



The impact of components of information literacy on student success in higher education¹

Vpliv komponent informacijske pismenosti na učni uspeh študentov v visokem šolstvu

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Abstract

Purpose: Student proficiency in information literacy (IL) is one of key competences for their independence, critical selection of information sources, implementation of new information, and the ethical use of information sources on their way to professional development. The study researched the influence of information literacy on student success in higher education.

Methodology/approach: The study is based on a sample of 197 regular undergraduate students, and the results were analyzed by using the multiple regression analysis.

Results: The results show that proficiency in searching for information sources positively influences students' success. Within the component Search, the influence of effective search procedures and the ability to master bibliographic sources on students' success were measured.

Research limitation: The study was limited to four components of IL (Theoretical knowledge, Search, Evaluation and Use of information), and the sample included students of economic and business sciences.

¹ With the experimental study of evaluation components of information literacy (Petermanec & Šebjan, 2017) we investigated and evaluated the key components for the program of IL. In the next step in this article we present how these key components could affect student study success.

Originality/practical implications: It was concluded that information literacy should be an integral part of the ongoing learning process and its effects should be constantly tested and improved.

Keywords: *components of information literacy, learning outcomes, students, education system, learning*

Izveleček

Namen: Obvladovanje informacijske pismenosti pri študentih je ena ključnih kompetenc za njihovo samostojnost, kritičnost pri izbiri virov, za implementacijo novih informacij v obstoječe znanje in za etično uporabo virov na poti do kariere. V članku bomo izpostavili, kako obvladovanje štirih komponent informacijske pismenosti vpliva na učni uspeh študentov in kako pomembna je le-ta za njihov profesionalni razvoj.

Metodologija/pristop: Študija temelji na vzorcu 197 dodiplomskih študentov. Rezultate raziskave smo analizirali z multiplo regresijsko analizo.

Rezultati/analiza: Raziskava je pokazala, da je komponenta »iskanje virov« najbolj izrazita, pri čemer pozitivno vpliva na uspešnost študentov.

Omejitve raziskave: V raziskavi smo se omejili na štiri komponente informacijske pismenosti (teoretično znanje, prepoznavanje potreb po informacijah, iskanje informacij in vrednotenje ter uporaba informacij).

Izvirnost/uporabnost raziskave: Zaradi pozitivnih učinkov informacijske pismenosti, mora le-ta postati integralni del učnega procesa, njene učinke pa je treba stalno preverjati in jih izboljševati.

Ključne besede: *komponente informacijske pismenosti, učni izidi, študenti, izobraževalni sistem, učenje*

1 Introduction

Information literacy (IL) research is not a new field, but it is a field that provides answers to important questions about the success of information literacy performance in the educational process currently supported by the European commission (2014). Advanced information technologies are changing our lives and our work habits (Kuhlthau, 2015). Information literacy is the ability to know when information is needed in any context, and to recognise and evaluate potential sources needed to find the information. An information literate person knows how to search for information efficiently, how to retrieve, interpret and understand it, and how to integrate it into their existing knowledge. All of these abilities are a necessary outcome of the teaching process, in which students should take an active part (ACRL, 2000).

Proficiency in IL is of great importance today, with easy access to information granted by information technology. A wide range of sources accessible via different search engines has resulted in oversaturation and uncritical use of information (Breivik & Gee, 1989). Students want to solve their study and research problems as quickly and easily as possible, but if they are not interested whether the information found has been checked and suitable, their research efforts will have been wasted. Many studies have researched IL proficiency within the study process, but none have shown a long-term effect on study and career success (Boh Podgornik, Dolničar, Šorgo, & Bartol, 2016).

