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# Edmodoing the Concept Attainment in Mathematics and Pedagogy: A Participant Observation Exploratory Study

# Zastosowanie platformy Edmodo w matematyce i pedagogice: Badania obserwacyjne z udziałem uczestników

## Brief about the study

> "We have found it more meaningful to regard the concept as a network of sign–significate inferences by which one goes beyond a set of observed criteria properties exhibited by an object or event to the class identity of the object or event in question, and thence to additional inferences about other unobserved properties of the object or event…concept is the network of inferences that are or may be set into play by an act of categorization…concept attainment is, arguably, an aspect of what is conventionally called thinking..." (J.S. Bruner, J.J. Goodnow & G.A. Austin, 2009)

The study makes it clear that the population of interest are learners and learning-facilitators dealing with mathematics as a subject and whose course

output is directly concerned with the facilitating learning and conceptual understanding in mathematics. The study indicates the major variables as ICT-based platform Edmodo, pedagogical method for concept attainment and concept attainment, where ICT and pedagogical method constitute the independent variable and concept attainment is the dependent variable.

Basically, the study features four prominent terms: Edmodoing, concept attainment, mathematics and pedagogy. Edmodoing, as a part of the ICT, is defined by the researcher; concept attainment is well defined by Bruner, Goodnow and Austin (1956; 1986) and others with respect to process and output with proper elements of a concept. Mathematics is well defined both as a distinct subject and the discipline. Pedagogy is well defined theoretically and operationally.

## Background and rationale of the study

It is still a general notion that use of ICT cannot improve learning and learning facilitation in general, and in particular at the institutional level. At the institutional level, in case of a typical subject like mathematics, people used to say that since it is a subject of logical thinking, ICT cannot be of any importance for learning the subject. Learning facilitators have mixed views regarding the idea that there is no difference between using ICT-based content and the traditional approach. Despite the fact that electronic technologies have been in use in education since the 1950s, research results have not made a strong case for their impact on learning and facilitating the process (Roblyer, 2008). This may be due to the fact that the stakeholders, especially learning facilitators in the education field, in particular within the secondary level education, at the mass level, are still not able to convince themselves about the impact of using technologies within their profession. This can be thought due to lack of proper evidences from their environment, which could convince and truly motivate them. Even in other sectors, such as industry, management, and so on, the wide use of PowerPoint presentations may be observed, but there is no proper evaluation. Moreover, while considering the field of learning and facilitating learning, the temporal factor is very important. No unlimited amount of time can be given to cover a single topic. Therefore, within this field content, means and instructional strategies are all equally important and must be taken into account in learning and its facilitation, as well as for research purposes.

The researcher, motivated by the basic assumption of educational technology, came to the conclusion that both the processes and products of technology can help in improving instructional effectiveness (Spencer, 1991) to explore the application of Edmodo in sharing ICT-based mathematics content by taking a few concepts in mathematics. Consequently, after discussing and receiving guidance from the supervisor, the researcher formulated the problem.

Should the study yield positive results regarding the use of ICT for learning and facilitating learning at the pedagogic level, then learning facilitators, educationists, educators and policy makers in India, may be motivated, and this can be adopted in the general practice of the learning and facilitating learning processes in institutions. More endeavours can be made on the part of the educational system to motivate the process and its progress. The study may also help in minimizing zone 5 of exclusion (Govinda, 2009) and helping in learning without burden (Yashpal, 1993) in order to be socially responsible (Reeves, 1995). Zone 5 includes those learners, who somehow get admission, but due to disinterest in facilitating learning methods, content, form of content and presentation leave the institution and are subsequently excluded from the formal system of institution education. Moreover, should the material facilitating learning be produced by each learning facilitator in the institution itself, it may help in attaining the concept of self-supporting institutions (Gandhi, 1962). The content will support the idiosyncratic nature of learning. The content developed will be most suitable for particular institutions, keeping in mind their requirements, and catering to their learners' needs in the best possible way.

The study involving technology, education and method is still a relatively unexplored area and still not up to the mark as required. Hence the current study has a rationale from the past, present and future.

