Volume 11 Number 2 DOI: 10.21344/iartem.v11i2.581

University students' study habits related to the use of study resources

Zuzana Sikorova[1], Iva Cervenkova[1], Marek Vaclavic[1] & Tomas Barot[1]

[1] Faculty of Education, University of Ostrava, Ostrava, Czech Republic

Abstract

The paper reports on the exploratory research study focused on the study habits of university students concerning the use of study resources. The aim of the study was to find out in what ways the students used the study resources and if the ways of use were related to the students' approaches to learning. The research sample comprised 2, 671 students from six different faculties. The inquiry has been conducted by means of two questionnaire tools. The results showed that at least one third of the students considered one or two resources as sufficient while learning for an exam or a test, and over half of the students used study resources almost solely at the end of the course. Study habits significantly differed according to the approaches to learning with the only exception: students unambiguously preferred learning from printed texts over learning from digital resources.

Keywords: Study resources, Study habits, Approaches to learning, University students

Introduction

The research study reported in this article dealt with the topic of study resources' usage in the university environment. By the term *study resources*, any text resources are understood, including the iconic ones, which are used as sources of information or means to acquire the course content. Nowadays, these include a wide variety of teaching and learning resources from didactically processed published materials like textbooks and course books; highly scientific publications of a given field like academic books and articles, encyclopaedias and dictionaries; materials, provided to students by lecturers, which

are usually available online (e.g. PowerPoint presentations, lectures in text, audio or video records, sample tests, links to external sites, webinars and many other curricular resources); to materials created by students themselves, like their notes, exam topics elaborated jointly by students or materials created and shared by other students. Besides these, students use materials more or less randomly found on the Internet as well, like seminar papers, essays and instructional videos. This last type of resources tends to be of a questionable degree of reliability. Typical features of current higher education study resources are rich diversity and flexibility. This hybrid environment (Astleitner, 2012; Manovich, 2007), characterized by its very own ecology (Wikman & Horsley, 2012), is one in which old and new resources, print and digital forms, are being mixed.

Research on higher education is being intensively developed among others in relation to dramatic changes in tertiary education in the last decades. In recent years, some studies in this broad research field about teaching and learning resources have focused on the comparison of printed and digital materials. Considering that the nature of the learning process of university students is based mainly on individual work and preparation, it is apparent that study resources play a vital role in university instruction. Research in the field of the use of university study resources – with exception of aforementioned comparison studies – still remains rather limited.

The importance of research on the usage of study resources lies especially in a thorough understanding of the processes, practices and behaviors of students and lecturers related to these resources. Considering the profound changes of the academic environment in this regard, such research studies appear to be more necessary. Research studies on university students' behavior related to the use of study resources are not common and terminology in this field is not stable yet. Student behavior related to the resources is described using terms 'study habits' (Berry et al., 2011; Judd & Elliot, 2017), 'resource use strategies' (Huon et al., 2007), 'study practices', 'textual practices', 'reading practices' (Lea & Jones, 2011; Pecorari et al., 2012), which include different manifestations of behaviour depending on the authors. In this text, the notion *study habits* is used to designate student behaviour concerning kinds of resources the students use, the ways they acquire resources, e.g. borrowing, purchasing, downloading and sharing, the time-wise circumstances of resources use, e.g. during the course or just before the exam, the frequency of resource use, and the number and format of resources the students work with.

The empirical study reported in this article is a part of a longitudinal research program of university students' study habits and usage of educational media and other study resources in university teaching and learning. The part of research reported here focused on following *research questions*: In what ways do the university students use study resources? (i.e. how do they acquire them; how many resources do they work with while preparing for an exam or a test; do they work with the resources during the whole course; do they prefer learning from printed or digital text?) Terms 'exams' and 'tests' denote the methods of students' assessment at the end of the courses. By means of oral or written examination, learning outcomes, i.e. acquired knowledge and skills, are checked. The important feature is that it is necessary to learn from a text in order to pass an exam or a test.

The main *hypothesis* focused on the relationship between the study habits concerning ways of using the study resources and students' approaches to learning – deep, surface and strategic.

Theoretical Background and Previous Research

Many experts in the research field agree on the fact that the whole field of the research on teaching and learning resources has been heavily undertheorized (e.g. Fuchs, Niehaus & Stoletzki, 2014). Nevertheless, beneficial models and theories have emerged in recent years, which are mostly related to research on the use of teaching and learning resources and which could represent the basis for future research. The text-teacher-student model (Peacock et al., 2004) approaches the use of resources as a process of interaction in a specific context. Bruillard's model is based on the impact of school practices in textbook design (2011). The model of using textbooks developed by Kong and Shi (2009) is grounded in measuring the implementation of curriculum. We consider the use of a sociocultural theory of activity based on the psychological model of tools and activities mediated by tools to be the most advanced and productive one (see e.g. Vérillon & Rabardel, 1995; Vérillon, 2005). This theory led to the development of a socio-didactic tetrahedron model (Rezat & Strässer, 2012) and to the promising documentation theory (Pepin, Geudet & Trouche, 2017; Geudet, Pepin & Trouche, 2012).

Considering the insufficient conceptualization and elaboration of theoretical foundation of the research field, the research survey reported here was based mainly on findings already achieved by empirical research in the field of teaching and learning resource use at universities. In the next part of the article, the main research issues will be identified which the recent empirical studies have solved so

far, and conclusions drawn from the findings will be summarized. Finally, the conception of approaches to learning that was adopted in the survey will be described.

