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UNDERSTANDING WHY IS STUDENTS DROP OUT: TOWARD A PROCESS THEORY

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Abstract

IT students dropping out is a key problem in academic institutions worldwide. Previous research on student dropout has advanced many factor or variance models explaining or predicting why university student drop out. Although these studies increased our understanding of the reasons students drop out of computer science courses, university studies, and online learning, we find the factor or variance models are an incomplete research paradigm in understanding the phenomenon. We argue that students' decision to drop out is a complex and dynamic phenomenon, which develops through a number of stages. As a result, this phenomenon is best understood in terms of process theories instead of variance models. Unfortunately, we find no process studies that explore a study trail describing the process that leads to students dropping out of university. As the first step in filling this gap in the research, we interviewed 40 IS (IS) and Software Engineering (SE) students, who dropped out of university at least once. Based on the interviews, we inductively developed a process theory in terms of van de Ven's (1992) work. Our process theory explains the trajectories that lead university students to decide to drop out. In addition, the process theory explains the dropout decision-making trail after the decision to drop out has been made. Our findings have implications for research and practice. For research, this article opens up new research directions for students who have dropped out. For practice, the findings provide new insights into the reasons students drop out of IS/SE programs, and based on that provides strategies for preventing students from dropping out.

Keywords: Dropout, process theory

1   Introduction

Students dropping out of IT discipline program is a major concern in the academic world. It is not only a waste of educational resources, but significant student drop-out can threaten the existence of IT departments. To understand the phenomenon of students dropping out, previous studies have explored many dropout issues, such as dropping out of computer science and IS courses (Kinnunen and Malmi, 2006, Xenos et al., 2002, Howles 2009), high education student dropouts in Spain (Lassibille and Gomez, 2008, Araque, 2009), Germany (Georg 2009), Italy (Pietro and Cutillo, 2008, Belloc, 2010), the United States (McGrath Cohoon, 2003, Allen et al. 2008, Porchea, 2010), Australia (Willcoxson, 2010), the United Kingdom (Bennett, 2003), and Korea (Shin and Kim, 1999), and online learning (Park and Choi, 2009, Willging and Johnson, 2004, Yukselturk and Inan, 2006). While previous models aimed at explaining students' reasons for dropping out have contributed to our understanding of the reasons explaining drop out, the models were investigated under the factor or variance model research setting. This means that the previous works aimed at finding independent variables or factors that explain or predict the dependent variable, namely, student dropout. As a result, the previous studies describe static variables or factors rather than understanding the whole process that students go through in deciding whether to drop out. Maintaining that idea, we argue that a student's decision to drop out is a complex and dynamic phenomenon, which develops through a number of stages. As a result, this decision is best understood in terms of process theories instead of static variance models. Unfortunately, we found no process studies that explore a study trail describing the process that leads to students dropping out of the university. As the first step in filling this gap in the research, we interviewed 40 IS and SE students who dropped out of the university at least once. Based on the interviews, we inductively developed a process theory in terms of van de Ven's (1992) work.

Such a process theory, describing the students' drop-out process, would be welcomed by research and practice. For research, this article opens up new research directions in students' drop out, especially the idea that student dropout is best understood in terms of process rather than static factors. For practice, the findings provide new insights into the reasons students drop out of IS/SE programs, and based on that provides strategies for preventing dropping out.

The rest of the paper is organized as follows: Previous studies are presented in section 2. Research methods and the setting are introduced in section 3. A process theory is introduced in section 4. Discussion and implications for research and practice are in section 5. Conclusions are introduced in section 6.

2   Previous studies on student dropout from university

In this section, we demonstrate that previous work focused on finding static factors rather than dynamic processes in explaining students' drop-out decisions. Early research on the topic shows mainly the factors that cause dropout but not the dropout process itself. For example, Rovai's (2003) model is based on a persistence model that explains the factors that affect a learner's decision to drop out of an online learning program. Park (2007) proposed a revision to the structure of Rovai's (2003) model; that is, some of the variables were eliminated. Willging and Johnson (2004) demonstrated that demographic variables, such as age, do not predict the likelihood of dropping out of online programs. Kinnunen and Malmi (2006) investigated the reasons CS students drop out of the CS1 course and how dropout reasons accumulate. The results indicate that the factors that most commonly drive dropout decisions are lack of time for studying and lack of motivation. Xenos et al. (2002) categorized the reasons students drop out into five classes: professional, academic, family, health-related, and personal reasons. Willcoxson (2010) showed that the factors of the reasons students drop out vary across different years and semesters. Shin and Kim (1999) concluded that workload has a significant indirect