Even though many researchers stress the numerous benefits of IL for all participants in the educational system and that integration of information literacy instruction is the key to successful student learning (Chen & Lin, 2011; Lindstrom & Shonrock, 2006), there are still questions about the influence of IL on student success. Some researchers have examined the relationship between student success and IL proficiency and their cooperation with professors, librarians and the use of libraries, the Internet and different information. Many propose numerous activities for IL improvement (such as encouraging librarian training and packaging information literacy content) but little has been done to evaluate what impact they will have on student success (Jackson, 2007). They have tested student success as proficiency in IL components but not the influence of IL component proficiency on study success (Samson, 2010; Saunders, 2012; Soria, Fransen, & Nackerud, 2013; Xiao, 2010). The problem is that with one-time IL component testing, we cannot determine their effect on student learning outcomes. With the help of IL, we want to achieve better study results through the whole educational process (Detlor, Julien, Willson, Serenko, & Lavalley, 2011). It is not enough to assume that we know the benefits of IL; it is essential to know the effects of IL on student success after studies are finished and later on in their careers (D'Angelo & Maid, 2004; Meyer, 1999). The aim of our study is therefore to examine all of the IL components and evaluate their influence on student success. The research questions are therefore: does an IL programme significantly influence student success and which IL competences affect their success? This is important for developers of education system programmes, and for participants in governmental and educational institutions.

The theoretical part of this paper examines IL components and evaluates their influence on success in the educational system. The second section presents the methodology of the study. The third part presents results, discussion and conclusions.

2 Theoretical review

2.1 Information literacy components

The most important IL components, according to the most established models like SCONUL (Society of College, National and University Libraries), the model by Bruce (1997), Big6 (Eisenberg, Lowe, & Spitzer, 2004) and the Association of College and Research Libraries (ACRL) standards (Johnston & Webber, 2003) are acknowledgment or awareness of information needs, including the searching for and access to information, evaluation and use/application, as well as expertise regarding the rules and ethical norms for its use. Critical thinking skills are applicable across disciplines, and that critical thinking ability, coupled with information seeking skills, is an essential component of IL (Anderson & May, 2010). Definitions of IL components in the digital era are based on the American Library Association (ALA) standard (ALA, 2000), which includes the following components: *define* the needs, problem and question; *find* locate, access, and retrieve information; *evaluate* the credibility, currency, reliability, validity, and appropriateness of the information retrieved; *communicate* the information legally and ethically using a variety of channels directed at a range of audiences (Wilson, 2014). Varga & Egervari (2014) introduced a model with seven components of IL: definition of information need, definition of relevant information resources, localization of information, selection of relevant information, investigation of information from different aspects, processing information and management of information.

Detlor et al. (2011) and Detlor, Booker, Serrenko, & Julien (2012) studied student IL with the following IL components: developing a research strategy; finding and selecting tools; searching, using, finding tool features; retrieving sources; evaluating sources; documenting sources; and understanding economic, legal and social issues, where IL competences such as the amount of active instruction, the amount of passive instruction and the total amount of instruction were designated. Bundy (2004) classified the components of IL into four categories (generic, parallel, integrated and embedded) and found that the most effective use of these components is the embedding of information literacy throughout the curriculum. Katz (2007) studied IL components in secondary schools from an information and communication technology (ICT) point of view and determined that the results of his study reflected poor ICT literacy performance not only by students within one institution, but in all participating high schools. Kurbanoglu, Akkoyunlu and Umay (2006) developed an information literacy self-efficacy scale that includes three key components of IL: the first IL component includes defining, selecting, interpreting, communicating information and learning from experience, and it is labelled as intermediate information literacy skill; the second component

was labelled as basic information literacy skills; and the third component was labelled as advanced information literacy skill. Chu, Tse and Chow (2011) examined proficiency in IL components on the basis of project-based learning (PjBL), regarding the level of information search knowledge and skills both before and after the inquiry of the PjBL project. They found that this kind of programme has a positive impact on the development of different dimensions of the student information literacy and IT skills, but could determine no concrete effects on student study success.