## Objectives of the study

The objectives of the study are key points in the entire analysis, guiding and providing insights for every possible solution to the problems arising within its framework. They provide directions to the study. The current study needed a systematic procedure and a guided output, therefore the objectives of the study were as follows:

I. To design the ICT-based content for learning and facilitating learning of mathematics based upon Bruner's idea of a concept.
II. To develop the ICT-based content for learning and facilitating learning of mathematics.
III. To create a group on specific Edmodo platform for learning and facilitating learning of mathematics.
IV. To upload the developed ICT-based content on Edmodo platform.
V. To apply Edmodo in learning and facilitating learning of this ICT-based content.
VI. To observe and evaluate the application of Edmodo in learning and facilitating learning of mathematics.

## Research questions of the study

Research questions are, generally understood as queries that a research study is aimed to answer. Culture, scope, experience and analogy are not the only factors that influence the formulation of research questions. These stem also from personal and idiosyncratic empirical experiences (Goode&Hatt, 1981). In this case non-directional, open-ended exploratory kind of research questions served as the best option for obtaining the real picture regarding the use of ICT and the traditional method. Goode and Hatt (1981) point out the characteristics of usable hypotheses and research questions - that these should be conceptually clear, should have empirical referents, be specific, related to available techniques and a body of theory. Therefore, considering the objectives of the study and keeping in mind the current scenario and above-mentioned criteria, the following research questions were formulated:

I. Within the Indian setting, how do learners work on an ICT platform Edmodo in groups?
II. How does a learner work individually?
III. Do the learners co-operate with each other? If yes, then how?
IV. Do the learners or participants collaborate with each other? If yes, then how?
V. How do the learners receive help from their mentor? What sort of intervention do they expect and seek from their mentor?
VI. How do learners further enrich their learning?

VII. Do the learners use the ICT platform Edmodo and academic interaction willingly or upon instruction?

VIII. Do the learners feel a sort of interest in the ICT platform Edmodo or do they feel a mental block?

The research questions are explicit in order to state the relationship between independent and dependent variables involved in the study. The research questions follow logically the statement of the problem. The statement regards the analysis of Edmodo as the ICT-based platform for concept attainment in mathematics and the use of ICT-based content in pedagogy. Research questions link up these and clearly point to a correlation among the three issues.

## Operational definitions of the important terms

Operational definitions are mentioned in this part; these involve, to a greater or lesser extent, the general gist of the definitions, which was formulated based on formal definitions obtained from various resources.

The operational definitions are as follows:

**I. Information and communication technology (ICT)**

The information and communication technology in the field of education, specifically facilitating learning and content development, in which computer in any form is used. Here, computer, projector, screen, the Internet, Edmodo and PowerPoint presentation tool constitute the ICT.

**II. Edmodo and Edmodoing**

Edmodo *(educational mode)* is an ICT-based platform which facilitates group formation and interaction between group members. It can be used for educational purposes. Edmodoing is using Edmodo for instruction and learning purposes through interaction, discussion and application of learning material. In the current research, Edmodoing is using Edmodo and transferring the learning progress made using Edmodo further, to facilitate learning of the others with the use of other means.

**III. Method**

A method is a set of steps or the way of doing something. In the current case, the method equals using and exploring Edmodo for ICT-based content, especially for concept attainment.

**IV. PowerPoint presentation**

The application software which comes with MS Office and is used to develop presentations using texts, pictures, graphs, animations, sounds etc.

**V. Concept**

A concept is an idea or category consisting of a name, examples, attributes and generalization.

**VI. Concept attainment**

Stage of attaining a concept with regard to its label, attributes, degree of attributes, examples/non-examples and definition or generalization.

**VII. Traditional or conventional approach of facilitating learning**

The approach of facilitating learning in which computers and related appliances are not used. In traditional or conventional approach of facilitating learning, self-learning is not feasible.

**VIII. Mathematics**

The content covered in the syllabus of mathematics in Central Board of Secondary Education curriculum for class 9. And, influenced by Devi (1987), the National Council of Educational Research and Training textbook for the purposes explored in detail.