effect on grade-point average via the study time variable. Bennett (2003) concluded that finances are a factor in decisions to drop out or persist. Porchea et al. (2010) concluded that students with greater motivation are more likely to obtain a degree and transfer rather than drop out. Allen et al. (2008) concluded that academic performance influences the likelihood of retention. Lassibille and Gomez (2008) concluded that academic preparedness is a major influence on program completion. Georg (2009) found that students generally drop out because of weak commitment to their course of study.

To summarize the previous research, previous work on students' dropout decisions aimed at identifying factors that cause students to drop out. None of these previous studies portrays the decision-making model as a dynamic process. As a result, there is a need to clarify the manner by which students come to this decision. None of the previous research describes the specific decision-making trajectory. To close this gap in the research, we apply the idea of van de Ven and Poole's (1995) process theory and inductively develop a process theory that attempts to describe the students' decision-making process and its critical stages.

3 Research methods and setting

The research process for this article is characterized by a qualitative and interpretive perspective. Grounded theory was used in the study (interviews n = 40, n = 9 for the second round). The research population consisted of interviews with 40 people. The interviews were carried out by phone. Twenty were women, and twenty were men. Thirty-four had studied at the University of Oulu. Six had not started. Their majors were IS/SE, and they started in different years. The study was extended in autumn 2010, and more interviews were conducted with the same students. Nine students were interviewed again about their motivation for studying during decision-making time and their emotions when they decided to drop out.

3.1 Data collection

Empirical data was collected by semi-structured qualitative interviews with students who had dropped out. Because of the researcher's personal experiences and the conceptual structures of the phenomenon cannot be forgotten (Sarker et al. 2001), the researcher tried to avoid any pre-conceptions in data collection and analysis. The interview theme was used only to support data collection, not to analyze the collected data. The researcher asked questions that she was interested in and was self-aware about earlier research but tried not to be trapped in the view that the research represents the final truth in that area (Urquhart 2007). The interviews were recorded (only one was recorded by hand). The average interview lasted 15 minutes. Interviews were 6 to 35 minutes long and conducted by phone.

3.2 Data analysis

All 49 interviews were transcribed. Upon receipt of the transcribed documents, one of the authors initiated analysis with coding. She coded data items, which are incidents that are classified into categories. Coding (open coding, selective coding, and theoretical coding) was conducted as follows. An incident was coded by assigning it a descriptive category and then comparing it with other similarly coded incidents. The result was the emergence of the distinctive theoretical properties of categories (Glaser & Strauss 1967). The categories were then compared, and the numbers of categories were reduced. Theoretical saturation was achieved because all new incidents reflected in the data could be incorporated into the existing categories of the model; no new information could be derived after this process. After this, a theory was formulated and conceptual categories identified (Glaser & Strauss 1967).

4   The process theory

This section outlines the process theory derived from the interview findings (Appendix 1 summarizes the data analysis). Table 1 contains the theoretical elements of the theory developed from the interviews.

Element	Description	Theoretical background	Description in the current research
Stage	Stages are theoretical constructs.	Weinstein et al. (1998)	Dropout process stages: Decision to enter the field and pursue studies; decision to start or forgo studying; studying, facing obstacles; decision to drop out or persist; confronting emotions.
Barrier	People face the same barriers in the same stage before they can progress to the next stage.	Barriers (Weinstein et al. 1998) occur in this stage.	Obstacles occur in stages. If an obstacle occurs and students cannot overcome it, they decide to drop out.
Transition	Movement between stages	Movement from one stage to the following stage (van de Ven 1992)	Transition from each stage to another.
Trajectory	Trajectory is usually prefigured in the lifecycle model.	Description of stages and transitions from one stage to the following stage (van de Ven 1995)	Trajectories are based on study trail and dropout process stages
Unit of change	There are two different angles for studying change at the organizational level: single entity and multiple entities.	Van de Ven and Poole 1995	The current work focuses on a single entity—the student.
Mode of change	Sequence of change events is prescribed a priori or progression is constructed and emerges as change process opens.	Van de Ven and Poole 1995	Proposed process model operates in a prescribed modality, similar to how lifecycle and evolutionary theories operate.
Progression of change	The progression of change (events) occurs.	Van de Ven and Poole 1995	Progression of change events is unitary, which is cumulative and conjunctive.