Within the research studies of the use of university study resources, two apparent strong topics were identified: 1) studies focused on the comparison of printed and digital resources use, including studies on learning from printed and digital text and 2) studies on the study habits and strategies of students. The latter group will be pursued more thoroughly, as it closely relates to the subject of the conducted survey.

Research on the Use of Printed and Digital Resources in University Education

Considering the massive changes related to ICT (Information and Communication Technologies) permeating all levels of education, it is natural that most of the research on university teaching and learning resources deals with comparing the usage of printed and digital materials. Studies explore students' preferences regarding the format of materials, factors influencing decision making about the choice between printed or electronic materials, and the influence of format on students' performance and learning motivation.

Where everyday reading is concerned, there is an unambiguous preference of digital resources, it seems that when it comes to learning from text, university students generally prefer printed materials. This conclusion should not be considered absolutely certain as there are some studies which confirmed the preferences of digital formats as well (e.g. Singer & Alexander, 2017a). Nevertheless, the results of numerous research studies based on questioning students, show that university students prefer printed materials (e.g. McGowan, Stephens & West, 2009; Jhangiani, Dastur & Le Grand, 2018; Woody, Daniel & Baker, 2010). It is of great importance that this conclusion was confirmed by a recent worldwide study conducted in 21 countries (Mizrachi et al., 2018). The survey investigated university students' perceived preferences and behavior in relation to printed and digital resources. More than 10 000 students from undergraduate to Ph.D. students participated in this study. Participants were from the USA, UK, United Arab Emirates, Israel, Bulgaria, China, France, Slovenia, Portugal, and other countries. Aggregated results confirmed that most respondents – almost 80 percent of all students – preferred learning from printed materials. At the same time, the students responded that, if learning from printed materials they focus better and remember learned information for a longer period compared to learning from digital resources. The authors of the study expected significant differences between preferences of students from

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different countries due to cultural differences, unequal levels of socio-economic development, and different education systems. It turned out that the student's country of origin did not play any role in preferences whatsoever.

The studies dealing with the issue of the impact of resource format on students' learning processes and outcomes are those of the greatest importance. These research studies examine the differences in learning, performance and/or text comprehension between students who learned, studied or sought to remember the information from printed materials and those who worked with digital ones. Generally, it can be concluded based on the results of the vast majority of current empirical studies, that there was no significant relationship between the format of study resource and university students' performance (Daniel & Woody, 2013; Kujawski Taylor, 2011; Chulkov & Vanalstine, 2013; Huon et al. 2007; Rockinson-Szapkiw et al., 2013; Gearhart, 2016; Thadani & Bouvier-Brown, 2016; Roy, Inglis & Alcock, 2017).

Singer and Alexander's overview study (2017b), based on a thorough and quality analysis of empirical research, focused on comparing reading from printed and digital texts conducted since the year 1992, warns not to make hasty conclusions. The authors considered all surveys with no regard to the age of pupils and students. They came to the conclusion, which surely applies for university resources too, that it is questionable to draw a general conclusion regarding the level and efficiency of reading comprehension from printed compared to digital resources. It is always necessary to carefully define, what is understood by 'reading' or 'learning from the text' in the research design, what 'reading digitally' vs 'digital reading' means, what is actually measured while evaluating acquired knowledge along with the quality the measurement tool is, what kind of text was given to students, what is the length of the text, is the topic familiar to the students, how do we define the task for them and other aspects (Singer & Alexander, 2017b).

Studies focused on the comparison of printed and digital resources are mostly based on quantitative design, with data being gathered by means of questionnaires and experiments. In contrast, the research focused on study habits of university students, which will be covered in the next part of the article, usually uses a mixed or qualitative methodology.

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Research on Study Habits Related to the Use of Resources

Research on study habits in relation to the use of study resources have been conducted with students of finance (Berry et al., 2011), material engineering (Lee et al., 2013), medicine (Judd & Elliot, 2017), psychology (Huon et al., 2007), various fields of humanities, sciences, technologies, medical studies etc. (Pecorari et al., 2012; Horsley, Knight & Huntly, 2010). Results have shown that study habits might differ from field to field, but certain findings emerged from the analysis of conclusions, which are likely to be valid regardless the field of study:

1. Many students work with the study resources only while preparing for an exam or test, even though the lecturers expect them to study the texts during the course. Significant parts of research studies, which dealt with the issue of university students' study habits, were focused on the issue of student motivation to study the assigned literature (e.g. Berry et al., 2011; Pecorari et al., 2012, Carney et al., 2008; Vandsburger & Duncan-Daston, 2011; Juban & Burnthorne Lopez, 2013). Researchers concluded that a considerable part of students do not read the assigned literature during the course, and so they do not prepare for work in the lessons. The findings of various studies have been very similar. Even though students know that it is important to read and that the lecturers expect them to do so, the majority of students do not study the assigned text during the course anyway. Despite being satisfied with the quality of the presented material, it is unlikely that they will read it as often as it is required (Juban & Burnthorne Lopez, 2013; Pecorari et al., 2012). In the study conducted by Berry et al. (2011), only about 20 percent of students claimed that they often or always read the assigned literature before the lecture. On the contrary, more than half of them did not ever or rarely read any assigned resources. Some students stated that they read a textbook only when they did not understand the specific topic of the lecture or if they encountered a problem while solving assigned tasks. Juban and Burnthorne Lopez (2013) found out that in cases of problems with understanding students preferred PowerPoint presentations over the textbooks.
2. *Textbooks are perceived as an alternative to lectures.* Students regard the textbooks, lecturers' notes or PowerPoint presentations and attendance on the lectures as important sources of knowledge. However, the textbooks are often perceived as an alternative to attending the lecture. They are a substitute rather than a supplementation and expansion of knowledge acquired from the lecturer,

or they are used only to solve the assigned tasks (Pecorari et al., 2012; Berry et al., 2011, Horsley, Knight & Huntly, 2010).