**IX. Reliability**

Validity encompasses reliability. Validity implies reliability (Hopkins, 2000; Monge & Williams, 2001; Willis, 2003; Steinhaus & Witt, 2003; Pellisier, 2007; Malhotra & Dash, 2009). In other words, if a tool is valid, then it is reliable too. And hence, the tool was validated to spontaneously having reliability. The current study, based upon the above-mentioned literature, concentrated on validity, and let reliability fall naturally into place.

**X. Validity**

Keeping in mind the generalized use and widespread application of the study subject, the experts' opinion and percentage of agreeability were taken as the form of validity (content-cum-face validity).

## Delimitations of the study

The following are a few of the major delimitations of the current study:

I. The institutions for the study are from limited states only. This is to control several confounding extraneous variables which could jeopardize the validity of the study.

II. A limited number of concepts are taken for the study. This enabled the researcher to use the facilitating learning and observation tool in such a manner that prevented the learners from fatigue, boredom and disinterest. A larger number of concepts can unnecessarily extend the tools, which can hamper the output of the study. But it is ensured that concepts are taken from all the units.
III. Only a few specific mathematical concepts are taken from the syllabus. This is to narrow down the subject, as well as set the content boundary.
IV. The learners participating in the study belong to the same proficiency level. The learners attend the same class and courses only.
V. A limited number of tools of ICT, i.e. only Edmodo and PowerPoint, are considered for the study. This is to refrain from misinterpreting the effect on the output of ICT tools and this keeps the study more focussed on particular ICT tool.
VI. The study does not concern equipping the institutions with ICT apparatus. This is to control the researcher from diverting from the main theme of the study.

## Research methodology

ICT-based content on some mathematical concepts was designed and developed upon Bruner's idea of a concept. A specific group on ICT platform Edmodo was created for learning and facilitating the learning of mathematics. ICT-based content was uploaded and shared via the Edmodo platform. Edmodo was applied for learning and facilitating the learning of this ICT-based content, and the behaviour was monitored. Application of Edmodo for learning and facilitating the learning of mathematics was analysed and evaluated. ICT-based content shared through Edmodo was used for facilitating the learning in real classrooms, with observations and analyses being made.

The independent, dependent as well as confounding variables of interest are well identified as per the needs of the study. Ample efforts are made to control the effect of confounding variables in order to get clear relationship between independent and dependent variables. The efforts are made to develop the theoretical foundation for the study supplemented by literature pertaining to Clark (1983; 1994), Kozma (1991; 1994a; 1994b), and many others from earlier period to the current period. The problem is clearly stated in terms of what to study and how; it also implies an idea about whom to study and why.

## Data collection and coverage

Data collection was performed for the purpose of obtaining observations, opinions and reflections, by administering an observation schedule, opinionnaire and an observation reflection schedule through ICT. The information was gathered from learning facilitators from two states, Delhi and Uttar Pradesh (UP). These tools collected data concerning the application of Edmodo in pedagogy and learning. The data was in the form of observations and opinions, and it was collected in relation to eight dimensions and respective objectives regarding work in group (dimension code I & objective code G), working as an individual (dimension code II & objective code I), cooperation (dimension code III & objective code C), collaboration (dimension code IV & objective code L), mentor's support (dimension code V & objective code M), enrichment in learning (dimension code VI & objective code E), forcefulness or willingness in use (dimension code VII & objective code F) and interest or mental block (dimension code VIII & objective code B). The data obtained were pooled under different categories. The syllabus of 9$^{th}$ class for mathematics presented in the Central Board of Secondary Education curriculum was covered for the ICT-based content and facilitating the learning.

## Sample

The main sample consisted of 10 pre-service learning facilitators studying the B.Ed. programme from Delhi and UP, who were enrolled and observed continuously for two years. The sampling technique was a non-probability purposive sampling. The sample comprised of learning facilitators from two different institutions. Apart from the sample of 10 pre-service learning facilitators and 350 indirect learners at school from class 9, 195 pre-sample elements were included for the validation of ICT-based content, observation schedules, opinionnaire and facilitating learning.