Among all of the components of information literacy, Lenox and Walker (1993) emphasized the dimension of analytical and critical competences while formulating a research question, and the evaluation of search results. They point out that an information literate person must have analytical and critical competences so s/he can formulate a research question and evaluate the results and search for different ways to access various types of information that satisfy her/his information needs. The American and Australian IL standards define the importance of this competence in a similar way (Bundy, 2004).

Knapp (1966), McCrank (1992) and Kuhlthau (1993) defined the basic education of an information literate person as the development of their competences and skills. Competences are, from the IL point of view, an individual's abilities to use knowledge and abilities for the successful and efficient completion of a certain task or job. They include skills, talents, personal and behavioural characteristics, concepts, beliefs, values, and self-image, all of which are required for work, professional and personal success.

2.2 Information literacy and student success

The standards published in *Characteristics of excellence in higher education* (Middle States ..., 2002) claim that IL is a strategy that will improve study habits of every student in any discipline and assist him/her in lifelong learning (Snively & Cooper, 1997). The basic purpose of education, in this view, is to achieve functional literacy using information and communication technology, which is an important step towards understanding the concept of IL (Bawden, 2001; Behrens, 1994; Doyle, 1992).

The American Library Association (ALA, 1989) summed up the best practices of IL in higher education in their guidelines: the mission of IL must be coordinated with the mission of the home institution. It clearly defines the input and expected results and establishes a basis for lifelong learning. An IL programme includes measurable criteria for evaluation based on pedagogical experience. The

implementation of IL in the curricula for all study years is formalised and clearly defined. IL programme planning of IT development and library services development is based on past knowledge of the students and their experience and defines contents, programmes or courses for IL teaching, taking into account different study levels and actively integrating different partners (students, teachers, librarians, IT specialists etc.), who exchange their teaching and evaluating experiences and are constantly refining the process of further education. A faculty supports IL by providing financial means and cooperation of the participants in IL, which is a concern of the entire institution and not only of its library (Kasowitz-Scheer & Pasqualoni, 2002). IL stresses student oriented learning that assures an upgrade of information proficiency throughout the whole study period. Effective IL programmes can provide a competitive advantage for academic institutions, for their graduates are better qualified for future employment. These programmes must be prepared on the basis of student needs analysis. It is also important to ask the following questions while preparing IL programmes: why do students need to find information; how can they find the information, and what do they have to know in order to use the information successfully (Kardoš, 2002). Ragains (2013) states that “applied critical thinking and fluency with information technology (two essential components of information literacy) can improve student academic success.” Based on the theoretical principles, the following hypothesis is offered:

Hypothesis: Components of IL have positive impact on student study success.

3 Methodology of research

3.1 Sample of research

Our study included 197 regular undergraduate students who were enrolled in the second year of the university programme in economics. Execution time of the experiment was important, because this study is related to the ultimate success of students and their final grades at graduation, so the study continued throughout 2013, when these students were finishing their studies. 153 students participated both in the initial at the beginning of IL programme and in the final test after finish the IL course. In 2015, we checked students’ success at the end of their studies.

3.2 Instrument and procedures²

The experimental study based on two groups, the experimental group (EG) and the control group (CG) where it was checked the level of information literacy in both groups before the experiment. In the study were included students by the subject “Basics of Marketing” at the University of Maribor Faculty of Economics and Business during 26 regular teaching hours and 13 meetings. With 80 % guaranteed attendance, only the tests of participants who took the test twice were counted. The tests were carried out in both groups before the beginning of the information literacy training programme and after its end. Each test was taken individually and interactively (each student at his/her own computer with access to the web catalogue COBISS/OPAC, the Internet, and e-resources accessible at the University of Maribor, Slovenia).