Table 1.   Theoretical elements of the model (modified from van de Ven and Poole, 1995 and Weinstein, 1998).

Our process theory type is lifecycle process theory in terms of Van de Ven and Poole (1995). It contains stages/phases that occur in a specific order, and then the dropout process happens (a lifecycle theory). In the lifecycle type of process theory (Van de Ven and Poole, 1995), change is imminent, and the developing entity goes through the process of change and moves toward a prefigured end state. These aspects are visible in our process model. Although external environmental events and processes can affect how the entity expresses itself, they are mediated by rules, for example. The typical progression of change events is this model is the unitary sequence. This is cumulative and conjunctive. Thus, the different stages have the same characteristics in the beginning and in the end. The final end stage is prefigured and needs a specific historical sequence of events. Every event contributes a piece to the final product, and they occur in a prescribed order. They are setting the stage for the next (Van de Ven and Poole, 1995). Our study also operates on a single entity, and this is a student. Evolutionary and dialectical theories operate on multiple entities, and lifecycle and teleological theories operate on a single entity. Our process model operates in a prescribed modality similar to the way a lifecycle theory operates (Van de Ven and Poole, 1995).

The process theory answers the following question (see figure 1): How do students decide to drop out of an IS/SE program?
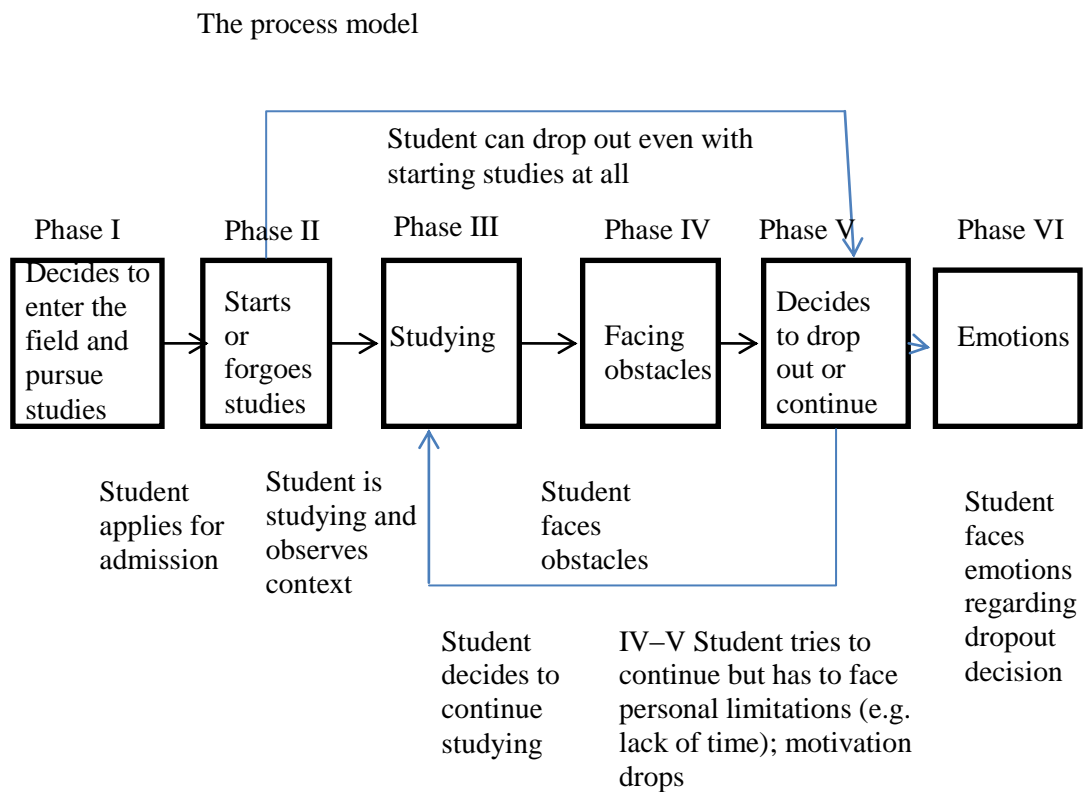
The process model