The population of interest is clearly defined. The sample and sampling techniques involved are endeavoured to clearly state, in order to show the need, the importance and rationale. The sampling allows for the generalization as regards the population of interest. The sampling encompasses all the characteristics of the properly represented population in terms of previous experiences, qualifications, current status, acquaintance with the confounding or necessary factors, etc.

## Design of the study

The study used exploratory research design. The exploratory design is a two-phased mixed method design using quantitative data to explain qualitative results (Creswell & Plano Clark, 2007). Phase one consisted of the collection of qualitative data. The second phase included the collection and analysis of quantitative data that were linked to the results from the qualitative study (Creswell & Plano Clark, 2007). Keeping in mind the emerging state of researches done within the Indian context and considering the objectives of the current study, wherein the researcher wanted to understand the phenomena of applying Edmodo for concept attainment in mathematics from the perspective of teacher educators, an exploratory design was used with 12 controlling variables.

Controlled confounding variables included: class level, content, concepts, ICT tools, content size, examples and non-examples, instructional strategies in ICT-based discussion, curriculum, elements of concept, availability of ICT facilities, types of items and efficiency and interest on the topic.

The steps listed below were followed during the study:

I. ICT-based content regarding some mathematical concepts was designed and developed based upon Bruner's idea of a concept.
II. A specific group on ICT platform Edmodo was created for learning and facilitating the learning of mathematics.
III. ICT-based content was uploaded and shared via the Edmodo platform.
IV. Edmodo was applied for learning and facilitating the learning of this ICT-based content.
V. Application of Edmodo for learning and facilitating the learning of mathematics was monitored.
VI. Application of Edmodo for learning and facilitating the learning of mathematics was analysed and evaluated.
VII. ICT-based content shared through Edmodo was used for facilitating the learning in real classrooms; observations and analyses were conducted.

## Tools / instruments:

I. ICT-based content – developed and validated by the researcher.
II. Observation schedule – developed and validated by the researcher.
III. Opinionnaire – developed and validated by the researcher.
IV. Observation reflection schedule – developed and validated by the researcher.

The tools gathered observations, opinions and observation reflections related to eight dimensions and respective objectives regarding working in group (dimension code I & objective code G), working as an individual (dimension code II & objective code I), cooperation (dimension code III & objective code C), collaboration (dimension code IV & objective code L), mentor's support (dimension code V & objective code M), enrichment in learning (dimension code VI & objective code E), forcefulness or willingness in use (dimension code VII & objective code F) and interest or mental block (dimension code VIII & objective code B).

The instruments are appropriate to the operational definitions of the dependent variables.

## Procedure for data collection

The procedure for data collection could be summarized in the following manner:

I. The observations were made by the researcher for the discussions held at Edmodo group by learning facilitators.
II. The observation schedule was used by the researcher for concluding and recording the observations.
III. Opinionnaires were filled by learning facilitators based upon their interactions on the Edmodo group.
IV. Learning facilitators monitored the process of concept learning (attainment) in mathematics with the use of ICT-based content while facilitating learning at schools.
V. Observation reflection schedules were filled by learning facilitators regarding the progress in concept learning (attainment) made by learners through ICT-based content at schools.

The efforts are made to describe the procedure involved in the current study in a way explicit and ample enough to allow replication. The procedure endeavours to provide sufficient control for validity and threats to validity as mentioned by Barker, Pistrang and Elliott (2002), Sani and Todman (2006), Cohen, Manion and Morrison, (2007); and Ary, Jacobs and Sorensen (2010).