The experiment was executed within the regular teaching process in 10 hours of lectures and 10 hours of interactive exercises for both groups (EG and CG). The test consisted of 40 questions with the highest possible score of 100 points. Individual test parts consisted of a different number of questions covering 4 IL segments, 18 questions dealing with *Theoretical knowledge*, and 15 questions with different *Search* types in different media and different sources. Two questions were used to define *Evaluation* and five for *Use of information*. The assessment of the test was adjusted to the needs of this experiment. The credit points for individual answers in the test were graded on a scale from 1 to 5 regarding the difficulty or scope of the possible answers. Before awarding points, we checked the frequency of the correct answers that gave us the basis for defining the difficulty of the questions. In addition to the experimenters, two independent assessors, experienced librarians who work with information literacy on a daily basis, also graded the test. At the end, we converted the number of collected points into a mark that was considered by the teacher when giving the final exam grade.

We created IL programme with components defined by ACRL (knowledge, search, evaluation and use of information). The efficiency of the programme was checked using quantitative techniques of the Christina Tovote Questionnaire – information literacy study (2004), which was adapted for the needs of Slovenian students. In designing the individual segments, we took into consideration the dimensions of IL defined by Gawith (2000): cognitive competence (knowledge, evaluation); technological literacy (use and ICT-competences) and library literacy (search). The knowledge test for information literacy consisted of 40 questionnaires, which covered all four components of IL:

² The description of procedure is connected with the study (Petermanec & Šebjan, 2017) which based on development of the program of IL.

- *Theoretical knowledge* based on an introduction to the characteristics of business and economic literature; understanding the importance of economic journals and their methods of information dissemination; systematic organization of information; formulating a clearly focused question for problem solving; structure, methodology and functioning of scientific work; modalities of critical appraisal of scientific papers; introduction to available databases.
- *Search* based on understanding effective searching techniques and how to find high-quality evidence-based information.
- *Evaluation* based on recognizing credible sources of business information, the importance of different bibliometric indicators.
- *Use of information* based on prudent use of information for the benefit for students and for others. Subject of personal relation towards information and assessment of its ethical use. How to choose the right library type and the appropriate resources, using various presentation techniques and use of references and citation tools.

Measuring scales in the questionnaire were translated from English in the Slovenian language. Student success was measured by the average grade (from 1-insufficient to 10-excellent), which students achieved at the end of the study. After the studies were finished, we combined the results of their IL components proficiency with their final average grade.

3.3 Analysis

A multiple regression analysis was used to test the hypothesis. The dependent variable in the conceptual model is based on student success; independent variables are components of IL (*Theoretical knowledge, Search, Evaluation and Use of information*). For the analysis of IL components effect on student success, partial regression coefficients and statistical significance analysis on the level $p < 0.05$ were used. F-statistics and the statistical significance of regression model on the level $p < 0.05$, correlation coefficient R and adjusted R^2 were also tested. The SPSS 21 (“Statistical Package for Social Sciences”) was used to process the data.