Student can drop out even with starting studies at all

Phase I	Phase II	Phase III	Phase IV	Phase V	Phase VI
Decides to enter the field and pursue studies	Starts or forgoes studies	Studying	Facing obstacles	Decides to drop out or continue	Emotions

Student applies for admission

Student is studying and observes context

Student faces obstacles

Student faces emotions regarding dropout decision

Student decides to continue studying

IV–V Student tries to continue but has to face personal limitations (e.g. lack of time); motivation drops

Figure 1.   Process model of a student's dropout decision-making process.

The process starts with the student deciding to enter the field and program. In this phase, the student has made the decision and tells why he or she wants to enter the program. The student also describes the type of views he or she holds regarding the information processing science field. In between

phases 1 and 2, the student has decided, and he or she has applied to the University of Oulu. In phase 2, the student decides to start the program or not. In this phase, the student has accepted a place but has to decide whether to enter school. In this phase, some students decide not to enter the program. Their next step is to go to phase 5 and drop out of the program before even starting. Then the students make other plans. Students who start the program go to phase 3. In that phase, they start the program and observe the context. Students have expectations of the program and see whether it matches their expectations. They meet new people and make new friends or not. They get support and counseling in their studies or not. They get experience in the program, and they like it or not. Between phases 3 and 4, students face motivation-related issues and have to face them in phase 4. In phase 4, students face motivation-related issues that are classified into two classes: 1) safety, love and belonging, and esteem needs and 2) personal issues. Emotions are in phase 5. Between phases 4 and 5, students can try to continue their studies but face personal limits. For example, there is not enough time to study and be with family. In phase 5, students decide to drop out or continue in the program. If a student decides to continue, he or she returns to phase 3 and studies. If a student decides to drop out, he or she drops out and has many emotions about the decision. Some students feel relieved, and some are even angry about the decision. Emotions vary based on the student's reaction to his or her decision to drop out. It is not an easy decision for all students. After experiencing emotions, a student gets consensus with himself or herself about the decision and makes plans.

5 Discussion

We would like to emphasize four contributions based on our empirical research. First, our results suggest the need to understand student dropout in terms of a dynamic process. While existing studies increase our understanding of the reasons students drop out of computer science courses, university studies, and online learning, we found no study that presents a study trail describing the process that leads to students dropping out of the university. Our process view is important, providing new information on students' decision to drop out. A student's decision to drop out is not static, but a complex and dynamic phenomenon, which develops through a number of stages.

Our study provides the first step in providing this process theory view that provides new information on the dropout decision process. This process view is the opposite of mainstream dropout research, where static factors are mostly aimed at identifying factors that cause students to drop out.

Second, our findings highlighted the key role of emotions, a feature that no other study on the subject has introduced. Previous studies end the analysis at the dropout decision period, but the lifecycle process model in the current work includes the next stage in this process; that is, the emotions and perspectives of the students as they made the decision are considered.

Third, we found that process theory explaining IS/SE students' dropout decision-making process shares features from van de Ven and Poole's (1995) lifecycle process theory. This means that the stages/phases occur in a specific sequence, after which the dropout process takes place. This is a new finding in IS research.

Fourth, we realized that needs may direct the decision to drop out. If some kind of need for safety occurs, for example, one cannot continue the program. These aspects are similar to those Maslow presented in his hierarchy of needs containing physiological needs, the need for safety and security, the need for love and belonging, the need for esteem, and the need to actualize the self (Boeree, 2006). In our study, motivation was affected by safety needs, love and belonging needs, esteem needs, personal issues, and emotions. In our study, if a person does not have a job, he or she concentrated on safety issues (employment) and dropped out of the program. Some students had their esteem needs filled by work duties. There was no need to study because they gained their goals in work life. In addition, a previous degree can fill these esteem needs. Some students had their belonging needs filled by entering a different field of study because they were not interested in our discipline. They found their direction in life. Motivation was directed elsewhere than our discipline. Five students dropped

out because of family reasons. The students had a need to belong (e.g., to family). Family is very important to many students. Students were not motivated to continue studies because they wanted to be with their family. Most of the students had friends so that aspect did not culminate as a reason to drop out.