## Data analysis

The statistical techniques used were as follows:

I. For the content-cum-face validity of items, percentage of agreeability was carried out. Content validity is the representativeness or sampling adequacy of the content – the substance, the matter, the topics of a measuring instrument (Kerlinger, 1978). Content validation, essentially, consists in judgment. Since the judgment in the form of neutral or undecided does not provide any clarity regarding agreement or disagreement, these were not assigned any weight in the percentage of agreeability. Percentage of consistency was calculated for rational judgments pooled from the responses of 40 subject experts and field experts.

$$\text{Percentage of consistency} = \frac{A+B}{A+B+D+E} \times 100$$

Where, A, B, D and E were the expert's opinion.
Explanation for A, B, C, D and E:

A) Extremely Agree
B) Agree
C) Undecided/Neutral
D) Disagree
E) Strongly Disagree

II. Chi-square test was used for testing the goodness of fit with a distribution (Hitchcock, 2009; Kault, 2003). It was used for testing that the obtained distribution fits with the specific distribution. A testing was pursued for verifying whether the obtained frequencies fit with the 'average' distribution.

$$\text{Chi square} = (|f_o - f_e| - 0.5)^2 / f_e$$

III. Mode

IV. Percentage

The statistics used were decided depending upon the nature of the research, type of data and scale of data. Since no statistical formulae can be used without knowing the scale of measurement and type of data, the statistical formulae selected are based upon the kind of statistics depending properly upon not only the size of the data, but also their nature and a requirement of analytical interpretation of the data obtained during the data collection procedure.

## Findings and conclusions

- The percentage of dimension agreeability for every selected item was 100%, hence content validity was achieved. The percentage of objective agreeability for every selected item was 100%, hence face validity was achieved. Following the analysis, 60 slides for ICT-based content, 40 items for observation schedule, 40 items for opinionnaire and 40 items for observation reflection schedule were finalised.
- Modes for each item and each category were found. These modes depicted the highest number of occurrences for each response. The levels found through modes were very high, high, average, low and very low. These levels supported by their modes were ample for depicting the majority among the learners.
- In Indian context, learners' teamwork on the ICT platform Edmodo is efficient. They feel comfortable using Edmodo and interacting with peers through the platform. The overall attitude towards using Edmodo in groups is positive.
- Individual work on the ICT platform Edmodo is effective and fruitful. Edmodo supports individual learners in facilitating personal learning, fostering individual skill development and enhancing their capability to build and provide effortless solutions at work.
- Learners from the same location co-operate with each other on the ICT platform Edmodo through supporting, helping in discussions and motivating for using Edmodo.
- Learners or participants collaborate at a little degree for learning and solving problems like technical and skill-based issues on the ICT platform Edmodo. The collaboration with remote learners is not so fruitful on the ICT platform Edmodo.

- Learners receive and require extensive help from their mentor on the ICT platform Edmodo. They expect and seek pedagogical, technical and, motivational assistance, reminders, and responses to queries from their mentor on the ICT platform Edmodo.
- Learners display a very positive attitude towards the use of Edmodo and ICT in future learning and facilitating learning process. Edmodo further enriches their learning. It opens up new things for learning, enhances co-operation and proves to be advantageous in interaction.
- Learners willingly engage in the use of the ICT platform Edmodo and academic interaction but a constant reminder, such as active participation of a mentor, is required from time to time.
- Learners feel a sort of interest in the ICT platform Edmodo and they do not experience a mental block while using Edmodo. In fact, they enjoy using Edmodo.
- The study, as a whole, stands for the statement that Edmodo, keeping all other confounding variables apart, supports the pedagogy of mathematics but the use of ICT-based content in the form of PowerPoint presentations does not provide appropriate support of learning the concepts and concept attainment in mathematics.

There is a clear interpretation of the results. Results are interpreted in terms of level of significance (wherever applicable), scores, means followed by the relationship between the variables. The results, in form of answers to all the research questions, are presented. The author also undertakes to present the results in an explicit form. The appropriate tables and figures are used as per the need and the rationale. The conclusions are clearly presented. The conclusions follow logically from the results of the study. The author has avoided reaching conclusions that are not directly supported by the outcomes of the study. Only those conclusions are drawn which are explicit and implicit enough to be based upon the outcomes and findings of the research.