3. Students often lose track in the number of available resources and demand specification of material, which can help them to succeed on the exam or test. Lecturers usually provide students with supplementary resources such as videos, links to external resources and tasks for revising, usually available from the university Learning Management Systems. However, most of them do not include "key" materials to acquire the basics of the course. Many students perceive these resources as "something extra," more like support or text for those interested, something which is not necessary for successful completion of the course. They would appreciate if lecturers designated the materials which are really necessary for succeeding, rather than just for support or for those are interested in the content (Berry et al., 2011; Horsley, Knight & Huntly, 2010).
4. *Students share study resources: a lot and often.* Judd and Elliot's (2017) study confirmed that sharing of teaching and learning resources is a widespread practice. Students stated that they shared resources via e-mail, social networks, and cloud services twice or more per week. They shared the materials which were not included in the list of recommended ones, printed resources such as textbooks or hand-written notes. Some students tended not to work with their own materials but to learn from the shared resources processed by other students.

The aforementioned findings of relevant research support conclusions regarding students' general study strategies. The results of empirical studies suggest that "student preference is for fast access to specific assessment-related information rather than broad in-depth analytical reading on the topics and concepts" (Horsley, Knight & Huntly, 2010, p. 57). Horsley, Knight, and Huntly (2010), Berry et al. (2011) and others came to the conclusion that students adapt their learning strategies to the resources available. They try to quickly acquire the knowledge required for an exam or a test with obvious emphasis on the very content being evaluated than on a deep understanding of the curriculum. Some authors suggest that the study strategies of current students are related to the fact that many of them might have issues with conventional study practices like reading and writing academic texts (Pecorari et al., 2012, Lea & Jones, 2011). Without trying to digress to sociological issues of the younger generations' lifestyles, it is likely that these strategies are related to university students' ways of life – many of them

work, participate in a lot of out-of-school activities and have little time to study. This idea was confirmed, among others, by findings of Horsley, Knight, and Huntly (2010).

University Students' Approaches to Learning

Understanding and diagnostics of learning approaches in this research stem from the theory of approaches to learning based on classical studies by Marton and Säljö on the deep and surface approaches (e.g. Marton & Säljö, 1997) and the conception of the strategic approach according to Entwistle and Ramsden (1983). The main difference between surface and deep approaches lies in the intention – either to reproduce the material presented or to understand it deeply (Entwistle, 2009). The search of meaning in a *deep approach* is based mostly on relating the findings with previous knowledge and experience, searching for patterns and essential principles, verifying the evidence and their relations with conclusions and of critical examination of logic and arguments. The *surface approach* is characterized by the intention of meeting the course requirements. The main tool is a reproduction, which leads to routine memorizing of facts or conducting procedures, the understanding of the course content as unrelated pieces of information and learning without considering its purpose or strategy.

Deep and surface approaches were identified thanks to the several key research investigations – by Marton and Säljö in Sweden, Entwistle and Ramsden in United Kingdom and Biggs in Australia. They represent the main dichotomy in approaches to learning, but they do not take into consideration a strong driving element: the assessment. Consideration of this effect required the development of a supplementary category – *strategic approach to learning* which takes into account the effort to achieve good marks. This approach is based either on performance motivation of students or on their sense of responsibility. Strategic behaviour can be defined by systematic study organization, time management, effort, focus and sensitivity to assessment requirements. Organization of one's study and effort, as features typical for strategy approach can be connected either with a deep or surface approaches.

According to Entwistle, the general description of the processes of learning involved in a deep approach cannot apply in the same form to each subject area: "In thinking about how best to support a deep approach by students, it is important to clarify, for each subject area, and even for each topic, the processes of learning that are necessary to develop deep conceptual understanding." (Entwistle, 2009, p 37). Even though we agree with the claim that it is necessary to consider the differences between the various disciplines, we argue that it is still possible to identify common features which can be seen in the

approaches adopted by students across subject areas. Considering this issue, we agree with the opinion of Biggs and Tang, who described the situation as follows:

> *"Some people talk of students' approaches to learning as if they were learning styles that students use consistently, whatever the task or the teaching … Others speak of approaches as entirely determined by context, as if students walk into a learning situation without any preference for their way of going about learning … We take a middle position. Students do have predilections or preferences for this or that approach, but those predilections may or may not be realized in practice, depending on the teaching context. We are dealing with the interaction between personal and contextual factors …" (Biggs & Tang, 2011, pp 27-28).*

The implication of this stance is that we do not understand the approaches to learning just as characteristics of students but as features that testify about the nature of teaching and learning in study programs of departments or even the whole institutions.