5.1   Limitations of the study

This study is subject to the typical limitations for qualitative studies (Seddon and Scheepers, 2012). While the number of interviews (n=40) can be seen as small from the perspective of statistical surveys, it must be stressed that the key issue in interview studies is the point of saturation, not a certain predefined number of interviews or a high N that allows statistical generalizations (Seale 1999). In this study, the interviews were stopped because saturation was achieved. Naturally, the saturation point is different for different contexts, and hence, no required number of interviews can be predefined. For example, Holmström-Olsson et al. (2008) interviewed 22, while Sarker and Sarker (2009) conducted 25 interviews. Speaking of generalizability, all the interviewees were from Finland with the results that caution need to be exercised before applying our findings to other societies and cultures.

5.2   Implications for practice and research

Based on empirical results, we outline the following implications for practice. For practice, this study sheds new light on how to prevent students from dropping out, and especially how students really decide to drop out and how we can help them in their study trail. The stages of our drop-out process are the key focus points for student advisors. First, we have to offer more precise information about the studies in the beginning of the studying trail steps. Second, students' motivation status and views should be checked in the beginning of the student retrieval process. Third, study planning should be more precise. Students do not reveal all problems in group counseling, so students need their own counseling time. Fourth, self-regulation skills could be taught at the beginning of the program; for example, time allocation is necessary, and goals are needed. Fifth, more time and effort are needed for counselors to follow students' grade activity. Students' course activity and performance should be followed after half a year of study so that students who do not perform well can be interviewed, and we can provide support. Sixth, we can create a study area that is more motivating in which to study. More group work, maybe pair-programming work should be provided, so that programming is not so difficult to perform. Many students need help with programming, and if the help is available, it may not be as demanding. Seventh, students who work should be guided differently. There should be some kind of collaboration with workplaces to get students to study. Maybe practical exercises could be considered so that studying can be done in workplaces. Eight, there should be some kind of incentive to improve students' progress. There could be more courses that could perform in many different stages so that students can gain study points earlier and can decide what to study. Ninth, strict time allocation for studying at the same time (as in medical schools) so all classmates are more motivated to study. Tenth, we have to remember that students have their own external commitments, and every individual is responsible for his or her work. We cannot do everything for them, but we can help them get the "right" attitude for studying and complete the program. We can support our students' studies.

Based on our empirical findings, we would like to emphasize research issues for future research on students' dropping out. Future research questions include the following: Do some courses (e.g., programming) increase students' decisions to drop out? If so, could for example pair-programming help decrease the dropout rate? Finally, given the student dropout trajectory, future research needs to study how different interventions can be designed at each stage, and to what extent these interventions help to prevent students deciding to drop out.

6   Conclusions

IT students dropping out is a key problem for universities. Previous research on student dropout rates has advanced many factor or variance models explaining or predicting student dropout rates. Although these studies increased our understanding of the reasons students drop out of computer science courses, university studies, and online learning, we find the factor or variance models are an incomplete research paradigm in understanding the phenomenon. We argue that students' decisions to drop out is a complex and dynamic phenomenon, which develops through a number of stages. As a result, the decision is best understood in terms of process theories instead of variance models. Unfortunately, we found no process studies that explore a study trail describing the process that leads to students to drop out of the university. As the first step in filling this gap in the research, we interviewed 40 IS (IS) and Software Engineering (SE) on-campus students, who have dropped out of the program at least once. Based on the interviews, we inductively developed a process theory in terms of van de Ven's (1992) work. Our process theory explains the trajectories that lead university students to decide to drop out. In addition, the process theory explains the dropout decision-making trail after the decision to drop out has been made. Our findings suggest that study motivation was affected by the need for safety, love and belonging, and esteem, as well as by personal issues and emotions. The needs and issues are barriers to studying. Two primary emotions arose from the dropout process: stability and certainty. Students indicated feelings of disappointment, anger, frustration, annoyance, as well as relief and satisfaction. The other issues that emerged were lack of time, social issues and familial connections, loss in the family, failure to attend classes full-time, and divergent levels of progress among students. In addition, work and realization they were studying the wrong major explain students' decisions to drop out.