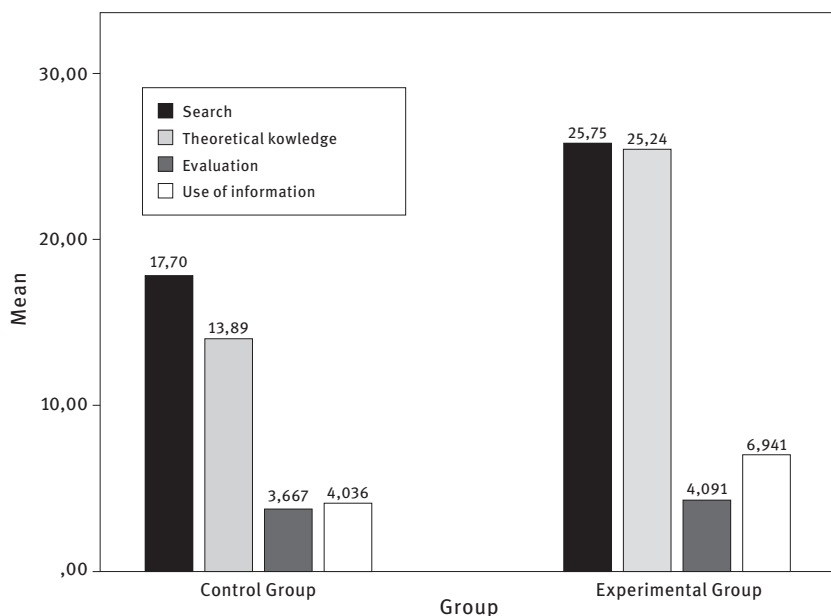
4 Results

Our analysis was carried out in four phases. In the first, the influence of the IL programme on proficiency in IL components for CG and EG was determined. Picture 1 shows the results of all IL components in the final testing of both CG and EG groups after the programme. All components except *Search* are not normally

divided on the $p < 0.001$ level, which was shown by the normality test (Kolmogorov-Smirnov test and Shapiro-Wilk test). The normality test showed that the *Search* component is similar to the normal division on the $p > 0.05$ level; we used a parametric test to determine statistical differences in average IL results between CG and EG and the nonparametric test for all other components. For the *Search* component we found that there are statistically significant differences in average end results on the $p < 0.001$ ($M_{CG} = 17.70$; $M_{EG} = 25.75$) level. A nonparametric t-test for two independent samples of other IL components (*Evaluation*, *Theoretical knowledge*, and *Use of information*) shows statistically significant differences in average value ranges. For the components *Theoretical knowledge* ($M_{CG} = 13.89$; $M_{EG} = 25.24$) and *Use of information* ($M_{CG} = 3.67$; $M_{EG} = 4.09$), statistically significant differences exist on the level $p < 0.001$; for the component *Evaluation* ($M_{CG} = 4.04$; $M_{EG} = 6.94$) they exist on the level $p < 0.05$.

On the basis of the end testing results, we conclude that the IL programme played an important role in promoting IL skills. Comparing both groups (CG and EG), we can see essential differences: the students who completed the IL programme (EG) achieved significantly better end scores in mastering all IL components.

The results of regression analysis were examined to determine whether proficiency in IL components has a significant influence on student learning success.



Picture 1: Final test results for each IL component.

The second phase tried to determine how the final IL test results for both groups influenced students' final success. The results in Table 1 show that the joint IL result positively and statistically significantly influences study success. When comparing the results of the regression analysis for both, the EG and the CG, we found that EG IL results influence student success more than CG results. The regression models are statistically significant on the level $p < 0.05$ and $p < 0.001$. The values of VIF for both regression models are 1, confirming that collinearity is not a problem for these models (Field, 2009).

Table 1. Results of multiple regression analysis for CG and EG (dependent variable: student average grade).

Variables	B	Beta	S.E.	t-value	VIF
(Constant)	6.720	(-)	0.395	17.029	(-)
Result of test IL for CG	0.023	0.349*	0.010	2.355	1.000
R = 0.349, R ² = 0.122, S.E. = 0.483, F _(1,40) = 5.546, $p < 0.05$					
(Constant)	6.373	(-)	0.232	27.441	(-)
Result of test IL for EG	0.019	0.447***	0.004	5.215	1.000
R = 0.447, R ² = 0.200, S.E. = 0.411, F _(1,109) = 27.198, $p < 0.001$					

Notes: * $p < 0.05$, *** $p < 0.001$; CG – control group; EG – experimental group; VIF – variance inflation factor; S.E. – standard error

The t-test outcome for differences in correlations shows that there is a statistically significant difference between the joint IL test result and student final success between EG and CG on the $p < 0.001$ level.