Research Methods

Considering the lack of research findings on the usage of study resources and study habits of university students and since the aim was to verify if there are differences in the study habits of students in relation to their approaches to learning, a design of an exploratory quantitative survey has been adopted. The data was collected by means of two tools: Students' Approaches to Learning Inventory, a Czech version of an original British tool ASSIST (*Approaches and Study Skills Inventory for Students*, 2005) and The Use of Study Resources Questionnaire (USRQ), a tool of our own construction.

Description and Adaptation of Students' Approaches to Learning Inventory

In order to diagnose the deep, surface and strategic approach to learning, the ASSIST questionnaire was applied, originally developed at the University of Edinburgh (*Approaches and Study Skills Inventory for Students*, 2005). Throughout the years, the questionnaire has been verified and modified by the team of original authors as well as by other researchers. Its validity has been examined in many different countries and cultures (Entwistle, Tait & McCune, 2000; Diseth, 2001; Byrne, Flood & Willis, 2004; Chang, Z., Martin, V. & Tammy, S., 2008 and others). According to authors' analyses, it has become apparent that three ASSIST scales, i.e. the scale of a deep, surface and strategic approaches can provide more valid and reliable indicators than other similar instruments.

The research survey presented in this article draws on our long-term research among students of teacher education carried out since 2013, when the instrument was used in a pilot survey for the first time (Sikorová & Malach, 2014). The original questionnaire in English consisted of 52 items; a later

version with 36 items was used to adapt the tool for the Czech environment. The items are in the form of a statement and students express their agreement with them on a five-point Likert-type scale. Professional translation into Czech was arranged and then a back translation from Czech into English. The sample for the adaptation of the questionnaire consisted of students from the Faculty of Education from the University of Ostrava (n = 299). A confirmatory factor analysis (CFA) was applied on the collected data and it confirmed that originally selected factors are sufficiently saturated, except for four items A17, A19, A20, A34. Consequently, these items were not included in the final version of the questionnaire survey. After we received respondents' answers, a new questionnaire structure was again subjected to the confirmatory factor analysis. Both factor analyses were based on the method of Principal Components. The method of element rotation VARIMAX was also used in order to better interpret results from the CFA.

The result is the instrument 'Students' Approaches to Learning Inventory' with the total number of 32 items. As for the 'deep approach' scale, the value of Cronbach's alpha coefficient of reliability was $\alpha = 0.786$, for the 'surface approach' $\alpha = 0.743$ and for the 'strategic approach' $\alpha = 0.731$, which can be considered acceptable.

Description of the Use of Study Resources Questionnaire

We developed the 'Use of Study Resources Questionnaire' on the base of research literature covering the topic of study resources and habits of students. It was decided to create a new instrument because we were not aware of the existence of any complex and verified tool focused on the topic. The topical areas of the USRQ include four sections: (A) frequency of use of study resources, (B) factors influencing the choice of resources (C) ways of use, (D) procedures of working with text. These topical areas were filled with a total of 47 items of the 5-point Likert-type scale. The topical area 'frequency of use of study resources' offered respondents 12 kinds of study resources, which can be divided into four groups:

1 Published didactic texts developed primarily for teaching and learning purposes: university textbooks, course readers, study support for distance learning;
2 Academic publications: monographies, academic articles, reference books like dictionaries and encyclopaedias;

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3 Texts written by lecturers or students: lecturers' presentations, students' own notes from lectures/seminars, exam topics prepared by other students and exam topics prepared jointly;

4 Specific digital resources: webinars, video-tutorials, e-courses etc., that means instructional kinds of sources meant for learning and unverified resources freely available on the Internet.

Besides the scale items, this section of the survey includes an open item for specification of other materials too. In the 2018 study the item 'webinars, video tutorials, e-courses, etc.' was added based on students' answers in the previous studies. Concerning the didactic texts and academic publications the format did not matter – the resources could be available both in printed and in the digital forms. In the pilot version of the survey, a specific item was included with the purpose to find out the popularity of all the resources amongst students. It turned out that the frequency of answers to question related to the frequency of use and to the popularity were significantly correlated (correlation coefficient $r > 0,9$ for most of the resources). It was apparent that students did not distinguish between the questions or simply used the sources which they preferred.

The factors which can influence the choice of study resources comprise: (a) factors related to the resource itself, e.g. the match between the topics covered in the resource and the exam topics, (b) factors related to the lecturer, e.g. direct recommendation of a resource, (c) factors related to the students, e.g. mutual help with acquiring the resources, and (d) factors related to syllabus, e.g. the resource was included in the list of prescribed literature.

The section of the survey dealing with the ways in which students use the resources includes items focused on how students acquire the resources, when they use them, with how many resources they work and if they are comfortable with the printed or electronic formats. The items related to the factors influencing the choice of the resource and the usage are in the form of statements with which respondents express the degree of agreement on a 5-grade scale.

The last section of the USRQ examines what procedures students apply while working with the text itself, while learning from the text. The items contain activities of underlining text, writing notes in, writing excerpts, a creation of mind maps, scanning through the text, reading the text over and over again and printing out the electronic text. The scale examines the frequency of activities from 'never' to 'always'.

The value of reliability coefficient Cronbach alpha of this tool reached $\alpha = 0,789$.