## Educational implications and applications of the study and findings

Evans (2002) talks about the criticism of educational research regarding the following issues: lack of answers to the policy makers' questions asked when deciding between alternative policies, not helping professional practice,

fragmenting, tendentiousness and political motivation. The current research endeavours to stand above this criticism. The best means for describing this aspect could be by discussing the implications of the study. The implications of the current study and its findings are as follows:

- The results were discussed in terms of the method of facilitating learning by use of concept formation and for the purpose of concept attainment. It was discussed whether using the ICT-based platform Edmodo in the Indian context would affect learning and social interaction. The study showed that the use of the ICT-based platform Edmodo is beneficial in pedagogical discussions on mathematics in Delhi and UP, where most of the institutions have the computer facility. Learning facilitators may or may not prepare their own ICT-based content for facilitating the learning of mathematics in the classroom setting when applying the discovery learning strategy for concept attainment. The study supports the concept of optimum utilization of information and communication technologies (Kanvaria, 2012) and attempts to reflect upon the use of Edmodo for the pedagogy of mathematics.
- The ICT-based content developed can be used as a Concept Attainment Tool in mathematics for school-level learners.
- The ICT-based content can be used for formative as well as summative purposes for the learners of mathematics concepts.
- When beginning to teach selective mathematical topics in secondary or senior secondary level classes, the evaluative part of the ICT-based content can be used to check the necessary conceptual understanding of the learners pertaining to those topics.
- The developed ICT-based content tool can be used as a readymade valid tool to assess the conceptual learning in Mathematics of school level learners.
- The tool is economical by virtue of labour, time and application.
- The developed tools endeavour to eliminate all four types of errors: a personal error, variable error, constant error as well as an interpretation error, so it can be used in different institutions in India with maximum accuracy.
- The tool can be used for diagnostic, prognostic, as well as predictive purposes for a few concepts in mathematics.

- The developed tool can be used for individual as well as group learning for school-level learners.
- The prepared tool can be used as criterion-referenced if a cut-off score is affixed to the correct answers and number of attempts.
- ICT-based tools like Edmodo and PowerPoint and their use in facilitating the learning and acquisition are good for learner's education, as far as concept attainment in mathematics is concerned.
- ICT-based tools like Edmodo and PowerPoint and their use in facilitating the learning are beneficial for learning of mathematical concepts in India, regardless of the state.
- The study supports the idea that media do affect the learning. Hence, learning facilitators should be provided ample freedom to make their own decision regarding the choice of media to deal with the conceptual understanding of mathematics' students.
- The study indicates that the use of Edmodo for pedagogical discussions is very fruitful. Hence, Edmodo can be used for pedagogical purposes in mathematics and its learning.
- The study also shows that learning facilitators take new technology in pedagogy as a good thing in the pedagogical discussions and support the use of it for enhancing their skills and capacity. Hence, ICT and innovative practices should be implemented by learning facilitators.
- The study supports the concept of cooperation but does not yield positive results fostering collaboration. Hence, in cooperative strategies, the use of ICT can be enhanced in pedagogy.
- The study underlines the idea that there is a need for more policies, implementation practices and campaigning at school level for incorporating ICT for teaching and learning.
- The study supports the formation and implementation of more policies, programmes of actions and schemes for supporting higher education teacher education institutions for achieving maximum benefits by using ICT in teacher education.

The researcher presents the implications of the study results with respect to the field of education, especially teaching and learning. They are based on the results of the study, not on what the author hoped or expected to be true. Ample efforts are made to keep the implications unbiased and objective. The appropriate educational applications are discussed. The applications follow

logically from the results of the study. Applications have explicit and implicit relationship with the results of the study. The correlations between the results, theory and existing literature are shown. The applications and implications are guided by the thoughts of social responsibility as mentioned by Salomon and Clark (1977); and Reeves (1995).