In the third step, we analysed the effect of IL components on the average student grade for EG. Table 1 summarizes the statistics of the average number of points achieved in the total sample surveys for individual components of information literacy and average value of student grade. Table 2 shows that students achieved the best test results in the field of *Search* ($M = 25.71$, $SD = 5.197$), followed by *Theoretical knowledge* ($M = 25.24$, $SD = 4.750$), and *Use of information* ($M = 6.94$, $SD = 2.282$). The students achieved the lowest number of points in terms of *Evaluation* ($M = 4.10$, $SD = 1.243$). The correlation matrix in Table 2 indicates a medium strong correlation between *Theoretical knowledge* and *Search* ($r = 0.546$, $p < 0.01$), and between *Theoretical knowledge* and *Use of information* ($r = 0.533$, $p < 0.01$). At the same time, we found a weak statistically significant link between *Use of information* and the average grade ($r = 0.247$, $p < 0.01$), and between the *Use of evaluation* and the average grade ($r = 0.203$, $p < 0.05$).

Table 2. Descriptive statistics and correlation matrix for EG.

Variables	1	2	3	4	5
1. Average note	1.000				
2. Search	0.415**	1.000			
3. Theoretical knowledge	0.352**	0.546**	1.000		
4. Evaluation	0.203*	0.331**	0.370**	1.000	
5. Use of information	0.247**	0.292**	0.533**	0.266**	1.000
Mean	7.57	25.71	25.24	4.10	6.94
±SD	0.458	5.197	4.750	1.243	2.282

Notes: * $p < 0.05$, ** $p < 0.01$, SD – standard deviation

Table 3 presents the results of multiple regression analysis for EG. The multiple regression model is statistically significant on the level $p < 0.001$. The regression model explained 16.8 percent of the variation in the dependent variable, student success, as indicated by the adjusted R^2 value. The Variance Inflation Factor (VIF) measures the impact of collinearity among the variables in a regression model. The VIF values ranged from 1.205 to 1.875, providing confidence that the regression model results were not affected by collinearity. The average VIF (1.477) is close to 1 and this confirms that collinearity is not a problem for this model. We determined that only the *Search* component has a statistically significant and positive effect on student success ($\beta=0.304$, $p < 0.01$). Other components (*Theoretical knowledge*, *Evaluation* and *Use of information*) in the conceptual research model do not statistically significantly affect student success. The positive feature of these results shows that students with more searching skills will be more successful in their studies. The multiple regression analysis results partly support the hypothesis.

Table 3. Results of multiple regression analysis for EG (dependent variable: student average grade).

Variables	B	Beta	S.E.	t-value	VIF
(Constant)	6.339	(-)	0.241	26.590	(-)
Search	0.027	0.304**	0.009	2.865	1.417
Theoretical knowledge	0.012	0.130 ^{n.s.}	0.012	1.084	1.875
Evaluation	0.014	0.039 ^{n.s.}	0.035	0.407	1.205
Use of information	0.016	0.080 ^{n.s.}	0.021	0.770	1.409

$R = 0.446$, adj. $R^2 = 0.168$, S.E. = 0.417, $F_{(4,105)} = 6.501$, $p < 0.001$

Notes: ** $p < 0.01$, n.s. – non significant; S.E. – standard error; VIF – variance inflation factor

In the last phase, we checked which skills within the *Search* component affect student final success. The multiple regression results for EG are presented in Table 4. Appendix A presents questions regarding the sources search. The multiple regression model is statistically significant on the $p < 0.01$ level. The average VIF

(1.350) is close to 1 and this confirms that collinearity is not a problem for this model. It explains the 17.6% of the whole variable. Four search skills (S1 – the best ways of searching articles in journals on service marketing (OPAC, databases, the Internet, printed journals, other); S4 – checking an article’s availability in the union catalogue according to the author and journal title; S10 – citing the bibliographic data of an article in a specific journal (volume, year, pages) and the journal’s accessibility in libraries, and S15 – checking the records of articles on the theme: knowledge management and evaluation in enterprise in OPAC) affect student final success on the $p < 0.05$ statistically significant level. The analysis shows that other skills within the IL component *Search* do not statistically significantly affect student final success.

Table 4. Results of multiple regression analysis for EG (dependent variable: student average grade).