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Research Sample

The data collection was carried out at all faculties of the University of Ostrava from December 2017 to February 2018. The questionnaires were distributed electronically by vice-deans to all students and in a paper form by lecturers to the students of Faculty of Medicine and Faculty of Education. After the elimination of incomplete questionnaires, 2,671 questionnaires were obtained, with 25.2 percent in electronic and 74.8 percent in paper form. The largest share in the research sample represented students from the Faculty of Education (n = 1127) and Faculty of Medicine (n = 882) where the number of respondents corresponded to approximately a half of the real number of students enrolled in these faculties in the given academic year. As for the Faculty of Social Studies, it was approximately 30 percent (n = 202), for Faculty of Fine Arts 20 percent (n = 90), and for Faculty of Arts (n = 161) and Faculty of Science (n = 209) about 10 percent of the real numbers of the enrolled students participated in the survey. The sample predominantly consisted of Bachelor's degree students (64.3 %), five-year Master's degree students represented 19.4 % and two-year Master's degree students 16.2 %. The sample comprised of full-time students (74 %) as well as part-time students (26 %). It included students from all years; the number of students was sharply declining with increasing years. With regards to the recommended sample size corresponding to the size of a basic sample (Chráska, 2016) in terms of validity, the minimum numbers of data needed for the samples was reached, with the exception of tests including the variable 'faculty'.

Statistical data analysis

Before the test of the hypotheses, the analyses of normality of data under consideration were carried out using the Shapiro-Wilk and Anderson-Darling procedures. The analyses revealed that the data were not normally distributed. Therefore, the Kruskal-Wallis and Mann-Whitney nonparametric tests were chosen for testing the hypotheses followed by post-hoc tests. If the zero hypothesis was rejected, the test power characteristics 1-β was set, which was demonstrable at 1-β > 0.8. Statistical processing was also supplemented by Partial Eta-Squared effect size. The effect size significance could be assessed according to an interval: small size $n^2 > 0.0099$, medium $n^2 > 0.0588$ and large effect size $n^2 > 0.1379$ (Richardson, 2011). Statistical analyses were carried out in the SPSS software version 25.

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Research Results

The study sought to answer research questions focused on the ways of using the study resources, more specifically on the circumstances of use connected with acquiring, number, time and format of the resources. Specific research questions were formulated as follows: What ways of acquiring the study resources do the students adopt? What number of resources do the students work with while preparing for a test or an exam? Do the students use the resources during the course or only just before the exam or the test? What are students' preferences concerning printed and digital resources?

The analyses aimed at the items associated to the frequency of use (see Sikorová, et al., in print) showed that students preferred resources that were directly related to the content of a given course. The most frequent resources were *students' own notes from lectures/seminars*, *presentations* developed by lecturers and *course readers* usually made by the lecturers for their own courses. In relation to these three resources, the medians reached the value of 5 on the five-point-scale from never (1) to always (5). Other very frequently used resources were *exam topics prepared by other students* and *exam topics prepared jointly* with median values of 4. 'Exam topics prepared by other students' are those which students obtain without their own contribution; they often do not even know who wrote them. Students often receive them from students in years ahead of them. 'Exam topics prepared jointly' are sets of materials created by students, often from one study group, who split all the topics assigned for an exam among themselves and then each of them prepares excerpts or summaries for a given topic or topics which are then shared.

Higher-education *textbooks* and *academic books* seemed to be less popular among students (median value 3) and sophisticate academic resources like *dictionaries*, *encyclopaedias* and *academic articles* tended to be neglected. It is worth noticing that while *unverified online sources* like Wikipedia were quite popular (45 percent of students reported using them always or often), specific digital genres like *webinars*, *e-courses or video-tutorials* were used considerably less frequently (only 16 percent used them always or often).

Ways of Acquiring Resources

Statements related to the ways of acquiring resources and the descriptive data connected to them are presented in Table 1. The central values – means and medians – presented in Tables 1 to 4 are related to the five-point scale: (1) strongly disagree, (2) somewhat disagree, (3) neither agree nor disagree, (4) somewhat agree, (5) strongly agree.

Two items referred to the issue of purchasing study literature. High values of standard deviations indicate that there were significant differences between students. The first item examined if students purchased academic literature at all. Numbers of respondents who either strongly agreed or somewhat agreed with the sentence “I have abandoned the purchase of study literature in the age of the Internet” and those who strongly disagreed or somewhat disagreed with it were rather equal – specifically 43 percent expressed agreement and 45 disagreed. With the inverse statement "I always buy recommended literature" 22 percent of respondents agreed and 67 percent disagreed. The results indicate that *less than half of all the students purchased literature at least sometimes* and over 40 percent of students apparently purchased the literature rarely or never.

Statement	Mean	Median	SD
I have abandoned the purchase of study literature in the age of the Internet.	3.00	3	1.45
I always buy the recommended literature.	2.26	2	1.28
I borrow the recommended literature in the library as soon as possible.	2.77	3	1.34
I rarely visit the library, usually, I try to get literature from the Internet.	2.57	2	1.41
If I had to borrow the literature in the library, I would prefer to use a worse resource which I have at my disposal.	1.92	2	1.16

Table 1. Ways of acquiring study resources by students
Notes: SD – standard deviation

Regarding the issue of lending resources in the library, more than 30 percent agreed with the statement that they rarely visited the library, compared to almost 60 percent who did not agree with the statement. At the same time, 35 percent of students agreed that they borrowed the recommended literature in the library as soon as possible. The data imply that *about one third of students did not visit the library at all* and on the contrary, about *one third of the students borrow the resources recommended by the lecturer as soon as possible*. There is also a group of students which cannot be overlooked (13 percent) who agreed – strongly or somewhat – with the statement that if they had to go to the library, they would have settled with a worse resource which they had at their disposal.

