowledge of cell growth kinetics. *Electronic journal of biotechnology,* 14(2). https://doi.org/10.2225/vol14-issue2-fulltext-2 https://www.scielo.cl/scielo.php?pid=S0717-34582011000200001&script=sci_arttext

Ingunn Eikeland & Stein Erik Ohna (2022) Differentiation in education: a configurative review. *Nordic Journal of Studies in Educational Policy*, 8:3, 157-170. https://doi.org/10.1080/20020317.2022.2039351

Tomlinson, C. A. (Ed.) (2005). Differentiated instruction. Lawrence Erlbaum Associates.

Esra Meşe & Enisa Mede (2022). Using digital differentiation to improve EFL achievement and self-regulation of tertiary learners: the Turkish context. *Innovation in Language Learning and Teaching.* https://www.tandfonline.com/doi/full/10.1080/17501229.2022.2043872

Zoi Karatza (2019). Information and Communication Technology (ICT) as a Tool of Differentiated Instruction: An Informative Intervention and a Comparative Study on Educators' Views and Extent of ICT Use. *International Journal of Information and Education Technology,* vol. 9, no. 1, pp. 8-15. https://doi.org/10.18178/ijiet.2019.9.1.1165

Wong, B.S., Chue, K.L., Ali, R.B. et al., B.S., Chue, K.L., Ali, R.B. et al. (2023). Differentiated instruction: a comparison of motivation and perceived competence between students with high and low readiness levels. Educ Res Policy Prac 22, 139–151. https://doi.org/10.1007/s10671-022-09323-2

Moallemi, R. (2023). The relationship between differentiated instruction and learner levels of engagement at university. *Journal of Research in Innovative Teaching & Learning,* Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/JRIT-07-2022-0041

Osadcha, K., Osadchyi, V., Spirin, O. & Kruglyk, V. (2021) Implementation of individualization and personalization of learning by means of Moodle. Youth and Market., 1/187, 38-43. http://mir.dspu.edu.ua/article/view/228274 (in Ukrainian)

Morze, N., Varchenko-Trotsenko, L., Terletska, T., & Smyrnova-Trybulska, E. (2021, March). Implementation of adaptive learning at higher education institutions by means of Moodle LMS. J*ournal of physics: Conference series,* Vol. 1840, No. 1, p. 012062. IOP Publishing. https://doi.org/10.1088/1742-6596/1840/1/012062

Tomlinson, C.A. (2014) The Differentiated Classroom: Responding to the Needs of All Learners. 2nd Edition, ASCD, Alexandria.

Ormrod, J. E. (2014). Human Learning (7th ed.). Pearson.

Furnham, A., Moutafi, J., & Crump, J. (2003). The relationship between the revised NEO-Personality Inventory and the Myers-Briggs Type Indicator. Social Behavior and Personality: *An International Journal,* 31(6), 577–584. https://doi.org/10.2224/sbp.2003.31.6.577

Wyman, P. J., & Watson, S. B. (2020). Academic achievement with cooperative learning using homogeneous and heterogeneous groups. *School Science and Mathematics,* 120(6), 356-363. https://doi.org/10.1111/ssm.12427

Tomlinson, C. A. (2017). How to differentiate instruction in academically diverse classrooms (3rd ed.). *Association for Supervision and Curriculum Development.*

https://files.ascd.org/staticfiles/ascd/pdf/siteASCD/publications/books/HowtoDifferentiateInstructioninAcademicallyDiverseClassrooms-3rdEd.pdf

Domina, T., McEachin, A., Hanselman, P., Agarwal, P., Hwang, N., & Lewis, R. W. (2019). Beyond tracking and detracking: The dimensions of organizational differentiation in schools. *Sociology of Education,* 92(3), 293-322. https://doi.org/10.1177/0038040719851879

Magableh, I. S. I., & Abdullah, A. (2021). The Impact of differentiated instruction on students' reading comprehension attainment in mixed-ability classrooms. *Interchange*, 52(2), 255-272. https://doi.org/10.1007/s10780-021-09427-3

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ОРГАНІЗАЦІЯ ДИФЕРЕНЦІЙОВАНОГО НАВЧАННЯ ЗА РІВНЕМ ЗНАНЬ В НЕОДНОРІДНИХ ГРУПАХ ЗАСОБАМИ LMS MOODLE

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Анотація. Сьогодні адаптація освітнього процесу до потреб студентів є однією з найпоширеніших тем в педагогічних дослідженнях. Різні аспекти цієї теми вивчаються українськими та зарубіжними науковцями. Дана стаття досліджує одне з дотичних питань - різницю в рівні знань здобувачів всередині академічної групи закладу вищої освіти. Різниця в рівні знань впливає не тільки на можливості досягнення навчальних цілей, але і на мотивацію до навчання. Отже, надаючи можливості студентам навчатись на власному рівні та за своєю навчальною траєкторією, ми можемо підвищити їх інтерес до дисципліни та покращити їх результати. Диференційоване навчання розглядається як один із шляхів забезпечення навчальних потреб в мультирівневих групах. Moodle розглядається як засіб забезпечення диференційованого за рівнями навчання, оскільки велика кількість закладів вищої освіти використовують системи управління навчанням для підтримки освітнього процесу. Результати опитування викладачів Київського університету імені Бориса Грінченка лягли в основу планування розробки диференційованого електронного курсу. Сформульовано основні вимоги до диференційованого електронного навчального курсу: можливості для визначення рівня знань студентів та пробілів у знаннях; проста навігація для студентів у різноманітті завдань та матеріалів; можливості для викладачів комбінувати завдання різних рівнів складності у одній діяльності; підтримка гнучкого групування; помірні витрати часу на розробку та підтримку роботи електронного курсу. Запропоновано модель розробки електронного навчального курсу для реалізації диференційованого навчання за рівнем знань, що включає тестування, адаптацію навчальних матеріалів до потреб студентів, налаштування груп і групувань, формувальне оцінювання, підсумкове оцінювання та зворотній зв'язок. Описується використання діяльностей та ресурсів Moodle для забезпечення всіх компонентів моделі. Окреслено роль груп та групувань у впровадженні диференційованого навчання та описано їх використання у Moodle.

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