Our findings have implications for research and practice. For research, this article opens up new research directions in students dropping out. For practice, the findings offer practical recommendations for preventing students from dropping out.

Acknowledgements

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APPENDIX 1: Construction of categories

The categories were grouped to determine the emerging theory. The two main categories and their relationships that were formulated in the previous coding phases were used as bases. A framework for understanding the dropout process of IS/SE students was developed. Two main categories emerged: (1) motivation and (2) study environment (see Table 2). The theory type can be classified as explanation theory, which explains 'what is' and 'why' rather than predicting issues (Gegor 2006). Next, some of the coding is introduced.

Category	Selective codes	Open codes
Motivation	safety, love and belonging, and esteem needs	Health Work Family Field and studies
	Personal issues Emotions	Time, moving, locality Stability Certainty
Study environment	Communication with organization Communication with family and others Studies	Support and counselling status Support status, friends Negative and positive experiences, grade, academic progress, study activities

Table 2.   Construction of categories.

Safety, love and belonging, and esteem needs

Safety, love and belonging, and esteem needs were discovered through data analysis. These needs are motivation related and strongly influence dropout decisions. These needs were the obstacles that compelled students to withdraw from the program. Research shows that employment gives people safety. Without work, a person's concerns revolve around safety issues; the decision to withdraw from the program engenders the desire for some guarantee of safety. Some students fear that individuals without a degree will not be able to secure employment. Two interviewees believe that even when they complete the program, they will not be able to find jobs.

> *'You realize that even if you graduate, you will probably be unemployed with the current skills that you have.'V5*

Field and studies

The issues related to academic field and studies are connected to belonging and esteem needs. Many students realized that they were in the wrong discipline and consequently experienced disinterest in carrying on. Their directions in life changed, a phenomenon that affects motivation. Studying is no longer regarded as a need because the students consider that they will achieve their goals by directing their efforts elsewhere. Some students addressed this problem by transferring to another major. Motivation was directed elsewhere, a behavior related to belonging needs.

Four of the students were accepted in a different field; hence, they dropped out of the IS/SE program.

> *'I got into another school because the program did not interest me.'V14*

Nine of the students were uninterested in their current major.

> *'Yes, it was not the field for me, and if I had been wise I would have dropped out earlier.'V42*

Work

Work influences the motivation to study. Most of the students dropped out because of work-related issues. Two students stated that changes in work responsibilities prompted them to withdraw from the program.

> *'The main reason was that work duties became more demanding.'V31*

Ten other students dropped out because their professional responsibilities demanded more time.

> *'Yes, my summer job changed into full-time work. I tried to study and work at the same time, but then I got a new job offer that exposed me to the international IT field.'V23*

Personal issues

Personal issues are motivation related and strongly influence dropout decisions. Three students dropped out because they moved to a different town. When a university is located in another town, proximity becomes a problem. One student lived too far from the university. Another student declared a combination of moving and the level of education as demotivating factors.

> *'The first reason was that I moved localities, to K...so the distance from my home to the school was so long.'V32*

Emotions

The two core emotions that arose were stability and certainty. Stability covers feelings such as disappointment, anger, frustration, and annoyance. Certainty includes emotions related to correct decision making; examples are relief and satisfaction. Emotions affect the decision-making process. Many students felt annoyed and angry when they were compelled to drop out. Some students were forced to choose this option even when they wanted to continue their studies. The annoyance stemmed from having to give up an item that they still wanted. Some of the students were disappointed in themselves.

Positive effects arose in that the students felt relieved when they perceived their decision to be the correct one. These students view dropping out as an opportunity to pursue positive aims, such as having more time for themselves.

> *'It was right and I was quite satisfied.' V12/certainty*

'...frustration and anger and bitterness that I did not get any leniency from work demands... even if I could relax from the demands of school.' V10 /stability