Number of Resources with which Students Worked

In a formal description of each university course, the mandatory and recommended or supplementary resources are enumerated. It is advised that the list of mandatory resources should not overcome five basic items while the list of recommended literature is usually much longer. The data on the students’ responses to the items examining the usual number of resources they need to prepare for an exam or test are presented in Table 2.

Statement	Mean	Median	SD

I think that one or two good resources are enough to learn from when preparing for a test or an exam.	3.82	4	1.11
While learning to prepare for a test or an exam I need to have more resources at my disposal to look into.	3.17	3	1.24

Table 2. Number of study resources which students need to learn from when preparing for a test or an exam
Notes: SD – standard deviation

We considered these statements to be contradictory, but the results tell us that respondents did not have to perceive it the same way. The correlation between the answers was rather high (Pearson's correlation coefficient r = 0,408). Almost 70 percent of respondents agreed with the statement that one or two resources are sufficient for preparation. On the other hand, 46 percent agreed with the fact that they need to have more resources at their disposal while learning, compared to 36 percent of respondents who disagreed. The responses imply that there was *more than one third of students who regarded one or two resources as a sufficient number*. The others either worked with more study resources or studied from one or two basic materials and had other supplementary ones at their disposal in case of need.

Time of the Resource Use

The items in the next section of the survey sought to examine the time-wise circumstances of the use of study resources, i.e. when the students worked with the resources. The results are covered in Table 3.

Statement	Mean	Median	SD
I use the study literature almost exclusively when learning for an exam or a test at the end of the course.	3.50	4	1.26
I work with the literature during the whole course.	3.13	3	1.30

Table 3. Time of the resource use
Notes: SD – standard deviation

Sixty percent of respondents 'strongly' or 'somewhat' agreed with the statement that they use literature almost exclusively to prepare for a test or an exam, while 25 percent chose the maximum value on the scale. In congruence with this, 46 percent of students confirmed that they worked with the study literature during the whole course, but only 16 percent chose the 'strongly agree' variant.

Preferences of resource format

From the viewpoint of resources format, students seem to have preferred studying from printed materials over studying from digital resources quite unambiguously. That finding certainly does not mean that they did not work with digital materials, but for learning from text they preferred the printed ones. The descriptive data are presented in Table 4.

Statement	Mean	Median	SD
I like learning from the printed texts.	4.50	5	0.89
I like learning from the electronic texts.	2.40	2	1.34

Table 4. Preferences of the resource format
Notes: SD – standard deviation

Almost 90 percent of respondents agreed that they liked learning from printed materials and at the same time *26 percent* agreed that they liked learning from electronic sources (they chose values of 4 and 5 on the scale). The correlation between the answers reached the value of Spearman's coefficient of sequential correlation ρ = (- 0,365). Based on this data, it is obvious that the fact that some students like learning from printed resources does not necessarily have to mean that they do not like learning from electronic ones and vice versa. Still, in the group of students who chose the maximum degree of agreement (5) with the statement "I like learning from the printed texts" there were three fourths of those who chose maximum or partial disagreement (1 and 2) with the statement "I like learning from the electronic texts."

Ways of Using the Resources in Relation to Approaches to Learning

One of the major aims of the survey was to verify the hypothesis about the relationship between study habits of students concerning the use of study resources and their approaches to learning. For the purpose of testing this hypothesis the five-point scales have been reduced to three-point scales in order to identify three categories of respondents: students who expressed disagreement with the statement (values 1 and 2 on five-point scale), students with neutral opinion and students who expressed agreement (values 4 and 5 on five-point scale). The hypotheses were formulated as follows:

H: There is a relationship between the rate of deep/surface/strategic approach to learning and the ways in which students use the study resources.

H1: There is a relationship between the rate of deep/surface/strategic approach to learning and the ways in which students acquire study resources.

H2: There is a relationship between the rate of deep/surface/strategic approach to learning and the number of study resources they use to prepare.

H3: There is a relationship between the rate of deep/surface/strategic approach to learning and time-wise circumstances of the resource use.

H4: There is a relationship between the rate of deep/surface/strategic approach to learning and preferences of the format of study resources.

The factual hypotheses have been transformed into statistical hypotheses then and tested using Kruskal-Wallis test and then post-hoc tests (Mann-Whitney U test) to verify the differences between groups.

Ways of Acquiring Resources in Relation to Approaches to Learning

The factual hypothesis H1 aimed at the relationship between student's approach to learning and ways of acquiring resources has been operationalized into statistical hypothesis H1a: There are statistically significant differences in the rate of deep/surface/strategic approach to learning between the groups of students who expressed positive, neutral or negative opinion about statements regarding the ways of acquiring resources. The results showed that students who visited the library more in the beginning of the course and purchased the recommended literature more often reached higher rates both on the scale of deep learning and on the scale of strategic approach (see Table 5). Students who did not visit the library and tried to get the literature from the Internet more often and at the same time agreed that they would settle with a worse source if they had to go to the library showed lower rates of deep and strategic approaches and at the same time higher rate on the scale of surface approach.