Variables	B	Beta	S.E.	t-value	VIF
(Constant)	6.680	(-)	0.301	22.213	(-)
S1	0.109	0.207*	0.051	2.148	1.245
S2	-0.034	-0.050 ^{n.s.}	0.065	-0.523	1.236
S3	-0.065	-0.133 ^{n.s.}	0.054	-1.211	1.609
S4	0.119	0.207*	0.058	2.066	1.344
S5	0.013	0.025 ^{n.s.}	0.057	0.221	1.682
S6	0.043	0.117 ^{n.s.}	0.035	1.216	1.245
S7	0.033	0.053 ^{n.s.}	0.057	0.572	1.129
S8	0.017	0.013 ^{n.s.}	0.121	0.143	1.131
S9	-0.030	-0.048 ^{n.s.}	0.067	-0.444	1.566
S10	0.089	0.221*	0.043	2.045	1.565
S11	-0.031	-0.074 ^{n.s.}	0.043	-0.716	1.417
S12	0.058	0.117 ^{n.s.}	0.049	1.194	1.283
S13	0.040	0.118 ^{n.s.}	0.034	1.159	1.386
S14	0.133	0.136 ^{n.s.}	0.092	1.448	1.185
S15	0.105	0.187*	0.054	1.953	1.221
R = 0.537, adj. R ² = 0.176, S.E. = 0.416, F _(15,95) = 2.568, p < 0.01					

Notes: * $p < 0.05$, n.s. – non significant, S.E. – standard error; VIF – variance inflation factor

5 Discussion

Our aim was to determine if the IL components (*Theoretical knowledge*, *Search*, *Evaluation* and *Use of information*) significantly influence student study success. The results partially support our hypothesis. Student study success is influenced by only one IL component, sources *Search*. These findings are supported by the students’ existing Internet search skills. Students find this component more interesting and easier than the others do. Other IL components (*Theoretical knowledge*, *Evaluation* and *Use of information*) do not significantly affect student final

study success. These are very important findings, for they prove that one-time IL programmes are not sufficient for study success and future career. The desired effects of systematic IL implementation in the study process require regular curriculum inclusion and yearly checking and improvement. Educational institutions should be aware that student IL cannot be achieved only with bibliographic instructions or short IL programmes, but must be provided in the joint activity of pedagogical staff in a specific discipline and a librarian. The rare studies which analyse IL influence on student learning success did not prove the influence of IL components. Squibb and Mikkelsen (2016) found that teaching research and IL curriculum had a positive impact on student learning. Although their study found that this learning did not translate to higher student achievement as measured by course grades and grade point average, our study shows that a short-term IL programme did have a significant influence on the final IL testing grade. At the same time, we found that our IL programme influenced student average final grade.

Researchers deal with designing IL programmes and their execution, checking the level of proficiency in IL components, and learning outcomes (Lindauer, 2004). Most agree that special courses should be implemented at all educational levels in order to provide students with knowledge, skills and IL competences. Only afterwards it can be evaluated if and what influence IL components have on student learning success. Studies show that there is no general interest in scholarly research for its own sake among young people (Lamanauskas & Augiene, 2011), and therefore it is necessary for them to become familiar with IL and its benefits as soon as possible.

On the basis of our results, we suggest IL implementation in academic curricula at the beginning of studies, in a course that could be called *Introduction to information literacy*; at the second Bologna level, the IL components should be introduced systematically with other teaching contents and they should be carried out in an integrated way. The differentiated model used in Finnish universities (Sinikara, 2006) has been modified for the use in our experimental IL programme so that it can be used regardless of the type of educational institution or field of knowledge. Proficiency in the components *Theoretical knowledge* and *Search* is a prerequisite for other two components – *Evaluation* and *Use of information*. Our study shows that only four skills within the *Search* component significantly influence study success. This means the *Search* component needs to be given more attention, mostly with useful search skills that provide students with easier and quicker help when using new technologies, even though cognitive scientists warn that new technology used inappropriately can seriously threaten the learning process in school (Aberšek & Aberšek, 2013). An information literate person is aware that successful information search depends on his/her skills and not so much on the technology used. The *Evaluation* component must be given more attention