## Scope of further research

- The study can be expanded to other secondary boards also.
- The impact on and the correlation with the overall learners' achievement in the summative exam constitute a topic of study.
- Sample size in the present study was limited. It can be increased to a remarkable extent, to get more generalizability and validity.
- Similar studies can be done for other subjects too.
- In this study, the area was limited to Delhi and UP only; this can be extended to other states.
- A similar tool can be prepared for the senior secondary level and a similar study can be held for that level, too, where mathematics is assigned more weight and importance than at the secondary level.
- The similar research can be carried out by a group of researchers belonging to different and various states.
- Other types of aspects, such as more than one media platform or a simultaneous combination of media platforms can be studied and a model can be established.
- Other environments, such as the pure virtual learning environment in the Indian context, can constitute a topic for further study.
- The impact on various subjects using ICT-based content and ICT-based platform in mathematics and other subjects can be a topic for further study.
- Though the current study is aimed at a major fraction of the institutional system in India, i.e. well-established formal institutions, studying the learners' attainment at non-formal and informal institutions can be a concern for a future study.
- The cultural element between the learner and the learning facilitator; the learner and institution; and the learner and content can be a topic for further study.

- The social relationship between the learner and learning facilitator; learner and institution; and learner and content can be further studied and a model can be established.
- In the current study, it was the researcher (the educator facilitating the learning process) who actually used and controlled the use of the ICT-based platform Edmodo. A further exploration of what happens when learners use the ICT-based platform Edmodo free from any direct control or interference of a researcher (an educator facilitating the learning process) may be studied as well.

**Abstract:** This paper is an attempt to gain insight into the use and application of Edmodo (an Information and Communication Technologies -ICT- platform) in facilitating learning and pedagogy of mathematics in general and concept attainment in mathematics in specific, over the period of almost four long years. The study is a type of interdisciplinary study dealing with ICT-media from the Technology discipline, concept attainment and method from the Education discipline and mathematics from the Sciences discipline. The study follows an exploratory research design through participatory observation mode where qualitative data collection and analysis was followed by the quantitative data collection and analysis. During the study, after developing the validated ICT-based content and applying it via Edmodo, observation schedule, questionnaire and observation reflection schedule were used, all developed and validated by the researcher, upon the learning facilitators to obtain qualitative and quantitative data. The study reveals some valuable and extraordinary results regarding the use and application of ICT-based platform Edmodo at the pedagogic and the use and application of ICT-based platform Edmodo within the pedagogic dimension, as well as when facilitating learning.

**Keywords**: Edmodo, Edmodoing, Concept Attainment, Mathematics, Pedagogy

**Streszczenie:** Niniejszy artykuł jest próbą uzyskania wglądu w wykorzystanie i zastosowanie Edmodo (platformy technologii informacyjno-komunikacyjnych – ICT) w ułatwianiu uczenia się i pedagogiki matematyki w ogóle oraz osiągnięć koncepcyjnych w matematyce w poszczególnych dziedzinach, w okresie prawie czterech lat. Studium to jest rodzajem interdyscyplinarnego badania dotyczącego ICT-mediów z dziedziny technologii, osiągnięć koncepcyjnych i metod z dziedziny edukacji oraz

matematyki z dziedziny nauk ścisłych. Studium jest prowadzone zgodnie z koncepcją badań eksploracyjnych w trybie obserwacji uczestniczącej, w którym za danymi jakościowymi i analizą następowało zbieranie i analiza danych ilościowych. W trakcie badania, po opracowaniu zweryfikowanych treści opartych na technologiach informacyjno-komunikacyjnych i zastosowaniu ich za pośrednictwem Edmodo, zastosowano harmonogram obserwacji, kwestionariusz i harmonogram refleksji nad obserwacjami, które zostały opracowane i zweryfikowane przez badacza w celu uzyskania danych jakościowych i ilościowych. Badanie ujawniło pewne cenne i nadzwyczajne wyniki dotyczące wykorzystania i zastosowania platformy Edmodo opartej na technologiach informacyjno-komunikacyjnych w wymiarze pedagogicznym oraz wykorzystania i zastosowania platformy Edmodo opartej na technologiach informacyjno-komunikacyjnych w wymiarze pedagogicznym, jak również podczas ułatwiania nauki.

**Słowa kluczowe:** Edmodo, Edmodoing, osiągnięcia koncepcyjne, matematyka, pedagogika

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