Ways of acquiring resources	Deep approach		Surface approach		Strategic approach	
	η^2	t	η^2	t	η^2	t
I have abandoned the purchase of study literature in the age of the Internet.	0,01	a	0,02	a	0,01	a
I always purchase the recommended literature.	0,02	(+)	x		0,01	(+)
I borrow the recommended literature as soon as possible.	**0,03**	(+)	0,01	(-)	**0,04**	(+)
I visit the library rarely; I usually try to get the literature from the Internet.	0,02	(-)	**0,03**	(+)	0,01	(-)
If I had to borrow the literature in the library, I would prefer to use a worse resource which I have at my disposal.	0,02	(-)	**0,03**	(+)	0,01	(-)

Table 5. Ways of acquiring resources in relation to approaches to learning
Notes: η^2 – size effect (Partial Eta-Squared), x – statistically significant relationship was not proved; t – tendency to increasing or decreasing values on the scale, proven with post-hoc tests, while (+) means that with a higher rate of agreement the rate on the scale of approach increases; (-) means that with a higher rate of agreement the rate on scale of approach decreases.; a – data did not show any apparent tendency.

Number of Resources in Relation to Approaches to Learning

Statistical hypothesis H2a has been formulated as follows: There are statistically significant differences in the rate of deep/surface/strategic approach to learning between the groups of students who expressed positive, neutral or negative opinion about statements regarding the number of resources that they worked with. The statistical tests suggested that one or two sources for preparation for a test or an exam more often sufficed for students with a higher rate of surface approach (see Table 6). On the contrary, students with a higher rate of deep and strategic approaches more often needed to use more resources, while students with a higher rate of surface approach needed more resources less often.

To sum up, the results confirmed rather evident differences between students with a deep approach, who needed to have more resources at their disposal and students with a surface approach who settled with one or two basic materials.

Number of resources	Deep approach		Surface approach		Strategic approach	
	η^2	t	η^2	t	η^2	t
I think that one or two good resources are enough to prepare for a test or an exam.	0,02	(-)	**0,05**	(+)	0,01	a
While learning I need to have more resources at my disposal to look into.	**0,06**	(+)	**0,04**	(-)	0,02	(+)

Table 6. Number of resources in relation to the learning approach
Notes: see Table 5.

Time of the Resource Use in Relation to Approaches to Learning

Statistical hypothesis H3a focused on the differences in time of use: There are statistically significant differences in the rate of deep/surface/strategic approach to learning between the groups of students who expressed positive, neutral or negative opinions about statements regarding the time-wise circumstances of using the resources. Students who worked more with resources during the whole course achieved higher rates on the scale of the deep approach (see Table 7). These findings were confirmed by analysis related to surface approach. Students who used the resources almost exclusively while preparing for an exam or a test showed higher rates of surface approach and at the same time lower rates of deep approach. The size effects reached rather high values, which proves more significant differences between the groups.

Resource usage duration	Deep approach		Surface approach		Strategic approach	
	η^2	t	η^2	t	η^2	t
I use to study literature almost exclusively only when preparing for an exam or a test.	0,03	(-)	**0,07**	(+)	0,04	(-)
I work with literature during the whole course	**0,05**	(+)	0,04	(-)	**0,08**	(+)

Table 7. Time of resources use in relation to the approach to learning
Notes: see Table 5.

Preferences of Resource Format in Relation to Approaches to Learning

Statistical hypothesis H4a concerned the preferences of printed vs digital resources: There are statistically significant differences in the rate of deep/surface/strategic approach to learning between the groups of students who expressed a positive, neutral or negative opinion about statements regarding the resource format preferences.

In relation to the issue of printed and digital resources, the conclusion was drawn that there were no differences between format preferences and approach to learning (see Table 8). Even though Kruskal-

Wallis tests suggested that there were differences between the groups of students with various rates of surface approach regarding the statement "I like learning from electronic texts", the value of test statistics was rather low (H = 21,284) and the same applies for the size effects.

Format preferences	Deep approach		Surface approach		Strategic approach	
	η^2	t	η^2	t	η^2	t
I like learning from the printed texts.	x		x		0,01	a
I like learning from electronic texts.	0,01	a	0,02	(-)	x	

Table 8. Format preferences of resources in relation to the learning approach
Notes: see Table 5.

To summarize the findings concerning hypothesis H1, it can be concluded that there was a statistically significant relationship between the deep/surface/strategic approach to learning on one hand and ways of acquiring resources, number of required resources and time of the resource use on the other. Hypothesis H1, H2, and H3 are considered to be adopted. On the contrary, hypothesis H4 concerning the relationship between the approach to learning and preference of the format of resources used for learning purposes was rejected.

Conclusions and Discussion

The research study sought to answer the question: what are the study habits of university students in relation to the use of study resources? In the article, the results are presented concerning the ways university students use study resources, specifically in which ways they acquire the resources, with how many of them they work while preparing for an exam or a test, if they work with the resources during the whole course, and if they like learning from printed or digital resources. At the same time, the hypothesis was verified if there was a relationship between the ways of using the resources and students' approaches to learning.