and in more hours, for it is a complex and demanding application of critical thinking, with clear criteria for quality and solution search. The component *Use of information* must educate the students about copyright and its fair use. This would, of course, be more efficient than purchasing expensive plagiarism detection software. In the future, instruments for measuring the long-term effects of IL should be developed, including methods to compare and follow the progress and development of an individual's degree of information literacy. Besides, it should be determined how to measure the effectiveness of IL programmes, and how IL is featured in the work place for work effectiveness. These are instruments suggested by renowned information literacy authors like Neely (2002).

Our study was limited to four components of IL, and our sample included students of economic and business sciences. The IL programme was carried out over a limited period of time. In the future we will include more IL components and extend our sample to include students in the natural sciences; the results of both studies will then be compared.

6 Conclusions

Our IL study has, like many other studies, shown that IL instruction has a significant influence on IL skills (Detlor et al., 2011; Samson, 2010), but not on study success in general. This is an important contribution to education in general; our study shows that only the *Search* component has a significant influence on study success, but not the other components including *Theoretical knowledge*, *Evaluation* and *Use of information*. An IL programme has short-term effects, but no long-term effects, if it is not carried out continuously throughout the educational system. Proficiency in all four IL components can influence study success with a consistent pedagogical approach, good performance, and yearly checking on the basis of earned results for programme improvement. If we wish to increase the level of proficiency in IL components, which will influence student study success and their future careers, we must strive for fuller implementation of IL into the educational systems. IL contents must be as clear and as target oriented as possible, because only then can they be truly helpful. This means that if teachers and library staff can transfer their applicative and practical knowledge with the use of up-to-date methods and new information technology, students will be more successful and efficient in their studies, and their level of knowledge quality is expected to be higher.

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Appendix A. Questions for measuring of component II “Search”

S1	If you want to find articles from journals on service marketing it is best to search in: (OPAC, databases, internet, printed journals, other).
S2	While searching in the library catalogue you used the search phrase »poslovna pisma« (business letters), but you found no records. What do you think? (the library has no records on this topic, you used a wrong word combination, all materials on this topic are already borrowed, the system does not recognise phrases)
S3	You will be searching in the ProQuest database for data on users' satisfaction with bank services. Which word combination or phrase will you use?
S4	A friend told you about an article by renowned authors in a specific journal. Check the accessibility of the article in the union catalogue according to the author and the journal title.
S5	You would like to search for documents/records on the meaning of a trademark and its influence on the value of the product. Which word combination will you use?
S6	You have to prepare a presentation on “Measures for Lowering the Damage in the Natural Environment Currently Valid in Europe.” Which word combination or phrase best describes your topic?
S7	Find the monograph with the title: Človek in njegovi simboli (2002) and find out: (who is the translator, what is the basic UDC, key words, publisher and place of publication, is this book available in your local library?)
S8	In your faculty library find all diploma papers on sale stimulation that were written in 2005. How many titles did you find?
S9	Write the call number for a book in your faculty library: Kotler, Philip: Management trženja: Posušje: Mate; Ljubljana: GV založba, 2004. Write the call number, signature, physical description, translator.
S10	The article Stakeholder Relationships in an International Retailing Context: An Investment Bank Perspective was published in the European Journal of Marketing. Cite other bibliographic data of the article (vol., year, number, pages) and write if your central university library has a copy of this journal.
S11	Search in OPAC for records with the key words marketing, connections, relations, communication. How many records did you find and which source is in your opinion the best one? Why?
S12	Search the EconLit database and write all data of the article by Maks Tajnikar: Transitional Adjustment of Large Companies in Slovenia and Economic Policy.
S13	Are there any articles in the EconLit database in Slovene?
S14	Find an article in OPAC on the following theme: knowledge management and evaluation in enterprise. How many records did you find?

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