Regarding the ways of acquiring the resources, a great variability was characteristic for answers about purchasing and borrowing the resources from the library. For instance, one third of students did not visit the library and at the same time, about one third of students claimed that they borrowed the recommended resources as soon as possible. Less than half of the students at least sometimes purchased study literature, however over forty percent of students apparently purchased the books or other resources never or rarely. The question arises as to whether it is the matter of finances. Further analyses suggest against it. Out of the total number of students who "did not purchase" (chose variants of answers

strongly/somewhat disagree) more than seventy percent did not borrow resources from the library either. It seems that these students either downloaded the study resources from the university LMS or from the Internet in general or they received them from their classmates.

Almost seventy percent of respondents agreed that one or two resources were sufficient for preparation for an exam or a test. On the other hand, only thirty-six percent of students disagreed with the statement that more resources were needed. We argue that explanation of the seeming discrepancy might lie in the fact that only a part of the students who chose to agree with the statement that one or two resources are enough, actually uses only them. Others probably work with one or two key resources, but often may have other, supplementary resources at hand. The issue is related to the notion of *resource centrality* (see Horsley & Huntly, 2011), which reflects the perceived importance of the resource for the successful accomplishment of the course. It means that the list of prescribed literature may include key, supplementary and marginal resources. The issue was not covered in the final version of the USRQ questionnaire, but it was originally part of the pilot version of the tool. However, the respondents in the pilot survey answered the questions aimed at frequency of use and at the importance of specific resources almost in the same way. It will be very useful to examine the importance of different kinds of resources, however, general questions seemed to be confusing for the respondents, the experience showed it was necessary to relate the questions to specific courses.

More than half of students confirmed that they used the study resources almost exclusively while preparing for an exam or a test. On the contrary, about forty percent agreed that they used the literature during the whole course. Unfortunately, there are only a few data available so far on the nature of teaching and lecturers' requirements regarding the resource use. So, we could not decide if it was the issue of the students not meeting the requirements or the lecturers not demanding the continuous work from students. The results imply that more research is needed comparing reports both from students and lecturers.

These findings are in concordance with results of other research studies which identified similar student behaviour: the students did not prepare for lectures continuously, even though it was expected from them (e.g. Berry et al., 2011; Pecorari et al., 2012, Carney et al., 2008; Vandsburger & Duncan-Daston, 2011; Juban & Burnthorne Lopez, 2013). Horsley, Knight and Huntly (2010), Berry et al. (2011) and others, came to the conclusion that students adapt their learning strategies to resources available,

they try to quickly and effectively acquire the knowledge needed for successful accomplishment of the exam or the test with obvious strategic stress on what is going to be assessed.

The items aimed at learning from printed and digital resources were not formulated as preferences but as liking purposely, because we did not want to present the two formats as opposites. However, it is obvious that respondents unambiguously preferred learning from printed materials over learning from digital resources. That certainly does not mean that students do not work with digital materials, but if they can choose, they prefer learning from printed ones. The conclusion about the students' preference for printed resources fully corresponds with the results of other research studies (e.g. McGowan, Stephens & West, 2009; Jhangiani, Dastur & Le Grand, 2018; Woody, Daniel & Baker, 2010). A recent comparative survey conducted in 21 different countries worldwide came to the same conclusion: almost eighty percent of all the students preferred learning from printed materials (Mizrachi, et al., 2018). Nevertheless, much more research is needed to find out the reasons for the preferences.

The verification of hypothesis on the relation between the ways resources are used and approaches to learning resulted in a conclusion about differences in study habits. To summarize the results, the analyses suggested that the students with higher rates of deep approach to learning tended to purchase the study literature and visit the library more frequently, they needed more resources at hand when learning and they used the resources throughout their courses more often. On the other hand, the students with higher rates of surface approach had less of a tendency to purchase the literature or to borrow it form the library, they settled with one or two resources and used the resources solely at the end of the courses more often.

More research on the issue is needed but the implication for university teaching may be as follows: prompt students to acquire study habits connected with the deep approach and thus reversely support developing it. The approaches to learning are not unchangeable (see Biggs & Tang, 2011), we believe they can be supported or supressed by different ways of teaching. It remains an unsolved issue, however, that the desirable behaviour related to the resource use may be the manifestation of deep as well as strategic approaches to learning (see Tables 5–8). If the students with attributes typical for surface approach apply strategic behaviour consistently, they can be successful even with university education (Entwistle, 2009). We suggest that the possible solution may lie in the assessment. It seems that contemporary higher education students mostly learn what is assessed (Horsley, Knight & Huntly, 2010),

therefore the evaluation methods and criteria should focus on deep understanding, i.e. seeking the meaning, relating ideas, application of the knowledge, looking for evidence and reasoning.

The questionnaire-based studies have well-known drawbacks, but the reported study provided a lot of valuable data on the use of study resources at the university and even more ideas for further research. Currently, the data of the follow-up qualitative study based on deep interviews with students from different universities are being processed and analyzed. Teaching and learning resources in higher education account for a new research field, especially from the viewpoint of educational science. So far, little is known about the nature and quality of the resources, much less about their impact on students' learning. It is necessary to develop theoretical background for the studies gradually, based on the research cooperation of experts from different fields, especially from educational science, educational technology, educational psychology, media studies and possibly others.

Special Thanks

This research was supported by a research grant from the University of Ostrava "Institutional development projects – Perspective Research Themes of the University of Ostrava".

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